LE STUDIUM

Loire Valley
Institute for Advanced Studies

SCIENTIFIC REPORT 2018


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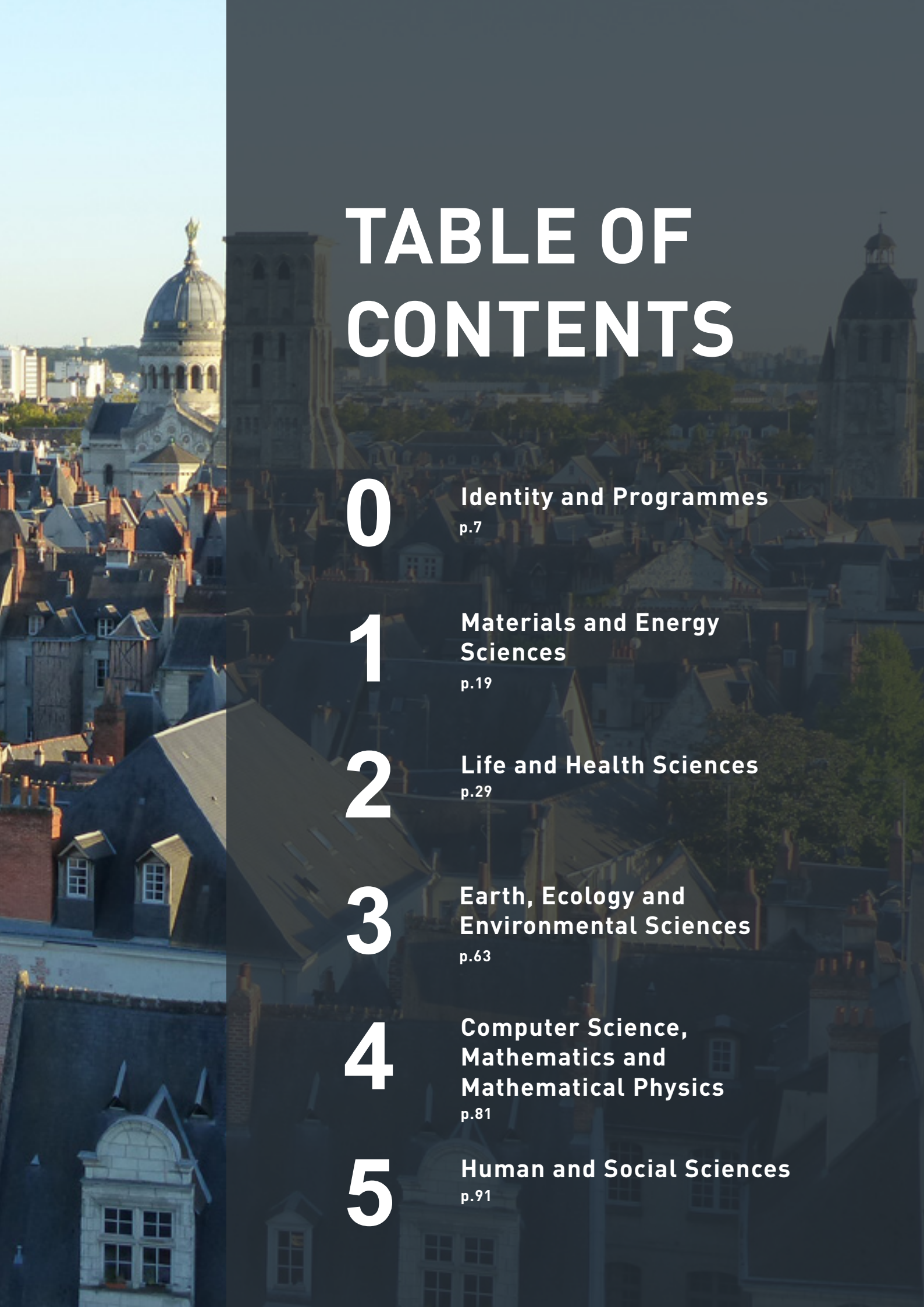

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L'EDITORIAL DU PRESIDENT

2018 est une année de croissance et d'activités intenses pour LE STUDIUM, l'institut d'Etudes Avancées de la Vallée de la Loire.
L'attractivité et le rayonnement du STUDIUM ont permis la réalisation cumulative de ses deux programmes-cadres : Ambition Recherche et Développement 2020, et le Programme Général SMART LOIRE VALLEY PROGAMME, intégré dans les Actions Marie Sklodowska-Curie de l'Union Européenne pour ses Fellowships. LE STUDIUM, à l'issue de plusieurs appels à projets ciblés ou ouverts à toutes les disciplines scientifiques, recueille et fait évaluer par des pairs indépendants puis par son Conseil Scientifique des projets et des profils de haut niveau venant enrichir les équipes de recherche de la région Centre-Val de Loire. Une moyenne mensuelle de 20 chercheurs invités sur des résidences d'un an, et plus de 300 chercheurs conviés au travers différents manifestations scientifiques et formats de bourse (Workshops, Conferences, Summer Schools, Experts Days, Consortia), découvrent l'écosystème régional et deviennent à la suite de leur passage les futurs ambassadeurs de la Loire Valley Intelligence à travers le monde.
Il convient de souligner l'engagement des acteurs du quotidien qui créent et maintiennent cette Qualité propre à LE STUDIUM: qualité de ses processus d'évaluation, qualité fondamentale de l'accueil et attention portée à l'environnement pour ceux qui viennent le plus souvent de très loin vivre dans notre région la science qui s'y élabore. Avec l'opportunité de découvrir sa richesse patrimoniale, aussi inspirante et stimulante que la science, pour l'imagination et l'intuition de nouvelles modalités de recherche.
Les rencontres avec le Commissaire Européen à la Recherche, la Science et l'Innovation, Carlos Moedas, en 2017 à Orléans et 2018 à Bruxelles ont permis d'apporter une marque de reconnaissance plus qu'encourageante pour LE STUDIUM : « J'ai vu et visité de très nombreux instituts de recherche, je n'ai pas vu ailleurs une organisation de cette nature. C'est un modèle pour l'Europe ». Reconnaissance qui revient de droit à son fondateur, le Professeur Paul Vigny, et à tous ceux qui ont œuvré à sa suite. Reconnaissance aux élus de la Région, d'Orléans Métropole, et des partenaires académiques et de la recherche qui soutiennent l'intelligence créative dans sa pluralité et son ouverture au monde. La lecture de ce rapport scientifique est une vraie promenade culturelle : présenter les chercheurs STUDIUM et les questions qui les animent, permet au lecteur de cheminer dans le parc des savoirs les plus avancés de notre région au sein de l'Université d'Orléans, l'Université de Tours, l'INSA Centre-Val de Loire, l'ESAD Orléans, des laboratoires du CNRS, ceux du Centre INRA Val de Loire, du BRGM, de l'IRSTEA, du CEA, de l'INSERM. A travers la pluralité des thèmes et des laboratoires hôtes, LE STUDIUM propose la lecture d'un paysage varié de l'intelligence en région, s'enrichit de contributions internationales de haut niveau, prolongeant une histoire patrimoniale riche et contribuant à l'attrait que suscite la Loire Valley. Ce parc des savoirs fait un lien entre l'élégance d'un passé reçu de nos aînés et le bel ouvrage des chercheurs en réseau qui approfondissent les fondamentaux de demain, en le connectant à tant d'autres cultures et nationalités

Prenons conscience que les efforts consentis dans la durée par l'ensemble des acteurs de ce territoire, avec la Région Centre-Val de Loire à leur tête, sont en mesure de produire un signal de Qualité, perceptible, harmonieux et attractif depuis de lointains territoires. L'Europe l'a déjà identifié. Le soutien fidèle, attentif et constructif de nos membres partenaires, élus, académiques, industriels, membres du conseil scientifique, est aussi ce qui nous encourage à poursuivre la recherche de nouvelles modalités pour éclairer encore plus subtilement cette Loire Valley. Qu'ils en soient chaleureusement remerciés. Puissent-ils trouver dans ce rapport scientifique ce plaisir partagé par tant de chercheurs de tous horizons, celui de l'intelligence des choses et des hommes, et l'envie de voir loin, encore plus loin.

M. Yves-Michel Ginot,
Président

THE PRESIDENT EDITORIAL

2018 is a year of growth and intense activities for LE STUDIUM, the Institute of Advanced Studies of the Loire Valley.

The attractiveness and influence of LE STUDIUM have enabled the cumulative implementation of its two framework programmes: the original General SMART LOIRE VALLEY FELLOWSHIPS PROGAMME integrated in the Marie Sklodowska-Curie Actions of the European Union and the Ambition Research and Development 2020 Programmes. They have fully mobilized the LE STUDIUM team and its governance. LE STUDIUM, via several calls for projects -targeted or open to all scientific disciplines- collects and submits to independent evaluators and then to its Scientific Council projects and senior profiles that once selected come to enrich the research teams of the Centre-Val de Loire region. A monthly average of twenty international experienced researchers in their annual residency, and more than three hundred researchers invited for several days or weeks to take part to scientific events organized by LE STUDIUM (Workshops, Conferences, Summer Schools, Experts Days, Consortia), discover the regional research ecosystem and become after their departure in many parts of the world the ambassadors of the Loire Valley Intelligence.

It is important to highlight the actors who create and maintain, over time, at a high level, the quality value offered by LE STUDIUM. Quality of its evaluation processes, of its standards and the so essential quality of the care and environment offered to those who come from very far away to experiment in our region the science developed here and discover its patrimonial wealth as much inspiring and stimulating as science for the imagination and intuition of new research modalities.

Meetings with the European Commissioner for Research, Science and Innovation, Carlos Moedas, in 2017 in Orleans and in 2018 in Brussels, have left behind encouraging marks of gratitude for LE STUDIUM: « I have seen and visited many research institutes, I have not seen an organization of this nature elsewhere. It's a model for Europe ». Recognition that belongs right to its founder, Professor Paul Vigny, and to all those who have worked in its aftermath, recognition as well to elected representatives of the Centre-Val de Loire region, Orleans Metropole, and academic and research partners who support the creative intelligence and the openness to the world reflected in LE STUDIUM programmes.

Reading this scientific report is a real cultural journey to discover LE STUDIUM researchers and the projects that drive them; it allows the reader to walk in the knowledge park of our region: the University of Orléans, the University of Tours, INSA Centre-Val de Loire, ESAD Orléans, the CNRS laboratories, the Centre Inra Val de Loire, BRGM, IRSTEA, CEA Le Ripault and INSERM. Through the plurality of themes and host laboratories, LE STUDIUM thus offers a reading of the varied intelligence landscape of the region, enriched by high-level international contributions and serves the attractiveness the Loire Valley already raises. This knowledge park stands as a link between the elegance of the past inherited from our elders and the remarkable work of networked researchers who deepen the fundamentals for tomorrow and link them with different cultures and nationalities.

It is key to underline that the long-term efforts of all regional partners, with the Centre-Val de Loire Region at their head, are able to produce an attractive and harmonious signal of Quality, perceptible from distant territories. Europe has already identified it. The faithful, attentive and constructive support of our partner members, elected officials, academics, industrialists and members of LE STUDIUM Scientific Council, is also what encourages us to pursue the search for new ways to shed even more subtle light on the Loire Valley. We would like to thank them warmly for this. May they find in this scientific report the pleasure shared by so many researchers from all walks of life, the pleasure of understanding things and people, and the desire to see far, even farther.

Mr Yves-Michel Ginot,
President

IDENTITY & MISSION

LE STUDIUM Loire Valley Institute for Advanced Studies (IAS): a unique support to research and innovation in the Centre-Val de Loire region and intellectual space for interdisciplinary exchanges.

Established in 1996 and inspired by the historical, geographical and human cultures of the Loire Valley, LE STUDIUM Loire Valley Institute for Advanced Studies is an internationally recognized regional agency, whose mission is to create in the Centre- Val de Loire region an outward looking dynamic for the scientific community that includes public and private research stakeholders, to contribute to strengthen the human capital for research, development and innovation and to participate in the valorisation of research and regional scientific and economic influence.

To achieve its objectives LE STUDIUM Loire Valley IAS supports international collaborative research projects and the mobility of experienced international researchers across all scientific disciplines, selects, recruits and hosts experienced international research fellows through calls for applications and develops a rich scientific animation programme with international conferences, workshops, transdisciplinary seminars, and events for the promotion of the scientific culture and knowledge. Each selected researcher benefits from a dedicated assistance to facilitate his/her smooth and prompt integration in the region.

LE STUDIUM Loire Valley IAS is largely supported by the Region Centre-Val de Loire and other local authorities and regional partners. The SMART LOIRE VALLEY general programme, for the period 2015-2020, operates with a co-financing from the European Union in the framework of the Marie Skłodowska-Curie Actions - COFUND for the mobility of experienced researchers. In parallel LE STUDIUM is the official partner for the international dynamic, recruitments and scientific events of the ARD 2020 smart specialization programmes initiated by the Region Centre-Val de Loire..

In order to achieve its mission at the interconnection between fundamental research and innovation, LE STUDIUM benefits from a strong regional network of scientific partners and works in close collaboration with regional research stakeholders:

- **Higher education and research institutions:** University of Orléans, University of Tours, INSA Centre-Val de Loire, ESAD Orléans
- **National research institutes:** BRGM, CNRS Centre Limousin Poitou-Charente, CEA Le Ripault, Centre Inra Val de Loire, Inserm, IRSTEA
- **Poles of Competitiveness:** Cosmetic Valley, Elastopole, Dream, S2E2,
- **Other clusters and organisations:** Euclide, Dev'Up, Végépolys, POLEPHARMA, Centre-Sciences, CCI, etc...

LE STUDIUM Loire Valley Institute for Advanced Studies awards are attributed thanks to the support and expertise of LE STUDIUM Scientific Council made up of more than twenty renowned international scientists who regularly dedicate some of their precious time to assess research projects and applications.

LE STUDIUM Loire Valley Institute for Advanced Studies provides its researchers in residence an intellectual and human space, which favours interdisciplinary exchanges and debates, guided by the three necessary conditions required for creative activity, namely Curiosity, Imagination and Intuition.

SCIENTIFIC VISION & SURROUNDINGS

From fundamental research to innovation and socio-economic development

LE STUDIUM Loire Valley Institute for Advanced Studies is strongly embedded in the Centre-Val de Loire region's research landscape. With more than 20 years of existence and holding a prestigious portfolio of regional and international research programmes, LE STUDIUM activities continue to grow and spread light on its actors and partners. The focus of its mission remains to build the human capacity for research and scientific knowledge and to foster socioeconomic development and innovation. As a matter of fact, LE STUDIUM's expertise lies in attracting, managing a growing flow of global research exchanges, creating new scientific value chains, and contributing to the emergence of innovative, collaborative research and enterprise activities. The impact of new knowledge on the economy is incremental, but the cumulative effect is substantial.

In November 2015, LE STUDIUM was awarded by the European Union Horizon 2020 COFUND scheme in the category of the Marie Skłodowska-Curie Actions. The Smart Loire Valley Fellowship Programme (SLV) enables LE STUDIUM to select and attract a large number of experienced research fellows who come to spend a one-year full time residency in the region Centre-Val de Loire. This award brought a five-year co-financing to the initial support provided by the Regional Council of Centre-Val de Loire and brings substantial benefits to all the laboratories of LE STUDIUM members.

In June 2018, LE STUDIUM Scientific Council reviewed seventy applications and recommended a total of fifteen awards, including one Research Professorship, twelve Fellowships and two Consortia. Other recruitments and awards were conducted in the framework of the ARD 2020 smart specialization programmes initiated by the Regional Council Centre-Val de Loire and in which LE STUDIUM is the key partner for the international dynamics and scientific events.

This past year, LE STUDIUM attracted and welcomed a total of thirty-nine international researchers from thirteen countries. These awards came across diverse disciplines from the social sciences, natural sciences and engineering to laboratories located in Orléans, Tours, Bourges, Blois and Chartres.

The monthly transdisciplinary seminars, LE STUDIUM THURDAYS, are praised by all participants, as they enable LE STUDIUM international Research Fellows and

Professors to advance their presentation skills, to gain a deeper understanding of all regional research activities, to experiment concrete transdisciplinary exchanges and to enhance visibility of host laboratories. PhD students are invited to attend, which is an opportunity to validate transversal credits, to meet international professional experts and to increase their scientific culture and knowledge. The eleven events organised in 2018 have demonstrated again the diversity of research projects represented in the faculty of fellows and in the creative interactions that emerged from all discussions.

As part of the awards given to selected candidates, LE STUDIUM finances the organisation of Conferences and Workshops; these multidisciplinary events continue to attract a large number of leading international researchers to the Centre-Val de Loire region each year. Their rather small size and peculiar specificity offer the ideal scenery for the creation of dynamic discussions, which often result in new ideas for research and international collaborations. This past year we were also pleased to partner with regional laboratories to hold a number of affiliated scientific fora. These partnership events are significant evidences of the collaborative dynamic between LE STUDIUM and the laboratories of our regional members, eighteen of them were organised in 2018.

Evening public conferences, LE STUDIUM LECTURES and RENCONTRES LEONARDO, contribute to the general public's awareness of research and stimulate the transfer of scientific knowledge to a wider audience; these events keep the local community informed about regional research activities and have become increasingly popular following the implementation of a new community linked promotion strategy. Partnerships with universities and other local actors have been essential to guaranty visibility and participation to these events.

LE STUDIUM is an international outward looking regional partner offering opportunities to access and develop fundamental research projects. These are essential to lead to new knowledge and create the fund from which the practical application of knowledge must be drawn. LE STUDIUM's mission nurtures this process closely linked to innovation, together with the laboratories of our members, to achieve quality socio-economic outcomes for the Centre-Val de Loire region.

THE SMART LOIRE VALLEY PROGRAMMES

The Smart Loire Valley General Programme

The Smart Loire Valley Programme call for applications, open from November each year to February next year, operates with a co-financing from the European Union in the framework of the Marie Skłodowska- Curie Actions - COFUND (Co-Funding of regional, national and international programmes for the mobility of experienced researchers) for the period 2015 to 2020. The Smart Loire Valley Programme is designed to foster international scientific exchanges and collaborations and to build human capacity and scientific knowledge for research, development and innovation in the Centre-Val de Loire region. It is open to all scientific disciplines and is a precious tool to access funding to develop fundamental research projects and extend international collaborations.

Events and networking actions organised by LE STUDIUM aim at creating synergies between academic disciplines and links with the industrial world in order to increase interdisciplinary research and translational research to stimulate socioeconomic development. Scientific projects are assessed and selected by independent external peer reviewers and an international independent Scientific Council to award the best candidates and high added-value research projects. To be eligible, applicant researchers must be nationals or long-term residents of a country other than France and comply with the European mobility rules.

LE STUDIUM RESEARCH
FELLOWSHIP *

This award enables experienced international researchers to work in a host laboratory for 12 consecutive months. The award is designed to offer internationally competitive researchers the opportunity to discover and work in nationally accredited laboratories with international renown in the Centre-Val de Loire region. A salary, a fully furnished housing, a logistic and administrative support, and funding to organize an international event are associated to the award.

LE STUDIUM RESEARCH
PROFESSORSHIP

This award enables an experienced international Professor to participate in research, research team building and postgraduate teaching. The Professorship residency consists in four periods of three months in the Centre-Val de Loire region (12 months in total in 4 consecutive years). For this award one or two laboratories of the Centre- Val de Loire region need to be involved. A salary, a fully furnished housing, a logistic and administrative support and funding to organize an international event are associated to the award..

LE STUDIUM RESEARCH
CONSORTIUM

This award enables to create a team of five researchers (led by one researcher or research team from the Centre-Val de Loire region) and funds its regular gatherings for a full week twice a year over two years (4 meetings in total over 2 years). The consortium projects have well-defined research objectives, a work plan to implement and milestone goals to achieve between meetings.

* The SMART LOIRE VALLEY Fellowships Programme receives H2020 cofunding from the European Union for reseach and innovation (Marie Sklodowska-Curie Actions, COFUND contract #665790)

The Ambition Research Development 2020 Programmes (ARD 2020)

The long-term Socio-economic development of the Centre-Val de Loire region, in a period of economic fragility, depends on the strength and growth of quality research, development and innovation.

The ARD 2020 programmes, the Region Centre-Val de Loire initiative to implement the EU Smart Specialisation Strategy, have been designed to generate Socio-economic impacts by providing support to create strong regional research and develop centres of international scale, stimulate innovation, job creation and socioeconomic dynamism in the territory.

Through these large research programmes, the Region Centre-Val de Loire supports the strengthening of quality research in five targeted domains to foster the development of world-class poles to enhance research and innovation activity in the region:

- **ARD 2020 Biomédicaments (biopharmaceuticals),**
- **ARD 2020 Cosmetosciences (cosmetics),**
- **ARD 2020 LAVOISIER (renewable energies),**
- **ARD 2020 PIVOTS (environmental engineering)**
- **ARD 2020 Intelligence des Patrimoines (cultural and natural heritage).**

LE STUDIUM stands as the official partner of these five regional ARD 2020 programmes, leading on the internationalization dynamic by providing expertise and services to recruit international experienced researchers and organizing actions and events to boost international scientific exchanges and collaborations.

ARD 2020
BIOPHARMACEUTICALS

BIOPHARMACEUTICALS
Innovation Dynamics in Health
in REGION CENTRE-VAL DE LOIRE

A drug is any substance or composition presented as having properties for treating, preventing or diagnosing disease in humans or animals whereas **BIOPHARMACEUTICALS** in the strict sense of the term, are molecules that have the characteristic of being produced from living organisms or their cellular components. These molecules are intermediate between chemical drugs and organisms' intrinsic biologics. The proportion of biopharmaceuticals in the drug market is constantly increasing and represents about 30% of the market. The Centre-Val de Loire region is at the cutting edge of research in the pharmaceutical sector and has included the development of biopharmaceuticals into its smart specialisation strategy. The Regional Council supports research in this sector to facilitate innovative industrial development and partnerships for socioeconomic development beyond 2020. The ARD 2020 Biopharmaceuticals programme aims to further develop and strengthen the Centre-Val de Loire region biopharmaceuticals industry by capitalising on the recognised capabilities of the multidisciplinary research teams from the regional research institutions so as to:

- Develop a flagship research and development pole on biopharmaceuticals in the Centre-Val de Loire region.
- Configure the biopharmaceuticals field by inter-sectorial development and innovation in the pharmacy/health sectors through start-ups, SMEs (Small and Medium Enterprises) including established local and regional based multinational companies.
- Promote the transfer of technologies/competences to existing and new businesses.
- Support the development of new competences for the sector.

The Biopharmaceuticals Programme creates a dynamic, mobilizing actors in the pharmaceutical sector, from fundamental research to production, to jointly develop the tomorrow's biopharmaceutical treatments in the Centre-Val de Loire region. It focuses on the design and biosynthesis of biomolecules for preclinical and clinical development by including the search for synergies with conventional chemically synthesised drugs. A number of innovative projects including academic and industrial partnerships covering a wide spectrum of biological molecules and domains are directly financed to bring immediate outcomes: vaccines, therapeutic antibodies, nucleic acids, lipoproteins, bio-production of medicines...

ARD 2020
COSMETOSCIENCES

In an international framework characterised by changing regulatory regimes and increasing harsh competition, research and innovation are key factors to ensure smart specialisation and sustainable economic development of territories and stakeholders. In the very well-established perfume and cosmetic industry of the Centre-Val de Loire region, the COSMETOSCIENCES programme aims at giving a significant impetus to research projects with a strong character of innovation to unlock industrial development blockages by opening the door to new concepts and enabling the creation of new startups. It fosters French leadership in the sector and the leadership of the Centre-Val de Loire region, particularly with regard to sustainable cosmetics.

Anchored in the Centre-Val de Loire region, this project revolves around the structuring of research at the national level on this cosmetic theme, including the research group (GDR) Cosmactifs, set up by CNRS in January 2015. It brings forty-eight laboratories together and is driven by the University of Orléans. Focused on economic development, this project shares in the international influence of the French cosmetics industry across the region Centre-Val de Loire.

Together with the Cosmetic Valley competitiveness cluster and in conjunction with the cosmetic industry, the programme creates the centre of expertise for the cosmetics Industry. Located at the very heart of the territory covered by Cosmetic Valley, the centre's mission is to support business growth in the perfume and cosmetics sector with research, training and development activities and services specifically targeting very small and medium sized enterprises (VSEs and SMEs).

The centre focuses on three complementary developmental axes:

- Cosmétopée and Sustainable Cosmetic
- Glycochemistry and Glycobiology
- Innovation in Formulation, Cellular Tools and Technologies

The programme is funded by the Region Centre-Val de Loire for the period 2015-2020.

ARD 2020 LAVOISIER

LAVOISIER **Laboratory with a VOcation for Innovation of the Safety and Industrialisation of Renewable Energy.**

TThe central subject of the LAVOISIER Programme revolves around promoting a process of design, research, development and industrialisation of materials and systems oriented towards new energies, including all considerations of reliability and safety of use for the devices studied during all stages of their deployment. This programme supports the development of the AlHyance platform.

The CEA (Centre for Alternative Energies) Le Ripault AlHyance platform is dedicated to joint research efforts (Universities, CNRS, industrials) in the field of non-emitting greenhouse gases energies, particularly in the hydrogen field (fuels and hydrogen storage cells). The research themes are the following: design and materials expertise, safety and effectiveness of the systems, synthesis and characterisation, and methods and implementations.

The LAVOISIER programme led by CEA Le Ripault covers activities through research to transfer of technologies and is supported by the Centre-Val de Loire Regional Government over 6 years till end of 2019 in the view to:

- Gather the conditions to support the tomorrow energies and develop promising innovations of growth by strengthening academic and industrial collaborations.
- Accelerate the industrialisation and the dissemination of innovative new products for low-carbon energy, focusing on the storage of electrical energy and hydrogen.
- Stimulate research on storage of clean and renewable energies (hydrogen, wind and photovoltaic), in order to facilitate their delivery from the place of production to the place of consumption.
- Promote the transfer of technologies/competences to existing businesses at the regional level and beyond.

The research focuses on the storage of hydrogen, storage of electrical energy, energy conversion, fuel cells and the production of hydrogen, development of a new and emerging topic on materials related to solar thermodynamic systems and the mechanical storage of energy. The programme develops a new approach for the design and development of low carbon materials, supported by the analysis of the environmental safety and impact of systems throughout their development stages and life cycles.

ARD 2020 PIVOTS

PIVOTS - **Environmental Technology Innovation, Development and Optimisation Platforms project**

The PIVOTS project is a coordinated set of seven experimental and analytical platforms focused on environmental quality monitoring and sustainable management of natural resources (soil, subsurface, surface water, groundwater, sediment and air) within a context of global change (increased anthropogenic pressure and climate change).

The innovation through PIVOTS is founded on an integrated approach based on excellent research by academic and industrial experts together at all stages of the value chain, from fundamental research to validation of products and services.

The platforms are identified as:

- DECAP: Development of Environmental Sensors and Pollutants Removal Processes
- PRIME: Remediation and Innovation in the Service of Environmental Metrology
- O-ZNS: Observatory of transport in the Unsaturated Zone
- PERMECA: Testing and Research Platform in Collaborative and Applied Environmental Mechanics
- PESAT: Soil - Atmosphere exchanges in peat bogs
- PESAA: Soil - Atmosphere exchanges in Agricultural soils
- PRAT: Atmospheric Reactivity

The teams involved originate from BRGM (French Geological Survey), University of Orléans, CNRS (National Center for Scientific Research), INRA (National Institute for Agricultural Research), Antea Group (consulting and engineering), DREAM (cluster of enterprises) and LE STUDIUM (Loire Valley Institute for Advanced Studies).

ARD 2020 INTELLIGENCE DES PATRIMOINES

An interdisciplinary research programme dedicated to innovation, training and scientific development, Intelligence des Patrimoines offers a new understanding of cultural and natural heritage.

INTELLIGENCE DES PATRIMOINES is an interdisciplinary scientific research and innovation programme serving the tourism heritage economy in the Centre-Val de Loire region and offering new education and employment perspectives. It consists in an unprecedented approach to the promotion of the territory combining the scientific research with the socio-economic world to design new innovative services and products. It reunites the efforts of thirty-three laboratories and three hundred and sixty researchers from Tours and Orléans, led by the Centre for Higher Studies of the Renaissance (CESR) in Tours.

The Intelligence des Patrimoines programme is articulated around five major interdisciplinary topic projects of research for the development of interdisciplinary scientific activities:

- Chambord Chateaux
- Vine and Wine
- Gastronomy, Health and Wellbeing
- Loire and Rivers
- Monuments, Parks and Urban Gardens

and proposes a transversal heterogenous digital data platform that collects and presents all developed activities and products (HeritageS platform). It offers new multidisciplinary and professional training courses at Master and Research Doctoral levels (École supérieure en Intelligence des Patrimoines) and has created a thematic academic incubator – the Smart Tourism Lab - for the development of startups on the regional territory and to support entrepreneurial projects dedicated to promote and renew the tourist experience around heritage.

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MATERIALS & ENERGY SCIENCES

HOST LABORATORIES IN MATERIALS & ENERGY SCIENCES

GROUPE DE RECHERCHE EN MATÉRIAUX, MICROÉLECTRONIQUE, ACOUSTIQUE ET NANOTECHNOLOGIES (GREMAN) - UMR 7347 - UNIVERSITÉ DE TOURS, CNRS, INSA-CVL

The GREMAN laboratory deals with the elaboration and characterization of materials, physics of condensed matter as well as nano- and microelectronics mainly focused on power electronics, RF electronics, MEMS for ultrasounds and energy harvesting. GREMAN has a well-known expertise in all the aspects of piezoelectricity covering multidisciplinary competences in all the fields from material science to device development.

Since 2008, GREMAN has started the development of a new generation of piezoelectric generators based on ZnO nanowires, which has now reached the level of fabricated ZnO-based devices generating electrical power. The whole device is designed and fabricated at GREMAN: growth of the ZnO nanowires, device fabrication in clean room and characterisation, thanks to the CERTeM technological platform.

INSTITUT DENIS POISSON - UMR 7013 - UNIVERSITÉ D'ORLEANS, UNIVERSITÉ DE TOURS, CNRS

The Institut Denis Poisson (UMR CNRS 7013) includes one hundred permanent professors, assistant professors and CNRS researchers, as well as thirty PhD students and postdoctoral researchers. As the result of a merger in 2018 of two laboratories, the MAPMO in Orléans and the LMPT in Tours, the Institute is bi-localized in the two cities. The activities of Orléans' branch of the Institute (former MAPMO – Mathematics Laboratory, for Mathematics, Analysis, Probability, Modeling, Orléans, created in 1994), are devoted to mathematical analysis, probabilities and mathematical physics with the focus on interactions with other branches of science, both internal and external to mathematics.

Le Studium Professor collaborates with the Tours part of the Institute (former LMPT – Laboratory of Mathematics and Theoretical Physics, created in 1996) which has a multi-disciplinary structure concentrated on studies of gravitation, integrable systems, classical and quantum dynamics of complex systems, and quantum field theory with applications in condensed matter and in solid-state physics.

LABORATOIRE DE PHYSICO-CHIMIE DES MATÉRIAUX ET DES ELECTROLYTES POUR L'ENERGIE (PCM2E) - EA6299 - UNIVERSITÉ DE TOURS

The Laboratory of Physics and Chemistry of Materials and Electrolytes for Energy (PCM2E) was created in 2012 and works in the field of energy conversion and storage (batteries, supercapacitors, hybrid photovoltaic, ionic liquids), nanostructured materials and organic electrochromic devices. Located in Tours. The overall project of the laboratory is built around competences in electrochemistry, thermodynamics and chemistry of materials. The laboratory has three priority themes:

- Electrolytes, membranes and electrode materials for energy storage
- Organic semiconductors and nanostructured materials
- Ionic Liquids

In addition, this laboratory is a unique research organisation owing to its in-depth focus on the design and development of novel electrolyte compositions. The electrolyte properties such as ionic conductivity, thermal behavior, potential range of stability, polarisability and dielectric constant fundamentally impact the performance of all types of batteries and form the core of the research activities. The beneficial effect of choosing and designing novel materials and compositions of the electrolytes and applying appropriately to different battery systems has been demonstrated through numerous publications and patents at PCM2E.

LABORATOIRE DE PHYSIQUE ET CHIMIE DE L'ENVIRONNEMENT ET DE L'ESPACE (LPC2E) - UMR 7328 - UNIVERSITÉ D'ORLEANS, CNRS

The LPC2E is a joint research unit of the CNRS and the University of Orleans. Together with the ISTO (Institut des Sciences de la Terre d'Orléans) and the Station of Radioastronomy of Nançay, it is one of the founding laboratories of the OSUC (Observatoire des Sciences de l'Univers de la région Centre-Val de Loire).

The fields of activity of its four scientific teams range from the atmosphere to the most distant space: physico-chemistry of the atmosphere, physics of space plasmas, planetology to study environment of planets and small bodies of the Solar System, pulsars and gravitation.

This research relies mainly on the scientific exploitation of instruments on board on satellites or space probes. The LPC2E is one of the CNRS-INSU (Institut National des Sciences de l'Univers) space laboratories, working in close partnership with the CNES (Centre National des Etudes Spatiales) to propose, design, build and operate these instruments, then make their data and observations and publish the results available to the scientist community.

Prof. Emre Erdem

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: University of Freiburg – DE

In residence at: Research Group for Materials, Microelectronics, Acoustics and Nanotechnologies (GREMAN) - Tours

Nationality: Turkish

Dates: December, 2017 to October, 2018

In present, Pr Emre Erdem is working as a faculty member in Sabanci University, Istanbul Turkey. He was appointed to this position in October 2018. Previously, he was awarded the title "Privatdozent" from the Faculty of Chemistry and Pharmacy of the University of Freiburg in June 2017. The "Docent" title in Physics he obtained from the Universitelerarası Kurul Ankara in June 2012.
Having completed his PhD thesis at the University of Leipzig, Germany, in 2006 (magna cum laude), he has a strong background in diverse fields, such as materials physics, physical chemistry, atomic physics, solid-state physics, defect chemistry, studies of electronic properties of energy materials and, of course, the synthesis and characterization of nanocrystals (functional nanomaterials, piezoelectrics, supercapacitors and, in particular, semiconducting quantum dots).

Dr Guylaine Poulin Vitrrant

Dr Guylaine Poulin-Vittrant received the Agrégation in Electrical Engineering in 2000 from ENS Cachan (France), her MSc and PhD in Electrical Engineering respectively in 2001 from INP Toulouse (France) and in 2004 from Paris XI University (France) on human mechanical energy harvesting using bulk PZT ceramics. In 2005 she became full time researcher CNRS at Grenoble Electrical Engineering Laboratory and at GREMAN laboratory since 2008. Her research interests are experimental investigation and theoretical models development for piezoelectric materials and devices. She has participated and participates in European ("MIND" EU Network of Excellence, Piezo Institute, "EnSO" ECSEL JU project), national ("OVMI","EVA","FLEXIBLE" ANR projects) and regional ("CEZnO", "MEPS", "CELEZ") projects. She authored more than 40 articles referenced in international databases.

INVESTIGATION OF INTRINSIC AND EXTRINSIC DEFECT CENTERS OF ZNO NANOWIRES FOR NANO-GENERATORS

Since the early 2000's, many new applications related to nomad electronics need "portable" electrical energy. Huge research efforts on Lithium based batteries have led to performances that made this technology the most popular for rechargeable batteries with the best energy densities. Recent efforts have also been done in order to charge them using renewable energy systems such as a photovoltaic cells, thermoelectric harvesters, or mechanical energy harvesters. Piezoelectric materials convert a physical pressure into the motion of electrons, and thus, the unused mechanical energy of our surroundings into electrical energy. Various technologies of piezoelectric harvesters have been tested for energy harvesting since the early 2000s. Since 2007, there is a tremendous interest for using one-dimensional (1D) piezoelectric nanostructures (GaN, PZT, BatiO3, PVDF, CdS...) for mechanical energy harvesting. Among several materials, ZnO nanowires are promising candidates. They present high values of piezoelectric coefficients, can be grown at low temperature on almost any substrates, and finally are environmentally friendly.

The need for a more effective ZnO nanowire synthesis strategy has seen significant developments towards solution based hydrothermal reaction techniques below 100°C. As a result of the low temperature synthesis, such nanowires typically show unacceptable levels of defects (optical and electronic), rendering them inferior to their high temperature counterparts. The level of the excess free carriers in the material has been theorized to partly neutralize the induced piezoelectric potential, limiting hydrothermal ZnO nanowire-based nanogenerators performance.

In this context, the main objective of the project is the investigation of intrinsic and extrinsic defect centers of ZnO nanowires for nanogenerators. In particular, we intend to understand the defect structures of ZnO nanowires which are synthesized by hydrothermal method.

After characterizing the defect centers via spectroscopic methods such as electron paramagnetic resonance spectroscopy and photoluminescence spectroscopy, we give effort to understand the effect of such defects on the electrical properties via impedance spectroscopy.

Then the nanogenerators have been manufactured and their performance has been examined using the dedicated test bench at GREMAN.

FRONTIERS IN NANOMATERIALS FOR ENERGY HARVESTING AND STORAGE

Objectives: High quality research contributions describing cutting-edge research of conceptual, empirical, experimental, or theoretical work in all areas of energy harvesting materials and systems are cordially invited for presentation at the conference. Topics that will be covered include, among others, novel processing techniques for nanostructured materials with high-energy conversion efficiencies, new materials for energy harvesting and storage, theory and modelling of these materials and devices, new structural and functional characterization methods, innovative design and integration of low-power/self-powered devices for next generation of sensors and actuators.

Outcomes: 25 distinguished speakers from all around the world have been attended and presented high-quality cutting-edge research results. Discussions were very fruitful and lots of new collaborations were established.

RÉDUIRE LA TAILLE DES MATÉRIAUX POUR AMÉLIORER LEURS PERFORMANCES ET LEUR EFFICACITÉ ÉNERGÉTIQUE

Mario Maglione director of the Institut de Chimie de la Matière Condensée de Bordeaux
CNRS, Université de Bordeaux, Bordeaux INP - France.

Research and development on materials has many implications in our daily lives. One of the general trends of this research is the decrease in the size of materials to increase the efficiency of the devices in which they are integrated. The most egregious example concerns information and communication technologies, which have greatly benefited from this race to reduce size which has joined the world of nanometer for many years. This trend is not only intended to increase performance but also can reduce the environmental impact of new technologies.

Other examples have been discussed on the use of nanomaterials in optics, medical imaging and renewable energies. On this last point, the problem of the recycling of wind turbine components has been exposed.

Finally, the application of the precautionary principle to these specific materials within a research laboratory such as the ICMCB has been described.

Prof. Dmitri Kharzeev

LE STUDIUM Research Professor

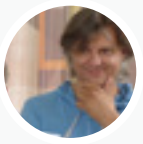
From: Stony Brook University - US

In residence at: Denis Poisson Institute - Tours

Nationality: American

Dates: June, 2018 to September, 2018

Dmitri Kharzeev was educated at Moscow State University; he received his PhD in particle and nuclear physics there in 1990. He then spent two postdoctoral years in the Italian National Institute of Nuclear Physics, three years in the Theory Division at CERN in Geneva, Switzerland, and a year at Bielefeld University in Germany. In 1997 he joined the newly created RIKEN-BNL Research Center at Brookhaven National Laboratory under direction of Prof. T.D. Lee, a Nobel laureate. In 2000 he became a Scientist with tenure at BNL; he had been the head of the Nuclear Theory group there from 2004 till 2010. In 2010, Kharzeev has become a Professor (since 2018 – a Distinguished Professor) at the Department of Physics and Astronomy at Stony Brook University where he directs the Center for Quantum Materials; he also continues to hold the Senior scientist appointment at BNL, where he is the Head of the RIKEN-BNL Theory group.



Dr Maxim Chernodub

Maxim Chernodub has received his PhD in 1999 at the Moscow Institute of Physics and Technology. In 1999-2001 and 2003-2008 he was a researcher in the Institute for Theoretical and Experimental Physics (ITEP), Moscow; in 2001-2003 he was a JSPS postdoctoral fellow in Kanazawa, Japan. He received his habilitation (Doctor of Science) degree in 2008 at ITEP. Since 2008 he is a researcher (and since 2016 – a senior researcher) of CNRS at the University of Tours, France. He received an Award of scientific excellence of CNRS (2010), outstanding Referee of the American Physical Society (2018) and Elsevier (2018). Recently his research has been focused on properties of theory of strong interactions in exotic environments of heavy-ion collisions at high temperature, strong magnetic field, and fast rotation. He also works on transport phenomena associated with anomalies in quantum field theories with applications in solid-state physics.

CHIRAL MATTER: THEORY AND APPLICATIONS

The main goal of the project is to form a new interdisciplinary Chiral Matter collaboration in Loire Valley to focus on key open problems in study of quantum strongly coupled matter, quantum coherence and topological order. The project will create a network of theoretical and experimental groups in the partner laboratories of Région Centre focused on joint efforts on basic and applied research of chiral matter. The experimental branch of the project aims to provide a solid ground for future commercialization of these ideas in the domains of transmission and storage of energy and information. The project will foster communication across disciplinary boundaries and among theorists, experimentalists and engineers. It will offer a unique opportunity for training postdocs and students by integrating them in these collaborations.

The achievements to date include:

1) The development of the idea of topological stabilization of a superconducting qubit by using a novel knot geometry. This should result in a longer quantum coherence time and this in a higher fidelity of the quantum computer based on the proposed "knot qubit". The analytical and numerical calculations of the stabilizing properties of the knot qubit are underway.

2) Basing on this theoretical idea (developed by M. Chernodub, J. Garaud and D. Kharzeev in Tours), we started working on the establishment of the "QuantiLoire" research consortium including experimentalists from the Loire valley region based at CEA and GREMAN laboratories. A particular aim of the consortium is to produce a prototype of the knot qubit for further experimental studies.

3) We have also considered an alternative direction based on usual, unknotted qubit made of a so-called noncentrosymmetric superconductor material. We expect that this material should have an intrinsic stabilization of the logical states. On the theoretical side, we are advancing the investigation of the ground state of these qubits using numerical Monte-Carlo simulations of thermodynamic states.

4) Proposed a new effect in the behavior of chiral solitons on vortices in chiral media: the "chiral propulsion". Namely, the soliton is transported along the vortex in the direction determined by its chirality (in collaboration with Y. Hirono, A. Sadofyev).

5) Proposed a new kind of a chiral magnetic effect induced by light in symmetric and asymmetric Weyl semimetals (with students E. Philip and S. Kaushik).

6) Argued that a conformal anomaly in Weyl/Dirac semimetals generates a bulk electric current perpendicular to a temperature gradient and the direction of a background magnetic field. An experimental realization of this new type of «giant» Nernst effect is proposed. The effect may be used for an efficient electric-power generation from thermal sources.

7) Demonstrated that a rotating warm phonon gas generates a new «zilch» current along the axis of rotation. The effect is related to a gravitational anomaly. The zilch quantum number, which literally means «nothing», may have important applications in transmission of information.

Dr Satyajit Phadke

LE STUDIUM Research Fellow
ARD 2020 LAVOISIER

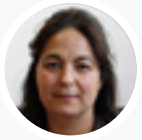
From: Customized Energy Solutions – IN

In residence at: Physicochemistry of Materials and Electrolytes for energy (PCM2E) - Tours

Nationality: Indian

Dates: January, 2016 to June, 2019

Dr Satyajit Phadke completed his PhD in Materials Science and Engineering from the University of Florida. His main interest area was the development of intermediate temperature proton conducting membranes for applications in PEM fuel cells. Thereafter he worked on an Advanced Research Projects Agency for Energy funded project as a postdoctoral associate at MIT. Here he pursued the development of a novel high temperature all liquid battery for stationary grid scale storage applications. He holds several patents from this work all of which have been licensed to Ambri, Inc. During his position as a materials scientist at Alveo Energy, Inc., a startup based in the Silicon Valley he worked on the development of Prussian Blue analogue battery materials. Additionally he has worked on the development of zinc alkaline batteries for transportation applications during his stay at Princeton University. He is the author of several publications in the field of energy storage and conversion technologies. Recently, he was selected into the list of '50 Most Influential Indians in the Field of Energy Storage and Microgrids' awarded by India Energy Storage Association (IESA).



Prof. Mériem Anouti

Professor Meriem Anouti is a Professor in the PCM2E laboratory at the University of Tours. Her research focuses of electrolytes for electrochemical energy storage with a particular emphasis on room temperature molten salts as ionic liquids, deep eutectic solvents and their mixtures. She also applies ionic liquids for nanomaterials synthesis and studies fundamental properties including dissolution of gases. Based on the use of ionic liquids, she formulates electrolytes for improving the lifetime of energy storage systems, especially by enhancing the voltage and operating temperature range and by controlling the phenomena at the electrode/electrolyte interface. She coordinates numerous ANR, regional funded and industrial research projects while also supervising PhD students. Her industrial research includes contracting with national and multinational companies.

ENERGY STORAGE SYSTEMS

The research project focuses on Energy Storage and Conversion Technologies and is supported by the ARD 2020 LAVOISIER Programme. The objective of the project is to develop novel materials for advanced energy storage devices. The research work performed on Lithium-sulphur batteries has lead to the expansion of the project in the form of industry funding for the next 2 years (2017 - 2019) from Arkema.

Details about the topics of research and the progress made are listed below:

1. **High energy NMC cathodes (HE-NMC)**: The high energy NMC cathodes have considerably higher energy density when compared to conventional lithium ion battery materials such as LCO, LMO, NMC, etc. Specific electrolyte modification strategies have been demonstrated to significantly reduce the capacity fade in these cathodes. In this work supported by SAFT and UMICORE technologies we have reported a 10X improvement in the cycle life of the electrodes by optimising the composition of the electrolyte. We have also demonstrated the applicability of a completely new characterisation technique of in-situ pressure measurement during galvanostatic cycling which aids in the study of the HE-NMC materials.

2. **Lithium-sulfur (Li/S)**: Li/S batteries have an extremely high theoretical capacity density of about 1600 mAh/g. Thus the use of Li/S batteries has the potential to reduce the weight of batteries by 4-6X. The main challenges limiting its commercialization are low cycle life, low coulombic efficiency and high self-discharge. Although significant progress has been made, most of the processes used are either difficult to scale up industrially or require the use of very expensive additives. We have shown that the electrolyte modification through the use of specific electrochemically active disulphide additives can not only significantly prolong the cycle life but also provide a very high coulombic efficiency.

3. **Organic electrodes**: Organic polymer materials have attracted a lot of attention in last decade due to their favourable characteristics to serve as effective electrode materials. In this research we are focusing on the characterization of PAQS (poly anthraquinone sulphide) as a negative electrode material. It shows excellent cycling stability with a high discharge capacity and very fast redox kinetics. By increasing the cycling rate from 1C to 4C only a 25% reduction in capacity is observed which makes it suitable for high power applications. Owing to the excellent charge/discharge characteristics, the material will now be paired with activated carbon and with conventional lithium ion cathode materials where PAQS can serve as a highly reversible and stable anode. Recent tests conducted show favourable cycling performance which opens avenues for the use of PAQS in sodium and potassium ion batteries also. Currently we are performing further investigation on the insertion/deinsertion kinetics of larger cations (potassium and sodium).

4. **Gas solubility measurement in electrolytes**: The work is focused on the measurements of the solubility of gases in various electrolytes and solvents of interest. Complimentary to these measurements are the pouch cell volume expansion studies and pressure cell measurements. These studies together allow precise in-situ determination of the evolution of gases during the cell cycling. Such studies are essential for prolonging the cycle life of batteries.

Dr Ján Žabka

LE STUDIUM Research Fellow

From: Czech Academy of Sciences – CZ

In residence at: Laboratory of Physics and Chemistry of the Environment and Space (LPC2E) - Orléans

Nationality: Czech

Dates: July, 2017 to July, 2018

J. Žabka is a chemical physicist (J. Heyrovsky Institute of Physical Chemistry of the CAS, v. v. i., Prague, Czech Republic) having an experience in ion/molecule chemistry using crossed-beam, guided-ion beam, ion traps, the SIFT instruments as well as Orbitrap aparatus and the synchrotron facilities. His major scientific interest is in the field of laboratory studies of ion/molecule reactions relevant to planetary atmospheres. J. Žabka has been working in the field of planetary chemistry for many years, in cooperation with foreign partners in the framework of European programs (Astrochem 2010 -2013, XLIC 2013-2016, Origins 2014-2017) and project funded by the Grant Agency of the Academy of Sciences of the Czech Republic. Co-author of 65 articles in journals, 878 citations (without self-citations), h-index 18

Dr Christelle Briois

Christelle Briois is associate professor (maître de conférences) at OSUC of University of Orléans, and a researcher at LPC2E in the Planetology team. In the last few years the main task of the team was to prepare for the operations and scientific exploitation of COSIMA (COmetray Secondary Ion Mass Analyzer), the mass spectrometer dedicated to the analysis of dust in the environment of comet 67P/Churyumov-Gerasimenko, on the Rosetta mission of ESA (launched in 2004). She is also co-Investigator of ROSINA, the suite of instruments analysing gases in the environment of the comet. This heavy and long term investment in instrumental science is now bearing its fruits, with the publication in Science, Nature and in other ranks journals of the first series of scientific papers presenting the results already obtained since Rosetta. Currently C. Briois is chair of the Comité Scientifique Orbitrap™, the French Consortium that has undertaken the development of a space-qualified Orbitrap™ core, for future in situ planetology applications.

VERY HIGH RESOLUTION MASS SPECTROMETRY FOR SPACE APPLICATIONS

The research project is part of a central activity of the LPC2E Planetology team that has the objective to develop, optimize and test space- qualified, very-high-resolution mass spectrometers, based on the Orbitrap™ design. The goal is to reach mass resolutions that will permit in situ chemical analysis of the high mass, complex organic molecules observed or expected to be observed, on or near various Solar System bodies, and considered as possible building blocks of life. LPC2E leads a Consortium of 5 French laboratories developing for space applications the core of such instruments, consisting in an Orbitrap™ cell and its immediate electronic and mechanical environment, and hereafter called Cosmorbitrap. The Consortium is supported by CNES, the French space agency, with additional funding from other sources. It has established, within two NASA and one H2020 proposals, prestigious collaborations with international partners who would develop front-ends appropriate for operation in diverse planetology contexts, leading to instruments that can be proposed on the next generation of in situ planetary missions. The leadership of LPC2E is based on its proven technical and scientific expertise as an established space sciences laboratory, e.g. actively involved in two instruments on board the Rosetta spacecraft. The Consortium works on the preparation of the scientific exploitation, characterizing and optimizing the science that can be obtained from the new family of instruments, and formulating goals and strategies they will make possible for the exploration of Solar System bodies.

One of the most important Consortium projects is to develop the interface coupling Orleans' laboratory prototype of Cosmorbitrap with the laboratory set-up LILBID (Laser Induced Liquid Bead Ion Desorption) of Frank Postberg in Heidelberg. The LILBID experiment has in particular allowed confirming the chemical nature of Enceladus plumes observed with the Cosmic Dust Analyzer (CDA) onboard the Cassini mission. This is a must-have experiment for calibrating such environments, as it will provide a much-higher mass resolution capability than what is currently available with CDA.

The research project supported by LE STUDIUM is planned to design, construct and subsequently experimentally test this implemented apparatus. During the first half of the project, an integration study simulation of the Orbitrap cell to the laboratory set-up LILBID was carried out. Based on this simulation it was decided to engineer a new prototype than to modify the original Orbitrap and LILBID apparatus. One of the arguments is to allow parallel research of various scientific goals.

ADVANCES IN SPACE MASS SPECTROMETRY FOR THE SEARCH OF EXTRATERRESTRIAL SIGNS OF LIFE

This conference was aimed at presenting the current state of knowledge in the field of mass spectrometry by the activities of the world's scientific organizations and the most active space agencies pursuing this fundamental research field. International experts have presented the results on mass spectrometry of on-going and recently-completed in situ space missions as well as the results of the return sample missions and experimental laboratory and relevant modeling results. Several space missions under development that address the research field was presented by representatives of Space Agencies.

A part of the workshop was devoted to the presentations of new High Resolution Mass Spectrometry space instruments under development that are required to advance in our capability to address the objectives laid down for the future missions under study.

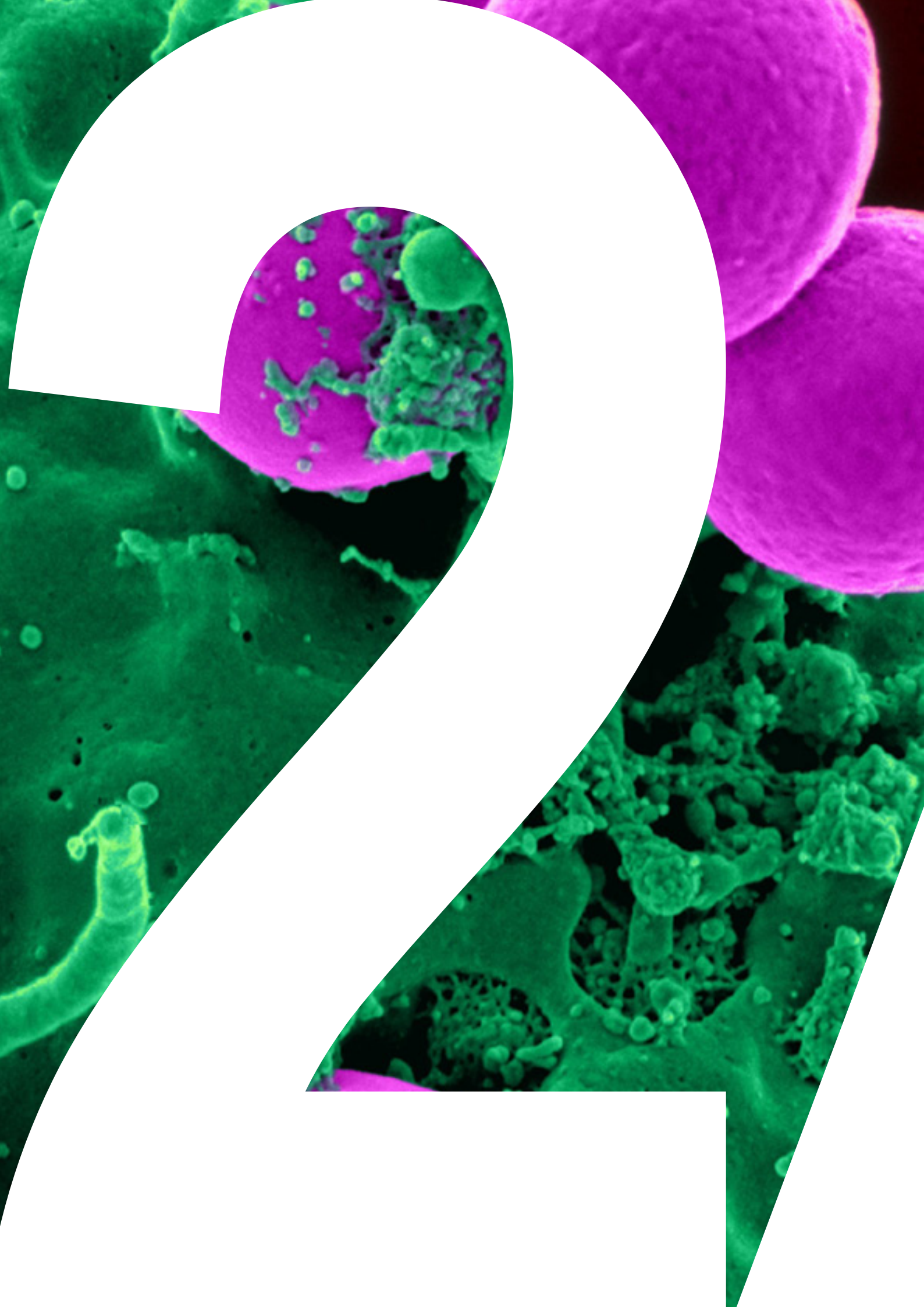
POUSSIÈRES COMÉTAIRES : COLLECTES EN ANTARCTIQUE ET MISSIONS SPATIALES

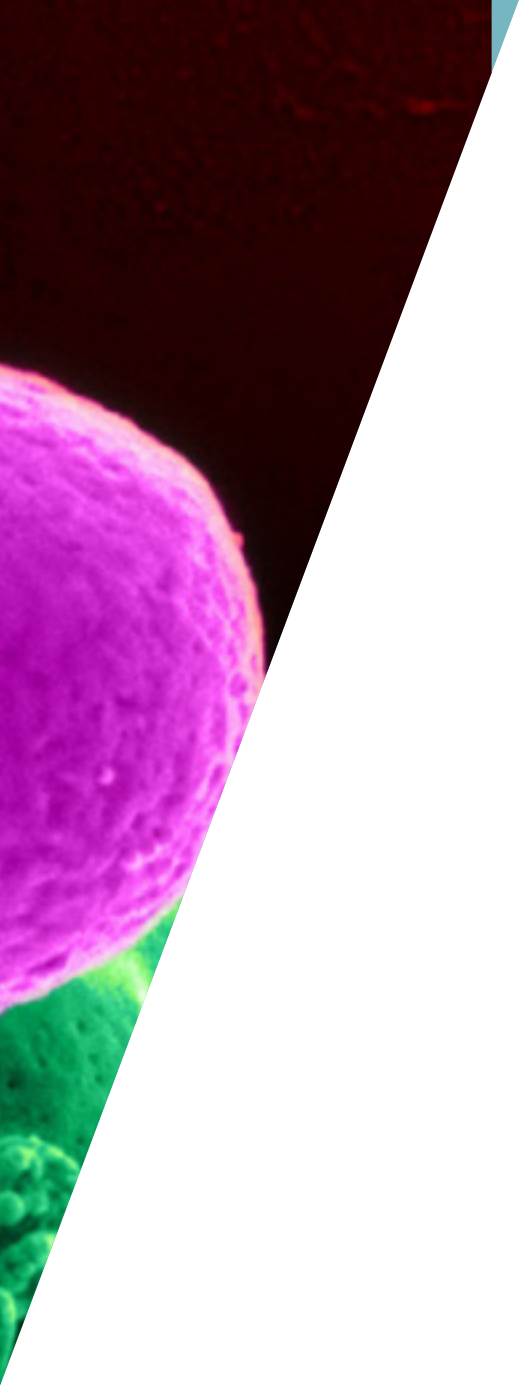
Ionospheres of planets and moons in the Solar System are unique and fascinating worlds which have always drawn people's attention. For example Titan and Enceladus, two of Saturn's satellites, are of major interest to scientific community. The Cassini-Huygens mission significantly expanded our knowledge of the Titan atmosphere which might be similar to the prebiotic terrestrial atmosphere and would represent a frozen model of Earth. Nevertheless, the nature of the physical and chemical processes leading to formation of large organic molecules from small compounds present in the Titan atmosphere is not well known. Presented results show that in spite of its low abundance in Titan atmosphere, the cyanoacetylene is probably one of the most important species in the ionospheric chemistry of Titan.

AROUND THE PROJECT

Oral Communications

Lindén, C. F.; Žabka, J.; Polášek, M.; Zymak, I.; Geppert, W. D. The reaction of C5N- with acetylene as a possible intermediate step to produce large anions in Titan's ionosphere, *Phys Chem Chem Phys.*, **2018**, *20*, 5377-5388.





LIFE AND HEALTH SCIENCES

HOST LABORATORIES IN LIFE & HEALTH SCIENCES

BIOMOLÉCULES ET BIOTECHNOLOGIES VÉGÉTALES (BBV) - EA 2106 - UNIVERSITÉ DE TOURS

the Lab of Plant Biomolecules and Biotechnology (BBV-EA2106, Tours University), founded in 1987 and located at the Faculty of Pharmacy. This Lab is mainly dedicated to the characterization of plant specialized metabolisms and their use as pharmaceuticals, cosmeceuticals and biopesticides with the use of combinatory approaches in plant physiology, molecular biology, biochemistry, bioinformatic (identification of genes), genetic and metabolomics. The lab is also involved in the development of plant biotechnologies (in vitro technologies and GMOs) and in bio engineering (production of plant metabolites in yeast).These two laboratories also work on applied research programs to identify new natural preservatives or Biologically active ingredients (BAIs) for cosmetics.

NANOMÉDICAMENTS ET NANOSONDES (NMNS) - EA 6295 - UNIVERSITÉ DE TOURS

The NMNS group is part of the Philippe Maupas Faculty of Pharmacy of the Université de Tours. It is lead by Professor Igor Chourpa.

It started in 2008 and became an independent "Equipe d'Accueil" in 2012. ts scientific research centers around the development of nanotechnologies for anticancer drugs and/or contrast agents for imaging with applications in cancer theranostics as well as dermatological and cosmetic science. The group's activities combine expertise in biology, chemistry (synthetic and analytical) and physics. This confluence of expertises is reflected in the pluridisciplinarity of its staff, consisting of pharmaceutical scientists, chemists and physicists.

The group enjoys research collaborations within an extensive national and international network consisting of academic and industrial partners. Funding sources include the Région Centre, La Ligue contre le Cancer, the Institut National du Cancer, ERA.NET Plus and ARD 2020 CosmétoSciences / LE STUDIUM.

CENTRE D'ÉTUDE DES PATHOLOGIES RESPIRATOIRES (CEPR) - UMR 1100 - INSERM, UNIVERSITÉ DE TOURS

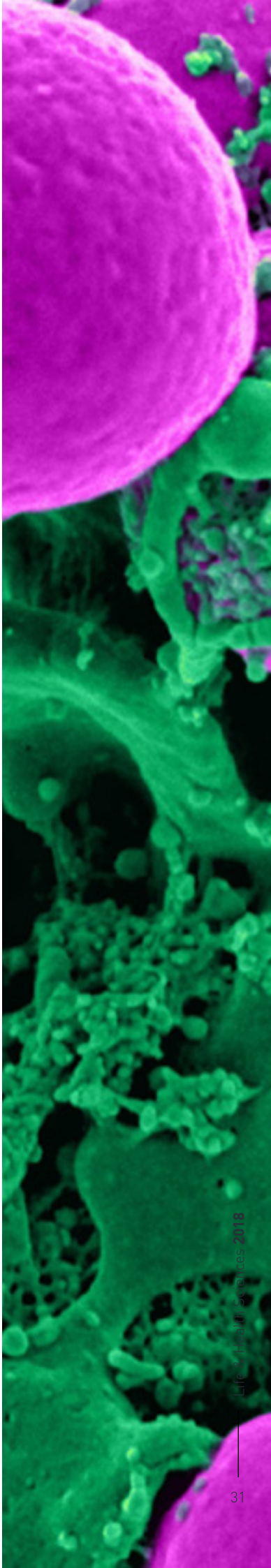
Respiratory diseases have a major impact in medical and socio-economic terms. It is against this backdrop that the CEPR is aimed to develop innovative research that gives a better understanding of the pathophysiology of these diseases and improves inhalation therapy devices.

These activities therefore fall in line with Inserm's scientific priorities which are:
- To identify the mechanisms at work in respiratory mucosal cell alterations and characterise their regulation during inflammatory and infectious processes;
- To identify the cellular and molecular mechanisms that regulate tissue remodelling in the various structures of the respiratory system;
- To develop better targeted treatment strategies.

This translational research has yielded an abundance of results that are complementary. Also, knowledge transfer from CEPR's scientific programmes was achieved both at the academic level (e.g. publications, oral presentations, student training, conferences organisation, etc), at the socio-economic level (e.g. acquisition of licences, patents deposits, development of public-private partnerships, etc) and at the clinical level (e.g. coordination of three national "PHRC" programs by clinicians affiliated with the CEPR's three teams, etc).

BIOLOGIE DES OISEAUX ET AVICULTURE (BOA) - UNIVERSITÉ DE TOURS, CENTRE INRA VAL DE LOIRE

In 2018, the Inra URA unit becomes the UMR BOA, Avian Biology & Poultry Research, by collaborating with the University of Tours.
In continuation of its project, the UMR BOA conducts integrated research on the biology of birds, from the molecular level to that of the animal in its environment. Its objective is to produce knowledge in the fields of physiology and genetics and to contribute to the development of sustainable livestock systems.
The research is based on three axes shared by the four teams of the unit:
To characterize the physiological, molecular, and genetic mechanisms underlying the biological functions of birds (metabolism, growth and development, digestion, plasticity, egg formation and function) ;
To propose evaluation tools, by developing indicators or biomarkers that can be used in selection programs and during rearing to improve bird adaptability and the quality of products (eggs and meat) ;
To integrate knowledge and tools so as to contribute to the transition from animal husbandry systems to multi-performance and to the food and non-food valuation of poultry products.
The Unit is also involved in comparative approaches between species in order to elucidate the specificities of the bird model. In order to promote the transfer of research results into poultry production practices, the UMR BOA, along with ITAVI, co-pilots the action program developed by the UMT BIRD – Poultry Farming, Systems and Territory.



IMMUNOLOGIE ET NEUROGENETIQUE EXPERIMENTALES ET MOLECULAIRES (INEM) - UMR 7355 - UNIVERSITÉ D'ORLÉANS, CNRS

The INEM, affiliated to CNRS and University of Orleans, is located on Orleans CNRS campus.

Created in 2001, INEM is presently composed of 2 Teams, "Immune responses to infection and injury" led by V. Quesniaux/ I. Couillin, and "Neurogenetics" led by S. Briault / S. Mortaud, focusing on « Autism, mental deficiency and genetics » and « Developmental Neurotoxicity». A spin-off company Artimmune SAS was created in 2010 based on our immunology team expertise and research. A joined laboratory is being created with INEM (Site: http://www.artimmune.com/).

Upcoming public health challenges will have to integrate the constant increase of 1) asthma and lung pathologies, 2) neuropathologies such as autism due notably to pesticides neurotoxic effects, and 3) the emergence of drug resistant bacteria and parasites. Inflammatory responses, either exacerbated and pathogenic, or protecting and controlling infection, are central. Our strategy to contribute to these clinical challenges is multifold and transversal. We aim at fostering the progress of the main research themes through common transversal approaches and research on mechanistic pathways, either in silico or in vitro when it is possible, but mainly through integrated in vivo approaches based on functional analysis of murine models.

PHYSIOLOGIE DE LA REPRODUCTION ET DES COMPORTEMENTS (PRC) - UMR 085 - CENTRE INRA VAL DE LOIRE, UNIVERSITÉ DE TOURS, CNRS, INSTITUT FRANÇAIS DU CHEVAL ET DE L'ÉQUITATION

The Reproductive Physiology and Behaviours Laboratory is affiliated to INRA, CNRS, University of Tours and IFCE. The Biology and Bioinformatics of Signalling Systems (BIOS) group uses systems biology approaches, including mathematical modelling and bioinformatics, to decipher G protein-coupled receptors (GPCR)-induced signalling and develops new pharmacological strategies targeting these receptors. A particular emphasis has long been put on the receptors for follicle stimulating and luteinizing hormones (FSHR and LHR) that are centrally involved in the control of reproduction. Capitalizing on the dynamics initiated in region Centre-Val de Loire in the framework of the MabImprove LabEx and the ARD 2020 "Biopharmaceuticals", the BIOS group is currently developing GPCR-specific antibody fragments displaying pharmacological efficacy in vivo.

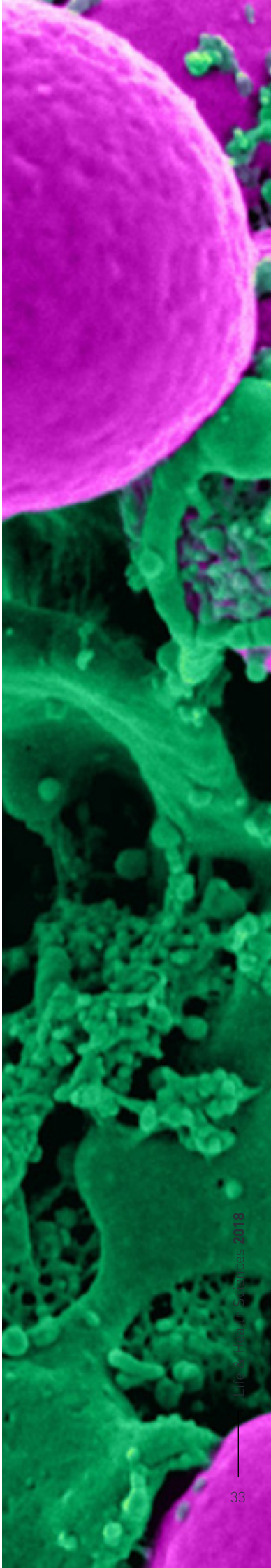
INSTITUT DE RECHERCHE SUR LA BIOLOGIE DE L'INSECTE (IRBI) - UMR 7261 - UNIVERSITÉ DE TOURS, CNRS

The laboratory is devoted to the analysis of biological processes using insects as model organisms. This is developed at all levels of biological organization, studying aspects ranging from sub-cellular signalling to ecosystemic properties. Since its founding 50 years ago, work at the IRBI has been characterized by an integrative approach in which methods from multiple disciplines are applied to tackle study targets. The scientific staff of the institute includes specialists in molecular biology, chemistry, biochemistry, physiology, behavior, biophysics, mathematics, ecology and evolutionary biology, as well as technicians whose specific skills support projects in these various fields.

This integrative approach is mainly oriented towards the understanding of interactions between insects and their environment, both for its biotic and abiotic components. While the main focus of the institute is on basic research, several projects also address problems through applied research. The latter including sustainable agriculture and the biological control of insect pests; the development of control strategies for pests, invasive species and insect vectors of human disease, and use of basic knowledge towards bioinspired engineering.

CENTRE DE BIOPHYSIQUE MOLÉCULAIRE (CBM) - UPR 4301 – CNRS

CBM is one of the largest research laboratories in the region Centre-Val de Loire. It was founded in 1967 to set up interdisciplinary collaboration between chemists, biologists and physicists. Researchers at the CBM are investigating the structure, dynamics and interactions of biomacromolecules. This approach entails searching for the molecular causes of biological dysfunctions which trigger the development of diseases. The center is also recognized for its research in biomedical imaging. One key goal of CBM is to conceive new strategies in human therapy by combining innovative approaches in peptide/protein synthesis, biochemistry, bio-physics, molecular and computational biology. For this purpose, biomolecular interactions involving DNA, RNA, proteins and ligand are studied at the atomic and molecular level. Moreover, some research projects are dedicated to the identification of new therapeutic targets and the development of innovative delivery systems for therapeutic and imaging agents in various pathologies. Novel therapeutic strategies are developed using original nucleic acid delivery systems that combine chemical vectors and physical methods. One main area is the optimization of innovative vaccination based on messenger RNA coding for tumoral or viral antigens for cancer and viral infection, respectively.



HOST LABORATORIES IN LIFE & HEALTH SCIENCES

IMAGERIE ET CERVEAU (IBRAIN) - UMR 1253 - UNIVERSITÉ DE TOURS, INSERM

The starting point for our research unit was a local network of psychiatrists and biophysicists. A first unit was created in 1988 to promote cross-fertilization among specialists from different domains. Almost all members were then assembled in the same campus (School of medicine – Tours University Hospital). The Unit research in Psychiatry, studies in cellular/molecular neurosciences and investigations aiming to develop new technologies for diagnosis and treatment of psychiatric and neurological diseases.

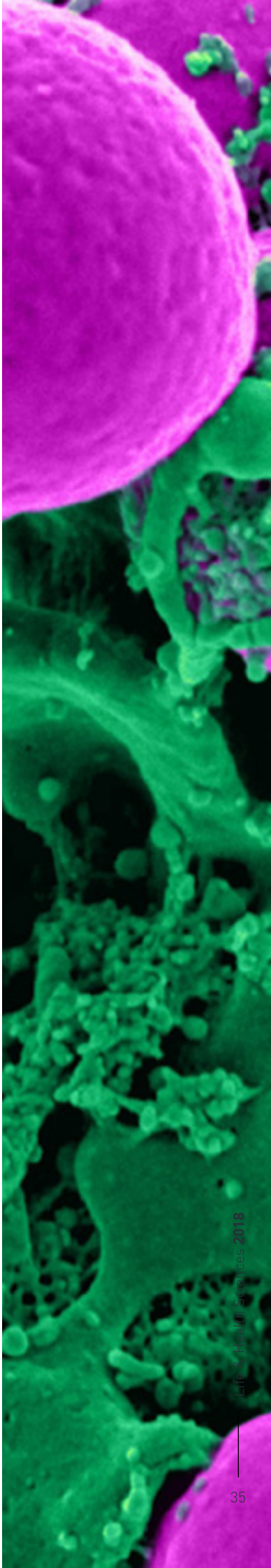
Our team have worked on the development of new technologies and methodologies which are non-pathology-specific and which include US brain imaging, DW-MRI (validation of tractography using a comparative anatomical approach), metabolomics, and radiopharmaceuticals development for PET imaging. In addition, we develop vector-valued image processing methods to increase the combined potentiality of these imaging tools. It helps to validate existing or emerging imaging methods. A neuroanatomy and neuroimaging group, leaded by C Destrieux, works inside this team and gathers anatomists, engineers and radiologists.

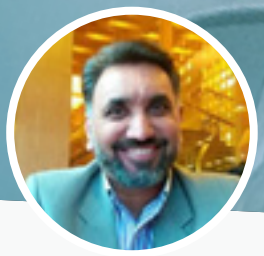
INSTITUT DE CHIMIE ORGANIQUE ET ANALYTIQUE (ICOA) - UMR 7311 – UNIVERSITÉ D'ORLÉANS, CNRS

The main objective of the laboratory's research activities is the discovery, the synthesis and the analysis of novel bioactive molecules having potential applications in drug discovery or in cosmetics. ICOA has numerous collaborations and partnerships in the Region Centre-Val de Loire, with many research laboratories such as CBM (CNRS UPR4301), forming with this laboratory a Research Federation (FR2708), with CEA (ICOA is Laboratoire de Recherche Correspondant LRC M09), with the Hospital of Orléans with many biotechs and large companies and through Clusters of Competitiveness such as LabEx SYNORG and IRON. In order to maximise human and financial ressources, the ICOA has recently created three focused strategic research axes: Therapeutic Innovation and Diagnostics, Molecular Diversity, and Bioactives and Cosmetics. Through these three axes, the research teams of the ICOA are working and publishing in many scientific areas such as molecular modeling, bioinformatics, glycochemistry, heterocyclic, nucleoside and green chemistry, etc.

LABORATOIRE DE BIOLOGIE DES LIGNEUX ET DES GRANDES CULTURES (LBLGC) - EA 1207 - UNIVERSITÉ D'ORLÉANS, CENTRE INRA VAL DE LOIRE

Founded in 1996, the team «Plant Lignans» works in the fields of plant physiology, molecular biology (gene function), biochemistry (biosynthesis of molecules through the plant), analytical chemistry and in vitro culture applied to the study of phenylpropanoids derived products. This team is also working on applied research programs to find new natural preservatives or active ingredients for cosmetics. More recently they started to work on allelopathic activities of plant specialized metabolites. The present project is therefore of special interest for this latter aspect of the research developed by the host team.





Dr Bilal Haider Abbasi

LE STUDIUM Research Fellow
ARD 2020 COSMETOSCIENCES

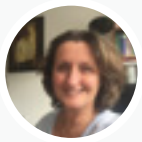
From: Quaid-i-Azam University - PK

In residence at: Biomolecule and Plant Biotechnology (BBV) & Laboratory of Woody Plants and Crops Biology (LBLGC) - Tours

Nationality: Pakistani

Dates: January, 2018 to September, 2019

After completing Phd from University of Chinese Academy of Sciences, Beijing, China, Dr. Bilal Haider Abbasi joined Quaid-i-Azam University, Islamabad, Pakistan on June 17, 2008 as Assistant Professor of Biotechnology. After establishing feasible platform for production of Caffeic acid derivatives from Echinacea purpurea submerged culture, he focused on medicinal plant biotechnology. In 2014, he was awarded with "Quaid-i-Azam University Best Young Researcher Award" in recognition of his outstanding achievements in Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan. In 2016, he was the winner of "Pakistan Academy of Sciences Gold medal for Biotechnology" in recognition of his significant contributions to the development of medicinal plant biotechnology at National level. He was declared as "Most productive scientist" in Department of Biotechnology, Quaid-i-Azam University in Research Productivity Award 2017 by Pakistan Council for Science & Technology.



Prof. Nathalie Guivarc'h

Nathalie Guivarc'h is a full professor and the director of the Plant biomolecules and biotechnologies laboratory (EA2106) at the University of Tours. After a PhD in plant physiology and metabolism from Orsay-Paris XI University and a Post-doc in the institute of Plant Sciences (ISV) in Gif-sur-Yvette, she obtained a position in the University of Tours. Her research themes are articulated around the identification, characterization and valorization of specialized plant metabolisms for biotechnological applications including metabolic engineering processes for the production of bioactive compounds of interest for pharmaceutical, cosmetic or agronomic applications. She has been involved in more than 20 collaborative projects (regional, national and europeen) in plant biology and biotechnological fields.

Dr Christophe Hano

Dr Christophe Hano is an associate professor at the University of Orléans and conducts his research activity at the LBLGC Lab (INRA USC1328), focusing mostly on plant physiology, molecular biology, and biochemistry. He mostly works on the regulation aspects controlling polyphenol biosynthesis in plants as well as on the development of methods of their extraction. The main objectives of his work are to elucidate the mechanisms of the regulation of the biosynthesis of these compounds with high potential for cosmetic and pharmaceutical applications, to provide informations dealing with their biological activities and to develop green sustainable extraction methods. He is a member of the Polyphenols Group and the Phytochemical Society of Europe.

STRATEGIES TO ENHANCE COSMECEUTICALS IN *IN VITRO* CULTURES OF HERBAL PLANTS

The overall goals of the current proposal will be to elucidate the phytochemical basis of the common traditional knowledge of the species by comparing the chemical composition of herbal plants grown as axenic cultures under identical nutritional, growth regulators and environmental regimes. Enhancing biologically active ingredients (BAIs) content in cell cultures of herbal plants by application of elicitors (biotic & abiotic) will cope with the over increasing demand of phenolic compounds.

The specific goals are:

To identify feasible production of BAIs in cell lines of various selected species from preliminary experiments, to apply biotic and abiotic elicitors and evaluate their influence on growth kinetics, biochemical parameters, antioxidative stress enzymes and phytochemicals, etc. To identify BAIs in cells grown under different elicitors and conditions. To establish correlation between different elicitors and biologically active ingredients (BAIs) biosynthesis.

Several herbal plant species were selected from Centre Val de Loire region and evaluated for their biosynthetic potential. However, Linum usitatissimum, Linum grandiflorum, Arctium lappa, Silybum marianum, Trifolium pratense, Echinacea purpurea were selected for further experiments. The average time to obtain feasible plantlets for explant ranges from 6-8 weeks. Leaf and stem explants were exploited to establish in vitro callus cultures. Several plant growth regulators were tested to optimize callus induction response. However, synergestic combination of cytokinins with auxin induced optimum response in these explants. Phytochemical profile was evaluated by HPLC to determine the pattern of BAIs accumulation. Dark and photoperiod conditions were are also exploited to evaluate growth behaviour and phytochemical accumulation in these calli cultures. We have evaluated antioxidant potential with different protocols/reagents and found that extract from similar cell lines have shown different levels of antioxidant potential. However, antiageing activities were also evaluated and some extracts had shown considerable activities. Heat map data had shown relationship between different metabolites and their antioxidant and antiageing potential. We have also established correlation among different data and developed a new platform to select optimum cell line. Principal component analysis (PCA) technique was also exploited to establish insight into biological methods and other parameters. This is the very first time that PCA have been utilized to evaluate feasible cell lines for biosynthesis of commercially attractive BAIs. It has been observed that the cells grown in LBLGC and BBV had diverse biosynthetic potential. It is observed that

these variations in biosynthetic potential were induced due to different culture conditions. These environment-induced variations paved new path for further exploration of biosynthetic pathways of BAIs and their link with different environmental conditions.

To make biosynthesis of these metabolites feasible, elicitation strategy was adopted. Several abiotic and biotic elicitors are proposed for application on these cell lines. In preliminary experiments, the optimum concentration of these elicitors is selected. However, further experiments are being conducted to devise reliable and efficient strategy for cost efficient production of these BAIs.

MODERN ASPECTS OF PLANT IN VITRO TECHNOLOGY

Medicinal plants are exploited since time immemorial due to health benefits they offer. Lack of cultivation practices and over-harvesting from wild provoke plant scientists to establish alternate platforms for the reliable and consistent production of these elite medicinal plant species. "Plant in vitro technology" provides a most promising platform for the production of chemically consistent plantlets for further biotechnological implications. However, the emergence of omics technologies, molecular biology, metabolic engineering and synthetic biology has revolutionized the field of life sciences. These are modern aspects of life sciences which are considerably influencing plant in vitro technology and phytochemical production. An application of these technologies is expanding horizons for an understanding of metabolic pathways involved in the biosynthesis of precious biologically active ingredients and their cost-efficient production.

The main outcome of this event was formation of "Consortium". Presenters from different countries (France, Pakistan, Germany, Poland and England) agreed upon formation of this network. Future possibilities on joint research grant and research work are being proposed. The next meeting of this consortium is going to happen in 2nd quarter of 2019. Several expertise are formulated to widen the horizon of future research work.

AROUND THE PROJECT

Scientific publications

Riaz, R.; Hashmi, S. S.; Khan, T.; Hano, C.; Giglioli-Guivarc'h; N.; Abbasi, B. H. Melatonin stimulated biosynthesis of antimicrobial ZnONPs by enhancing bio-reductive prospective in callus cultures of *Catharanthus roseus var. alba*. Artificial cells, *Nanomedicine and Biotechnology*, **2018**, *46*, 5936-5950.

Zahir, A.; Ahmad, W.; Nadeem, M.; Giglioli-Guivarc'h, N.; Hano, C.; Abbasi, B. H. In vitro cultures of Linum usitatissimum: Synergestic effects of mineral nutrients and photoperiod regimes on growth and biosynthesis of lignans and neolignans. *Journal of Photochemistry and Photobiology B: Biology.*, **2018**, *187*, 141-150.

Nadeem, M.; Abbasi, B. H.; Garros, L.; Drouet, S.; Zahir, A.; Ahmad, W.; Giglioli-Guivarc'h, N.; Hano, C. Yeast-estract improved biosynthesis of lignans and neolignans in cell suspension cultures of Linum usitatissimum L. *Plant Cell Tissue Organ Culture*, **2018**, *135*, 347-355.

Younas, M.; Hano, C.; Giglioli-Guivarc'h, N.; Abbasi, B. H. Mechanistic evaluation of phytochemicals in breast cancer remedy: Current understanding and future perspectives. *RSC Advances*, **2018**, *8*, 29714.

Younas, M.; Drouet, S.; Nadeem, M.; Abbasi, B. H.; Hano, C.; Giglioli-Guivarc'h, N. Differential accumulation of silymarin induced by exposure of *Silybum marianum* L. callus cultures to several spectres of monochromatic lights. *Journal of Photochemistry and Photobiology B: Biology*, **2018**, *184*, 61-70.

Drouet, S.; Abbasi, B. H.; Falguieres, A.; Doussot, J.; Vanier, J. R.; Ahmad, W.; Sumaira, Laine, E.; Hano, C. Single laboratory validation of a quantitative core shell-based LC separation for the evaluation of silymarin variability and associated antioxidant activity of Pakistani ecotypes of Milk Thistle (*Silybum Marianum* L.). *Molecules*, **2018**, *23*, 904.

Renouard, S.; Corbin, C.; Drouet, S.; Medvedec, B.; Doussot, J.; Colas, C.; Maunit, B.; Bhambra, A. S.; Gontier, E.; Jullian, N.; Mesnard, F.; Boitel, M.; Abbasi, B. H.; Arroo, R. R. J.; Laine, E.; Hano, C. Investigation of *Linum flavum* (L.) hairy root cultures for the production of anticancer aryltetralin lignans. *International Journal of Molecular Science*, **2018**, *19*, 990.

Dr Yuri Dancik

LE STUDIUM Research Fellow
ARD 2020 COSMETOSCIENCES

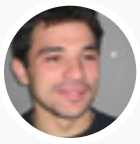
From: Institute of Medical Biology - SG

In residence at: Nanomedicines and Nanoprobes (MNMS) - Tours

Nationality: American

Dates: October, 2018 to October, 2019

Yuri Dancik obtained his PhD in Chemical and Biological Engineering from the State University of New York at Buffalo in 2007. His main research interests are understanding the physico-chemical basis of chemical transport through skin and applications in cosmetic, pharmaceutical and toxicological science. In Buffalo, he developed mathematical models of drug transport through skin appendages. He worked at Procter & Gamble (Brussels), developing in silico pharmacokinetic methods for the prediction of skin sensitization and systemic toxicity following cutaneous exposure. From 2014 to 2018 Yuri was Senior Research Fellow at the Institute of Medical Biology and the Singapore Skin Research Institute. His colleagues' and his efforts into the development and validation of a novel microfluidic skin-on-chip platform were recognized with a Global 3Rs Award.



Dr Franck Bonnier

Franck Bonnier obtained his PhD from the Department of bio-spectroscopy for life sciences as a member of the Médian CNRS group, Université de Reims, France. Following his PhD, he joined the FOCAS Research Institute, DIT in 2008 as a post-doctoral research engineer under the National BioPhotonics and Imaging Platform, Ireland, and as a member of the Biophotonics and Imaging group which specialise in the application of biophotonics, especially Raman and Infrared spectroscopy, in the biomedical field. Since September 2014, Franck Bonnier has joined the NMNS research group at University François-Rabelais de Tours (France) as associate professor. The main field of expertise remains the development of methodologies towards implementation of spectroscopic techniques as clinical screening tools for diagnostic or with a particular focus on pharmaceutical and cosmetic applications.

MOLECULAR IMAGING USING RAMAN SPECTROSCOPY: FROM FUNDAMENTAL RESEARCH TO INDUSTRIAL APPLICATIONS

We are using Raman spectroscopy to demonstrate the impact of storage conditions on the quality of lab-grown human skin equivalent tissues. The skin equivalents they are using are known as reconstructed human epidermis or RHE (Figure 1), as they mimic the uppermost epidermal layer of human skin.

The development, characterization and use of RHE is an active area of cosmetic and pharmaceutical R&D. Designed to replace animal tissues, RHE are particularly useful for testing or screening new cosmetic formulations and pharmaceutical topicals. To date, little is known on the effects of common tissue storage conditions on the quality and in particular, the barrier function, of RHE. Commercial RHEs are frequently cultured and shipped in batches of 6 or 12 replicates (Figure 1A). With testing and screening applications often requiring large numbers of replicates, practical knowledge on the effects of storage conditions is of significant value to academic and industrial RHE users.

The specific scientific goals are thus:

- To investigate the impact of different storage conditions on the barrier function of RHE. To this end, the penetration of a chemical applied to the RHEs stored under the different conditions is tracked via Raman spectroscopy (Figure 2A).

- To compare the chemical penetration results obtained via Raman spectroscopy to results obtained in parallel from a widely-used, but more laborious, methodology for studying skin penetration (Figure 2B).

- To assess how the information obtained by Raman spectroscopy complements that attained from the conventional skin penetration experiment.

In addition to answering a practical scientific question, the project is meant to highlight a novel application of Raman spectroscopy within the field of skin analysis.

Thus far we have optimized of skin penetration experiments and spectroscopic data acquisition through rigorous preliminary experimentation and the methodologies for data analysis, designed and performed a full experiment involving RHE replicates stored under various conditions, with both Raman spectroscopic and conventional skin penetration data obtained and analysed of the full experiment's results.

The results obtained thus far are very encouraging and enable us to design follow-up experiments to fine-tune and complement our latest work.

Prof. Pieter Hiemstra

LE STUDIUM Research Professor
ARD 2020 BIOPHARMACEUTICALS

From: Leiden University Medical Center - NL

In residence at: Centre for the Study of Respiratory Pathologies (CEPR) - Tours

Nationality: Dutch

Dates: **September, 2018 to December, 2018**

Pieter S. Hiemstra studied (Medical) Biology at the University of Utrecht where he graduated in 1984. He obtained his PhD degree at the Medical Faculty of Leiden University in 1988. Following one year as a research fellow in the Depts. of Nephrology and Rheumatology, he joined the Department of Infectious Diseases as an assistant professor to work on phagocyte biology. In 1990-1991 He spent a 5-month post-doctoral training period in the laboratory of Prof. R.I. Lehrer (UCLA, Los Angeles, USA), where he worked on antimicrobial peptides. In 1992, he joined the Department of Pulmonology as an assistant professor and head of the laboratory of the department. In 1994, he was appointed associate professor, and in 2004 Professor of Respiratory Cell Biology and Immunology. He has been elected in 2014 as Fellow of the European Respiratory Society (ERS), the largest respiratory society worldwide.

DEVELOPMENT AND APPLICATION OF WELL-DIFFERENTIATED CULTURE MODELS OF PRIMARY AIRWAY EPITHELIUM FROM VARIOUS SOURCES

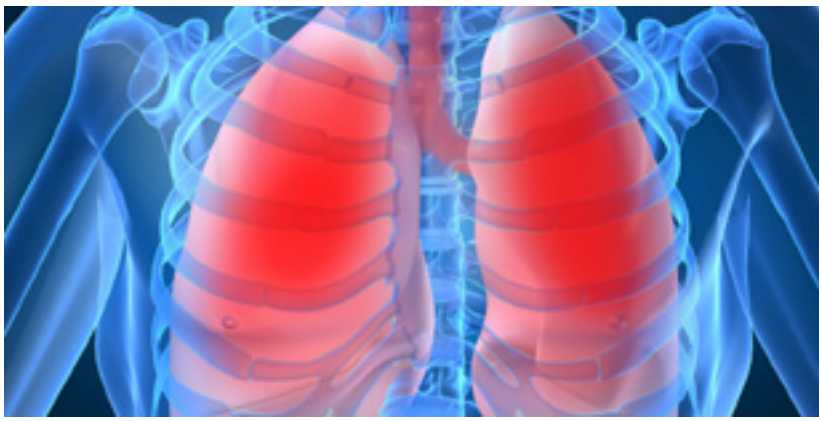
During the 3-month fellowship in 2018, air-liquid interface cultures of primary human airway epithelial cells were successfully introduced in the CEPR, and used to study modulation of respiratory pathogenic bacteria and viruses. Directly linked to the ARD2020 research program entitled "PRIMine – « Modèle préclinique de PRIMates non humains (PNH) pour traiter les épisodes infectieux d'exacerbations de la Broncho-Pneumopathie chronique obstructive (BPCO) », nasal scrapings from non-human primates were successfully obtained and used to initiate epithelial cell cultures. As indicated in the fellowship report, it was evident that adaptation of the cell culture method was needed because of the limited number of cells obtained. At his laboratory at the Leiden University Medical Center, Prof. Hiemstra and his team have now optimized a method using organoid cultures to obtain airway epithelial cell cultures from small amount of patient material (including bronchoalveolar lavage, tracheal aspirates and nasal scrapings) that can be passaged as organoids and subsequently used to continue cell culture and differentiation at the air-liquid interface (required for exposure to airborne substances such as cigarette smoke and air-pollutants). The method is based on a recently published protocol with important adaptations (1).

Therefore the aims of the 2019 2-month fellowship will be to:

Introduce the methods for culture of airway epithelial organoids at CEPR with the aim to establish cultures of nasal epithelial cells from nasal scrapings of non-human primates.

Further establish isolation and culture of primary airway human epithelial cells at CEPR in collaboration with Thoracic Surgery (Dr Antoine Legras) and Pathology clinical departments. Next these cultures will be used to continue the joint experiments on modulation of respiratory pathogens and/or cigarette smoke challenges by biopharmaceutics.

In addition to these activities, after discussion with the various course directors Prof. Hiemstra will also again contribute to teaching in the various Master's programs (as was done during his 2018 fellowship).



Dr Mustapha Si-Tahar

My research team (entitled «Respiratory infection and immunity») develops translational research programs in the field of respiratory infections.
The strengths of this team are based on the members who are associated with it. This includes scientific experts in immunology and microbiology as well as clinicians.
The team develops programs using molecular and mechanistic approaches, in vivo experiments as well as pre-clinical and clinical investigation.

Prof. Maxwell Hincke

LE STUDIUM Research Professor

From: University of Ottawa – CA

In residence at: Avian Biology & Poultry Research (BOA) - Nouzilly

Nationality: Canadian

Dates: March, 2018 to May, 2018

Maxwell HINCKE (PhD, Univ. Alberta, 1981) is a senior scientist and tenured Full Professor in the Faculty of Medicine at the University of Ottawa. He is former Head of the Division of Clinical and Functional Anatomy, and has been a member of the Senate of the University of Ottawa. He investigates integrated defence strategies that operate at biomineralized barriers to understand molecular control of calcitic biomineralization and antimicrobial strategies. His vision is that the insight gained can be reverse-engineered for application to human health and therapeutics. His CV includes: >102 refereed journal publications; mentorship: >96 undergraduate & graduate students, postdoctoral fellows and clinical trainees; awards: Excellence in Mentorship; international research collaborations with extended sojourns in France, Spain and China.

Dr Sophie Rehault-Godbert

Sophie Réhault-Godbert (PhD, Univ. of Tours, 2001) is currently the co-director of Défenses de l'Oeuf, Valorisation, Evolution (DOVE). She has expertise in the physiology of chicken egg formation, egg defenses, functional and structural characterization of egg proteins including proteases, antiproteases and antimicrobials, and has coordinated a project aiming at evaluating the therapeutic potential of egg derived molecules against microbial infections, inflammation and cancer. Her research addresses the role of egg proteins and the regulation of egg defenses during chicken embryonic development. She has authored 25 peer-reviewed articles, 8 book chapters, and holds 1 patent. She was a partner in various DOVE-coordinated projects.

EVOLUTION OF INNATE IMMUNITY AT BIOMINERALIZED BARRIERS

Hypotheses: The antimicrobial environments in the critical zone between the eggshell and CAM are upregulated during embryonic development and during pathogen challenge: i. Genes coding for defense molecules are expressed within the growing chorioallantoic membrane during embryonic development; ii. Secreted antimicrobial proteins enhance protection against pathogens in the chorioallantoic membranes and in the extra-embryonic fluids; iii. Weakening of the eggshell during CAM-mediated decalcification is compensated by upregulation of innate immune mechanisms.

To explore these hypotheses, the aims are:

1. To identify the full inventory of peptides / proteins that intervene between the eggshell and developing embryo and characterize their role in pathogen defense.

2. To determine the plasticity of protection against pathogens in embryonic placental – like structures during development .

3. To further characterize the role of the CAM in eggshell calcium solubilization / decalcification during embryonic development, using functional bioassays, transcriptomics, proteomics and bioinformatics.

4. To perform comparative proteomics analysis of the CAM and allantoic fluid in order to determine interconnections between these structures.

- What are the achievements to date?

1. A review specifically focused on the Studium project was recently published in the Journal of Innate Immunity. Hincke MT, Da Silva M, Guyot N, Gautron J, McKee MD, Guabiraba-Brito R, Réhault-Godbert S. "Dynamics of Structural Barriers and Innate Immune Components during Incubation of the Avian Egg: Critical Interplay between Autonomous Embryonic Development and Maternal Anticipation". Recently S. Réhault-Godbert was asked to write with M. Hincke a chapter for the new edition of a book "Avian Immunology", edited by Thomas Göbel, Lonneke Vervelde, Ton Schat and B. Kaspers. The writing is scheduled during Spring/Summer 2019.

2. A PhD Project (director: S. Réhault-Godbert / co-director: M. Hincke) has been developed (final decision in March, 2019). If accepted, M. Hincke will participate in the recruitment and the supervision of the candidate, who is expected to start the PhD project in October, 2019.

3. A research project called DeciCAM (Decalcification, Immunity of the Chorioallantoic membrane, Coordinator S. Réhault-Godbert, WP leader M. Hincke) is currently being evaluated (ANR AAPG2019). A decision of acceptance for the second phase is expected in the beginning of February, 2019.

4. A special day devoted to the avian egg has been planned for March 22, 2019 by the "Pôle Alimentation" at the Villa Rabelais, Tours with the help of Michel Duclos (INRA).

5. MH had the opportunity to meet various scientists working on innate immunity in domestic animals (IAD-2018) on 26 and 27 March, 2018. The scientific network for the STUDIUM project is progressively growing and will help to identify speakers for the workshop that will be organized in 2020.

Dr Denis Reis de Assis

LE STUDIUM Research Fellow
ARD 2020 BIOPHARMACEUTICALS

From: Pontifical Catholic University of Rio Grande do Sul - BR

In residence at: Imaging and Brain laboratory (iBrain) - Tours

Nationality: Brazilian

Dates: March, 2018 to March, 2019

D Reis de Assis did his masters and PhD studying brain energy metabolism. He showed that metabolites accumulating in a fatty acid oxidation disorder called MCAD deficiency decrease the activity of the enzyme Na+, K+-ATPase, Krebs cycle, the activities of the mitochondrial respiratory chain complexes, creatine kinase and cause lipid peroxidation. He did his first post-doc in the neural stem cells field. During his second post-doc, he clarified mechanisms by which cell therapy is neuroprotective in a rat model of epilepsy, methylprednisolone improves aversive memory, neurotoxicity of venoms, and by which a neuropeptide involved in appetites and neuropsychiatric disorders acts in hippocampal cells. He received hands-on training in iPS cells and human neural progenitors. Currently, D Reis de Assis studies the effects of a hallmark protein in amyotrophic lateral sclerosis, TDP-43, on calcium signalling and mitochondrial bioenergetics.

Prof. Hélène Blasco

H Blasco is professor and practitioner in the Laboratory of Biochemistry and Molecular Biology and in the team «Neurogenomics and Neuronal physiopathology» of INSERM U1253 (CHU and University of Tours). She is specifically working on Amyotrophic Lateral Sclerosis (ALS), a neurodegenerative disease characterized by degeneration of motor neurons that leads to a progressive muscular paralysis. ALS diagnosis is mostly based on clinical criteria that lack the precision to establish a rapid diagnosis. Thus, her research activity is focused on the development of biomarkers, the understanding the aetiology of the disease and the identification of new neuroprotective agents. She has particularly used metabolomics approach to highlight diagnosis and prognosis biomarkers in ALS patients and animal models, and to improve the knowledge of pathophysiological ways in cell models. More recently, the team is developing a therapeutic approach based on intrabodies to target protein aggregates. Thus her current project is mainly to develop biopharmaceuticals in ALS and to use pharmacometabolomics to assist this development.

RECOMBINANT INTRABODIES AS MOLECULAR TOOLS AND POTENTIAL THERAPEUTICS FOR AMYOTROPHIC LATERAL SCLEROSIS (INTRABALS)".

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disease that has no diagnostic marker, prognosis, nor an effective treatment. Numerous physiopathological mechanisms have been described for this disease, in particular the aggregation of cytoplasmic TDP-43. Additionally, a "prion-like" mechanism of the propagation of the pathology including TDP-43 has been described. Much effort has been directed to therapeutic treatments for ALS, but these efforts explore sparsely the potential of biomolecules.

The objective of this project is to target the protein aggregates containing TDP-43 by a novel approach. We plan to characterize the therapeutic sites of TDP-43 through fragments of antibodies synthesized by the cell, termed intrabodies. The results of this project will have applications not only for ALS but also potentially for other neurological diseases, such as dementias.

We have just obtained our first intrabodies (about 6 clones) that we will characterize.

We are currently evaluating several markers, including cellular respiration, glycolysis, the endometabolome, as well as calcium signaling and neurotransmission. We have obtained interesting results and we have determined few robust and reproducible parameters to test for intrabodies screening. We are currently testing the effects of TDP-43 on synaptic neurotransmission by a technique called patch clamp, which measures several electrophysiological parameters using primary cultures of motor neurons from mice (Fig 2). These experiments have the potential of showing if TDP-43 overexpression could disturb neurotransmission in motor neurons, which is a property exclusive of excitable cells, such as neurons. I addition, our preliminary results suggest that overexpression of TDP-43 in HEK293 cells do not affect directly mitochondrial respiration (Fig 3), however it provokes an increase in the basal levels of intracellular calcium (Fig 4). Thus, we are currently testing whether TDP-43 overexpression also affects intramitochondrial calcium levels, which are critical to stimulate mitochondrial respiration. Our results are important, since there is currently a disagreement among data from different research groups regards the effects of TDP-43 on the mitochondrial energy metabolism.

The collaboration with the industrial partner (still under negotiation) will provide a library of small molecules that could mimic the activity of the intrabodies with the advantage of an easier access to the brain and into target cells. Therefore, we will test the competitive binding of these small molecules against the intrabodies then will test their protective effects in vitro in the models described previously.

AROUND THE PROJECT

Scientific Publications

• Lanznaster, D.; de Assis, D. R.; Corcia, P.; Pradat, P. F.; Blasco, H. Metabolic biomarkers: a strategy towards therapeutics improvement in ALS, *Front Neurol.*, **2018**, *9*, 1126.

Dr William Horsnell

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

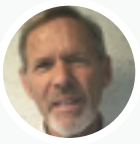
From: University of Cape Town – ZA

In residence at: Molecular and Experimental Immunology and Neurogenetics (INEM) - Orléans

Nationality: British

Dates: July, 2017 to July, 2018

My research investigates how immune responses control parasitic worm infections, how parasitic worms influence this immunity and how these immune responses help us understand other diseases. This has resulted in the identification of novel mediators of protective immunity against worms and shed new understanding on how these mediators change our immunity to other infections. My work is published in peer reviewed journals and, where relevant, patented for future commercial explotation. Components of our work addressing relationships between worms and bacterial infection were awarded a Harry Crossley Research Prize. All research activities are currently supported by multi-year grants from the National Research Foundation (South Africa), Poliomyelitis Research Foundation (South Africa) and the Deutsche Forschungsgemeinschaft (Germany).



Dr Bernhard Ryffel

Bernhard Ryffel's research interests primarily lie in understanding the mechanisms of pulmonary inflammation and repair of resulting lung injury. He has published over 400 papers and has H factor of 75. In addition to his position at CNRS he also holds chairs in Shangai and Cape Town. He currently holds a number of major international grants supporting this work. In addtion to his academic achievements Bernhard has excellent links with industry, has played key roles in the founding of PhenoTec AG and ArtImmune and consults widely.

TARGETING ACETYLCHOLINE RECEPTORS TO ENHANCE IMMUNITY TO ACUTE VIRAL INFECTION

Recently studies have shown that acetylcholine (ACh), a neuro- transmitter, which regulates nerve and muscle functions, also strongly regulates the immune system. Immune cells can produce and release ACh to control local immune responses independently of the nervous system. The understanding of ACh mediated immunoregulation in disease is very limited. Here we will build on recent discoveries made by us that blocking ACh signaling can boost the ability of the immune system to control a viral infection in the lung. The infection we are studying is known as RSV and is the main cause of small children being hospitalised for breathing difficulties.

Our project will show how blocking ACh can be used to develop new treatments for this and other lung diseases.

To date our work at INEM has resulted in the generation of two novel mouse strains. These are mice with targeted disruption of expression of the enzyme required to generate ACh; choline acetyl transferase (ChAT). We have targeted disruption of ChAT in two populations of innate lymphoid cells (ILC) known to contribute pulmonary inflammation in a range of disease settings, including viral infection. We are currently establishing the integrity of this Cre mediated disruption and testing for phenotype in a range of pulmonary inflammation models.

Additionally, we are testing the effects of pharmacological inhibitors of ACh on lung inflammation.

Through this work we have identified that ILC derived ACh is critcal for optimal induction of type 2 lung inflammation.

NEUROTRANSMITTERS: NON-NEURONAL FUNCTIONS AND THERAPEUTIC OPPORTUNITIES

Neurotransmitters have profound effects throughout the body, and are essential for communication between neurons, stimulation of muscle and the function of epithelial layers. It is now clear that neurotransmitters regulate a wider range of physiological responses than previously appreciated, including major influences on the immune system, and can be produced by non-neuronal sources.

In this meeting we presented new insights into how neurotransmitters function outside of the nervous system, how these roles contribute to protecting the body from disease and how these molecules can be manipulated to treat disease.

The meeting allowed existing collaborators to meet. Importantly is has also led to the establishment of new collaborations and networks.

PESTICIDES ET SYSTÈME NERVEUX : DES INTERACTIONS SUPECTES

Pesticides have been used in considerable quantities by intensive agriculture for more than half a century. Pesticide residues are found not only in water but also in our food. These pesticides pose a real public health problem for the users and the general population. Indeed, their presence even in small quantities leads to many questions about their involvement in health problems. Epidemiological studies conducted on populations exposed to these toxicants appear to show an increased risk of cancer, congenital malformations in direct progeny, infertility, neurodegenerative pathologies and immune deficiencies. It now seems to be established that highly exposed populations have an increased risk of developing neurodegenerative diseases such as Parkinson's disease and potential genetic pathologies of neurodevelopment. This hypothesis seems all the more likely to be tested because of the steady increase in mental disorders, including autism and attention disorders, with a current prevalence of 5% to 8% of the 4 million children born each year in the United States. Despite progress in the diagnosis of these pathologies, a genetic explanation currently only responds to a portion of the observed clinical cases. Environmental causes have therefore been suggested, particularly during early development stages ; pesticides are among the suspect compounds. As a matter of fact, some pesticides have been deliberately developed to target the nervous systems of organisms such as insects and mites, for example. Even if a mammal's nervous system does not always respond in the same way to these products as that of an insect, harmful interactions cannot be excluded, not to mention the effects of endocrine disruption. Other pesticides are not intended to target the nervous system, such as herbicides, but their molecular structure questions and raises doubts about their safety on the nervous system. Prof. Stéphane Mortaud (Experimental and Molecular Immunology and Neurogenetics (INEM) / CNRS, University of Orléans) gave a detailed presentation in front of a large public.

AROUND THE PROJECT

Scientific publications

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5 Logan, E.; Luabeya, A. K. K.; Mulenga, H.; Mrdjen, D.; Ontong, C.; Cunningham, A.; Tameris, M.; McShane, H.; Scriba, T. J.; Horsnell, W. G. C.; Hatherill, M. Elevated IgG Responses in Infants are Associated with Reduced Prevalence of Mycobacterium tuberculosis Infection. *Frontiers in Immunology*, **2018**, *9*, 1529.

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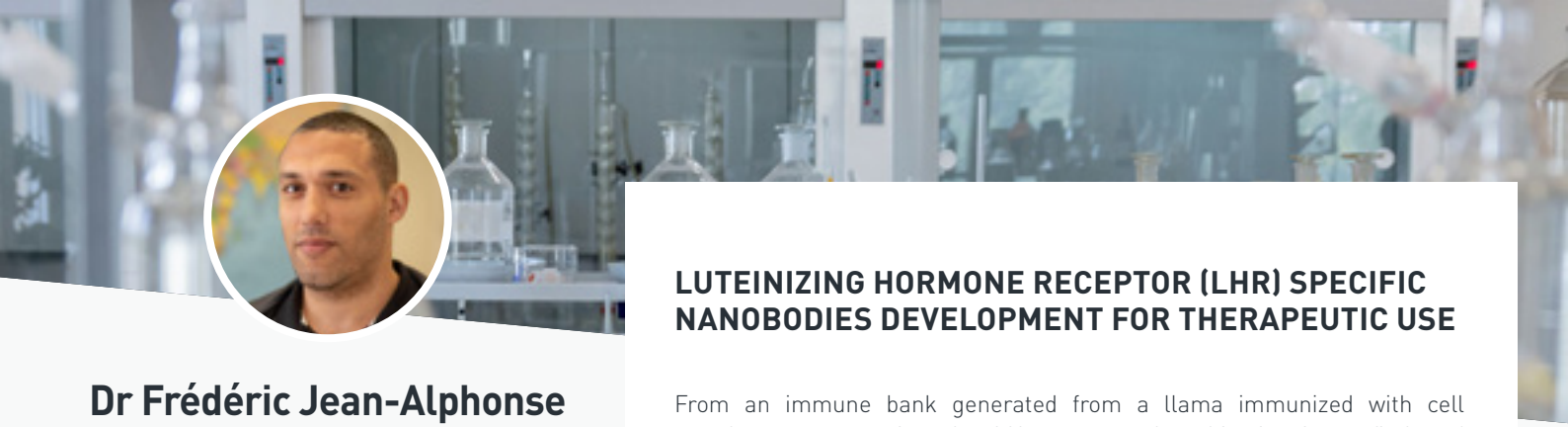
7 Jogi, O.; Svanes, C.; Siiak, S.; Logan, E.; Holloway, J.; Igland, J.; Johannessen, A.; Levin, M.; Real, F.; Schlünssen, V.; Horsnell, W. G.; Bertelsen, R. J. Zoonotic helminth exposure and risk of allergic diseases: a study of two generations in Norway, *Clinical and Experimental Allergy*, **2018**, *48*, 66-77.

8 Dewals, B. G.; Layland, L.; Prazeres da Costa, C.; Horsnell, W. G. C. Maternal helminth infections and the shaping of offspring immunity, *Parasite Immunology*, **2018**, *29*, 12599.



Dr Frédéric Jean-Alphonse

LE STUDIUM Research Fellow
ARD 2020 BIOPHARMACEUTICALS

From: University of Pittsburgh – US

In residence at: Physiologie de la Reproduction et des Comportements (PRC) - Nouzilly

Nationality: French

Dates: November, 2018 to November, 2019

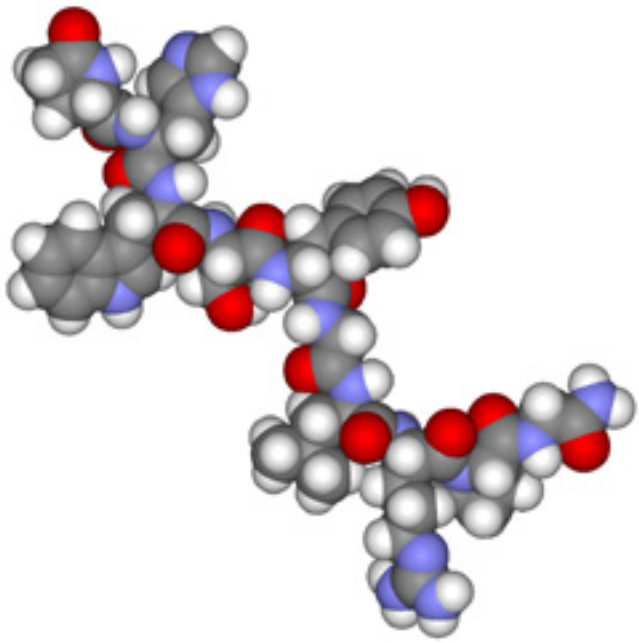
During my PhD obtained in 2008, and my two postdoctoral experiences, I've been study G Protein-Coupled Receptors (GPCRs). I characterized small molecules Gs biased ligands for the Vasopressin Receptor type 2 (V2R) and also demonstrated that these molecules act as pharmacological chaperonne to restore cell surface expression and function of several mutants of the V2R involved in the Nephrogenic Diabete Insipidus. For my first post doc at the Imperial College London 2009, I described the endocytic trafficking of the Gonadadotrophins receptors and, I identified and characterized a new endocytic compartment that we call Very Early endosomes where LHR traffics to and signal from. To further study this new concept of endosomal signaling by GPCRs, in 2013, I joined the laboratory of Prof. Vilardaga in Pittsburgh, USA. In 2017, I was promoted Research Instructor in the Department of Pharacology and Chemical Biology (University of Pittsburgh).

Dr Eric Reiter

Eric Reiter is research director at INRA Nouzilly. He has a long-standing experience of GPCR biology and pharmacology. He received his PhD in Molecular Biology from University of Liège, Belgium in 1996. The same year, he took a position of researcher at INRA, Nouzilly, France. He visited Robert J. Lefkowitz's laboratory at Duke University for two years between 2003 and 2005. He was group leader in the PRC Unit from 2006 to 2011. In 2009, he co-founded ReproPharm, a start-up from INRA. He has published 67 peer-reviewed papers that have been cited more than 3150 times. He has acted as an expert for national and international agencies. He organised 1 international congress and 2 workshops and maintains sustained editorial responsibilities for a number of journals. He is a WorkPackage leader in MabImprove LabEx and coordinates the GPCRAb project in the framework of ARD 2020 Biopharmaceuticals

LUTEINIZING HORMONE RECEPTOR (LHR) SPECIFIC NANOBODIES DEVELOPMENT FOR THERAPEUTIC USE

From an immune bank generated from a llama immunized with cell membranes expressing the LH receptor, the objective is to find and characterize VHH (nanobodies) binding the LHR, possibly at various epitopes (extracellular or intracellular). Following isolation of these VHH, their pharmacological properties (antagonists, agonists, biased ligands, allosteric modulators, etc.) will be determined. The goal of this study is to develop therapeutic tools targeting LHR function. To date, I've been involved in the development of tools for the selection of VHH. For the panning step, I designed cDNA mimicking different epitopes of the receptor (Ectodomain, C-terminus, intracellular loop 3). The different epitopes have been optimized to be expressed in mammalian cells as well as bacteria for in vitro expression. Since my arrival I also prepared my candidature for the CNRS recruitment for which I wrote my scientific project. This project has been submitted early January. Regarding the VHH/antibody project, I attended to the MabImprove retreat (Mont Dore 2019) allowing me to meet the other scientists developing therapeutic antibodies and involved in the MabImprove Labex programme.



Dr Marcelo Gustavo Lorenzo

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

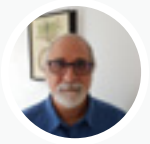
From: Oswaldo Cruz Foundation– BR

In residence at: Institute Of Research On Insect Biology (IRBI) - Tours

Nationality: Argentinian

Dates: May, 2018 to May, 2019

Marcelo Lorenzo graduated in Biology at the Univ. of Buenos Aires (1991), then became Ph.D. at the same university (1997). He had postdoctoral experience in CPqRR-FIOCRUZ (1999-2002) and the Swedish Agricultural Univ (2009-2011). He is an Invited professor at University of Tours (May 2016) and since May 2018 has initiated a stay funded by Le Studium Foundation. Main experience on insect physiology (emphasis on behavioral physiology), acting on topics such as behavior, pheromones, functional genomics, triatomines, development of baits and traps. 60 papers published on insect neuroethology. Expert ad hoc for CNPq, Le Studium, CONICET, FAPEMIG, FAPESP and other international institutions. Editorial board member for PLOS ONE, Frontiers in Ecology and Evolution and Neotropical Entomology. Recently elected Vice-President of Latin American Association of Chemical Ecology.



Prof. Claudio Lazzari

Claudio Lazzari has obtained his Master degree (Licenciatura) and PhD in Biological Sciences at the University of Buenos Aires (Argentina) with theses on the sensory systems of kissing bugs, vectors of Chagas disease. He joined during a few years the Biocybernetics laboratory at the University of Tübingen in Germany to work on insect vision. After having occupied positions at the University of Buenos Aires and CONICET (Argentina), C. Lazzari moved to France in 2003 as a full professor at the University of Tours, but keeping strong collaborative bonds with Argentinean and Brazilian laboratories. He is interested in the behavioural physiology of insects, in particular disease vectors, being mosquitoes and kissing-bugs his main experimental models. His research focuses on the adaptations of insects to the haematophagous life, using an integrative approach, which includes functional morphology, physiology, molecular biology and quantitative analysis of behaviour.

GENOMICS OF LEARNING AND MEMORY IN DISEASE VECTOR INSECTS

Goals: 1) determining whether bug learning through the PER protocol depends in a form of protein-dependent memory formation (LTM); 2) characterizing changes in expression profiles of known memory-related genes in the brain of R. prolixus exposed to a learning protocol, as compared to naïve ones; and 3) identifying a novel set of genes in the brain of R. prolixus whose expression shows clusterization with the memory-related genes above.

Experimental procedures have been evaluated through preliminary trials to allow adjusting our protocol for the transcriptome study (e.g., RNA extraction and bug learning protocols). Necessary reagents and small equipment have been ordered and some have been already incorporated in our stock. The development of drug injection protocols has been initiated for the remaining experimental approach. In parallel, we have initiated experiments to uncover the molecular bases of heat perception in triatomine bugs. This experiment is intended to determine which receptor proteins are necessary for the detection of infrared radiation emitted by hosts, which is the key stimulus utilized for the learning protocols used in the main project. These assays will require the down-regulation of target gene expression (with three independent genes called TRPA1, inactive and waterwitch) through the injection of specific dsRNA (a methodology named RNA interference). Injected insects will then be used for testing their ability to respond to thermal stimuli in comparison to intact bugs than have not been injected or bugs injected with dsRNA for a mammal gene not found in insects (mock control).

Dr Norinne Lacerda-Queiroz

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: National Institutes of Health (NIH) - US

In residence at: Molecular and Experimental Immunology and Neurogenetics (INEM) - Orléans

Nationality: Brazilian

Dates: October, 2017 to October, 2018

Norinne Lacerda Queiroz received her PhD in cell biology in 2011 from the Universidade Federal de Minas Gerais (UFMG) in Brazil. From 2012 to 2017, she was a postdoctoral fellow at the National Institutes of Health (NIH), working in the Laboratory of Malaria and Vector Research (LMVR). Norinne mostly focused on studying malaria pathogenesis and host-parasite interactions in murine models. She has experience in the area of parasitology, cell biology and immunology. She authored over 10 publications in the field of malaria, including collaborations. Currently, her research focuses on systemic damage during experimental severe malaria and especially in pulmonary pathology. A better understanding of severe manifestations during malaria might contribute to the development of new therapeutic approaches, for those often-lethal complications.

Dr Valérie Quesniaux

After a PhD in Biochemistry in France and post-doctoral fellowships at the Max Planck Institute for Immunobiology, Freiburg, Germany, she worked for 12 years at Novartis Pharma Basel, Switzerland on immunosuppressants and anti-inflammatory drugs. Back to public research in 2000, she is now Research Director and heading the research unit INEM at CNRS, Orleans, France, she extended her field of interest to the immune responses involved in lung inflammation, and host-pathogen interactions, in particular in tuberculosis and experimental severe malaria. Former coordinator of the European project "TB REACT", she contributes to several European, national or international research projects, including an International Associated Laboratory (LIA) "TB Immunity" with the University of Cape Town, South-Africa (2007-2014), and a second "LIA" on "Lung Inflammation" with the University of Sao Paulo, Brazil (since 2012).

STUDY OF PULMONARY DAMAGE IN EXPERIMENTAL SEVERE MALARIA: MALARIA-ASSOCIATED ACUTE RESPIRATORY DISTRESS SYNDROME (MA-ARDS) AND MALARIA SEPSIS INDUCED BY SECONDARY BACTERIAL INFECTION

Plasmodium parasites annually infect hundreds of millions of people and complications known as severe malaria lead to half a million deaths. Severe malaria includes cerebral malaria (CM), acute respiratory distress syndrome (ARDS), and severe anemia. Experimental malaria models are relevant to study severe malaria-associated syndromes, respecting the complexity and diversity of those manifestations.

The main goal of this project is to investigate the immunopathology of two pulmonary often-lethal major but neglected complications: malaria-associated acute respiratory distress syndrome (MA-ARDS) and malaria sepsis induced by secondary bacterial infection. It has been demonstrated that patients with malaria may develop MA-ARDS after the start of antimalarial chemotherapy, as well as succumb from hypersensitivity to secondary bacterial infection, due to exacerbated inflammatory response. As a first approach, we aim to characterise the endothelial-leukocyte interactions in a rodent model of MA-ARDS, and the detrimental role of CD8+ T cells in the context of pulmonary damage, through the involvement of adhesion molecules (LFA-1 and VLA-4) and granzyme release. In a second part, we are planning to examine the mechanisms of pulmonary damage in the context of secondary bacterial challenge, focusing on the role of free heme-associated cell death and neutrophil dysfunction.

Altogether, this study ambitions to better characterise the pathogenesis of MA-ARDS and malaria sepsis, investigating cellular and molecular mechanisms involved in the pulmonary damage and endothelial leukocyte interactions. An understanding of the mechanisms underlying the disease pathogenesis is essential for the development of new therapeutic approaches, especially adjunctive therapy, for those often-lethal complications.

MALARIA - CURRENT STATUS AND CHALLENGES

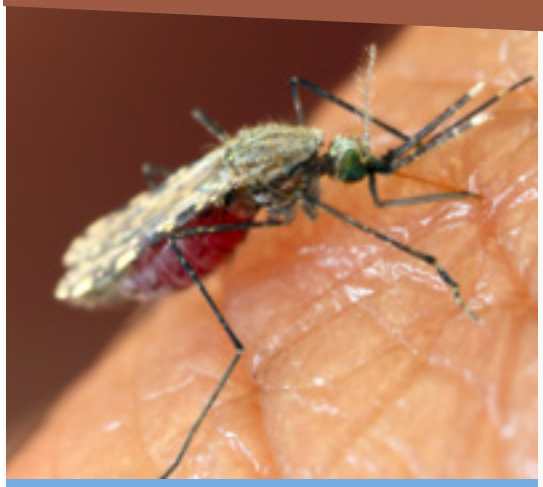
The STUDIUM Conference "Malaria - Current status and challenges" was held in Orleans, 27-28 September 2018. Malaria is caused by the protozoan Plasmodium sp. and remains a major global health issue with millions of cases annually and half a million deaths, predominantly among children under five in sub-Saharan Africa. The disease displays a spectrum of symptoms and complications and the severity in human infections is determined by complex host-parasite interactions. While much progress has been made towards reducing the burden of malaria, considerable work remains to be done in order achieve a thorough understanding of the infection and hoping to find an efficient and cost-effective way to control the disease.

This conference offered an excellent opportunity for internationally renowned scientists to present their data and share cutting-edge research in the malaria field, from basic science up to clinical applications. This meeting focused on fundamental aspects of biology, epidemiology, pathogenesis and immunity, as well as the development of new drug therapies and novel strategies for vector control in the malaria field.

MALARIA : UNE MALADIE QUI A CHANGÉ LE COURS DE L'HISTOIRE

The LE STUDIUM public lecture "Malaria : une maladie qui a changé le cours de l'Histoire" was given by Dr Norinne Lacerda-Queiroz and Dr Nicolas Riteau, from the INEM/ CNRS Orléans – France. Dr Lacerda-Queiroz is mostly dedicated to studies of malaria pathogenesis and host-parasite interactions in murine model. In parallel, she is also interested in the historical, scientific and literary aspects of infectious diseases. Dr Riteau has been recruited as a junior scientist in 2018. Nicolas studies the role of endogenous danger signals and their ability to generate sterile pulmonary inflammation.

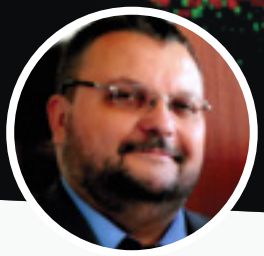
This lecture opened on transdisciplinary aspects of malaria through human history as well as an introduction to the disease, one of the most lethal infectious diseases of our time. It was followed by a description of significant historical events related with Malaria, as well as treatment evolution and the occurrence of malaria in art and literature.



AROUND THE PROJECT

Norinne Lacerda-Queiroz, Mélanie Meda, Florence Savigny, Isabelle Maillet, Bernhard Ryffel, Nicolas Riteau, Valérie Quesniaux. IFNγ signaling and pulmonary damage during *Plasmodium berghei* ANKA infection. XLIII Congress of the Brazilian Society of Immunology, Ouro Preto – MG, Brazil, 2018.

Nicolas Riteau, Florence Savigny, Corinne Panek, Norinne Lacerda-Queiroz, Malak Sbeity, Mégane Nascimento, Marc Le Bert, Bernhard Ryffel, Aurélie Gombault and Isabelle Couillin. Protective role of the nucleic acid sensor STING signaling pathway in idiopathic pulmonary fibrosis. XLIII Congress of the Brazilian Society of Immunology, Ouro Preto – MG, Brazil, 2018.



Prof. Marek Łos

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: Jagiellonian University – PL

In residence at: Molecular Biophysics Center (CBM) - Orléans

Nationality: Polish

Dates: October, 2017 to October, 2018

Pr Łos holds 2 visiting professorships (in Poland and in China) and a 'Senior Scientific Adviser' position at Linkocare AB, Linköping, Sweden. In 2003, he received the prestigious Canada Research Chair career award. Pr Łos (co-)authors about 150 scientific papers and 7 patents, edited several books and volumes. He has been serving as member of a number of editorial boards of scientific journals, as well as on grant review committees in the Europe and in Canada. Pr Łos pursues various research projects in oncology, targeted cancer therapies and regenerative medicine. His most important scientific achievements were the description of involvement of caspases in CD95 mediated apoptosis, (Los et al., 1995; Nature 375: 81-83), and the discovery of the role of kinase Akt both in the regulation of cell survival and cell death (Maddika et al, 2008, J Cell Sci; Maddika et al, 2009, Mol Cell Biol).

Dr Catherine Grillon

Dr Catherine Grillon is a CNRS researcher at the Center for Molecular Biophysics in Orleans. She has long-standing expertise in skin biology, oxidative stress, angiogenesis, physio-pathological cell microenvironment and cell interactions. She has contributed to the discovery of lectins on skin cells and lymphocytes, to the study of the role of the tetrapeptide AcSDKP in protecting stem/progenitor cells against cytotoxicity of chemotherapeutic agents. She has studied the importance of oxygen level really present in the microenvironment for skin cell activity and developed in vitro skin models respecting physioxia. Now, she is developping several projects mainly in skin biology with the aim to prevent or treat skin aging. She is co-author of 34 publications + 3 patents, is now co-leader of the axis "Skin biology", co-leader of a group of 14 people and co-responsible of the CBM PiCYFIC plateform (cytometry and cell imaging).

EFFECTS OF ELECTRO-CONDUCTIVE, BIOMATERIAL-BASED TISSUE SCAFFOLDS ON STEM CELLS AND TRANSDIFFERENTIATION- DERIVED SOMATIC CELLS.

The project focuses on the development of novel engineered artificial electro-conductive extracellular matrix materials, and characterization of their compatibility and interactions with stem cells, both under normal condition and upon stimulation with 0,2-1V, and 0,05-2,0 Hz oscillations. The engineered extracellular matrices will be obtained from combination of biodegradable polymers like for example PLGA, PCL, PLA with:

I – conductive polymers like i.e. PPy, PEDOT, PANI, in order to make the combined polymers electro-conductive,

II – carbon-based nanomaterials, like single-wall carbon nanotubes (SWCNT), and/or multi-wall carbon nanotubes (MWCNT), in order to make the combined polymers electro-conductive,

III – combination of conductive polymers, carbon-based nanomaterials, and bioactive elements, in order to achieve controlled drug release.

The nanomaterials will then be tested for biocompatibility and for other potential biologic properties, on primary somatic cells obtained either by transdifferentiation or by reprogramming with subsequent differentiation to selected cell types. Such tests will be performed both under normoxic and under hypoxic conditions. Furthermore, since natural extracellular matrix (ECM) is electroconductive, and several cell types, including muscle cells, cardiac-muscle cells and neurons are routinely exposed to electric currents, selected biocompatibility tests will also be performed under electrostimulation (0,2-1V, and 0,05-2,0 Hz oscillations).

EST-CE PARCE QU'ELLES SONT IMMORTELLES QUE LES CELLULES SOUCHES SONT FASCINANTES ?

Between 11 and 13.06.2018 in Orleans, we have organization a Le Studium conference with the title "Stem cells & cancer stem cells - regenerative medicine and cancer". The conference attracted participants from 4 continents. It was hailed by the attended scientists as an excellent multidisciplinary platform allowing for convenient exchange of ideas and as an encouragement for discussion on emerging research trends related to conference's topics. The informal contacts facilitated by the conference resulted in new collaborations. One of the younger speakers attending the conference, Prof. Shiva Abgari-Bigrami, is about to submit her application of the Senior Researcher Le Studium Fellowship (February 2019 call). Several prominent scientific presentations from the meeting will be published in the upcoming special volume of The European Journal of Pharmacology, hence providing further publicity not only for the speakers but also for the Le Studium organization.

STEM CELLS & CANCER STEM CELLS - REGENERATIVE MEDICINE AND CANCER

"Stem cells & cancer stem cells - regenerative medicine and cancer". Due to the rapid development of science and technologies within the areas of 'stem cells', 'biomaterials', and 'regenerative medicine', the presentation addresses the urgent need for providing a relevant information to a broader audience, on the cellular, and biomaterial aspects of regenerative medicine, as well as on the associated ethical issues. This is very important for the development of a mutual understanding between three separately functioning areas of science & medicine and their importance for the society. The presented latest technologies foster interdisciplinary relationships that will lead to solutions for the significant challenges faced by today's medicine, and society in general. The presentation also reflected upon the homeostatic balance created by apoptosis and proliferating tissue stem cells, the naturally regenerative capacities of various tissue types, various differentiation protocols, and more...

AROUND THE PROJECT

Scientific publications

1 Hashemi, M.; Bahari, G.; Markowski, J.; Małecki, A.; Łos, M. J.; Ghavami, S. Association of PDCD6 polymorphisms with the risk of cancer: Evidence from a meta-analysis, *Oncotarget*, **2018**, *9*, 24857-24868.

2 Hashemi, M.; Bahari, G.; Tabasi, F.; Markowski, J.; Małecki, A.; Ghavami, S.; Łos M. J. LAPTM4B gene polymorphism augments the risk of cancer: Evidence from an updated meta-analysis,*J Cell Mol Med*, **2018**, *22*, 6396-6400.

3 Wcisło-Dziadecka, D.; Simka, K.; Kaźmierczak, A.; Kruszniewska-Rajs, C.; Gola, J.; Grabarek, B.; Hybiak, J.; Grillon, C.; Mazurek, U.; Łos, M.J. Psoriasis Treatment Changes the Expression Profile of Selected Caspases and their Regulatory MicroRNAs, *Cell Physiol Biochem*, **2018**, *50*, 525-537.

4 Alizadeh, J.; Shojaei, S.; da Silva Rosa, S.; Rezaei Moghadam, A.; Zeki, A. A.; Hashemi, M.; Los, M. J.; Gordon, J. W.; Ghavami, S. Detection of Small GTPase Prenylation and GTP Binding Using Membrane Fractionation and GTPase-linked Immunosorbent Assay, *J Vis Exp.*, **2018**, *11*, 141.

Books or book chapters

5 *Book: "Stem Cells and Biomaterials for Regenerative Medicine"* 1st Edition, *edited by* M. J. Łos, A. Hudecki, E. Wiechec; **Elsevier Academic Press**, (2018), **ISBN**: 9780128122587.

6 Łos M.J., Skubis, A., and, S. Ghavami #2: *"Stem cells"*, in *"Biomaterials, Stem Cells & Regenerative Medicine – in Brief"*, Eds.: Hudecki A, Wiecheć E, and M. J. Łos, (2018), **Elsevier Academic Press**, (2018), **ISBN**: 9780128122587.

7 Wiechec E., Hybiak J., Kieda C., #6: *"Introduction to Transplantology"* in *"Stem Cells and Biomaterials for Regenerative Medicine"* 1st Edition, *edited by* M. J. Łos, A. Hudecki, E. Wiechec; **Elsevier Academic Press**, (2018), **ISBN**: 9780128122587.

8 Hudecki A, Kiryczyński G, and M. J. Łos, #7: *"Biomaterials, Definition, Overview"* in *"Stem Cells and Biomaterials for Regenerative Medicine"* 1st Edition, *edited by* M. J. Łos, A. Hudecki, E. Wiechec; **Elsevier Academic Press**, (2018), **ISBN**: 9780128122587

9 Łos M.J., Panigrahi S., Sielatycka K. and C. Grillon #13: «*Successful Biomaterial-Based Artificial Organ—Updates on Artificial Blood Vessels*» in *"Stem Cells and Biomaterials for Regenerative Medicine"* 1st Edition, *edited by* M. J. Łos, A. Hudecki, E. Wiechec; **Elsevier Academic Press**, (2018), **ISBN**: 9780128122587.

Prof. Igor Lima Maldonado

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: Federal University of Bahia - BR

In residence at: Imaging and Brain laboratory (iBrain) - Tours

Nationality: Brazilian

Dates: January, 2018 to January, 2019

IL Maldonado (BMath, MD, PhD) is Neurosurgeon and Researcher. For the previous six years, he worked as a professor and neurosurgeon at the Federal University of Bahia, where he was head of the Laboratory of Anatomy, and oversaw the implantation of the Neuromusculoskeletal Unit, a novel department which assembled different specialties related to the nervous and locomotor systems. His works have targeted the functional anatomy of the white matter, intraoperative mapping in awake patients, and endovascular therapies for cerebrovascular diseases. He is an executive member and former vice-president of the Anatomy Committee of the World Federation of Neurosurgical Societies, whose mission is to promote the neurosurgical anatomy among neurosurgeons and researchers worldwide. Following his fellowship, IL Maldonado was recruited by the Tours University Hospital and continued to perform research activities in the iiBrain Unit.

Prof. Christophe Destrieux

Christophe Destrieux serves as a staff Neurosurgeon in Tours University Hospital since 1998. He is mainly interested in low-grade gliomas, epilepsy and stereotactic surgery. He spent one year (1997) in University of Utah (Salt Lake City, USA), where he developed an atlas of the human cortex for the FreeSurfer package. He obtained his PhD in 2009 (Univ. Tours), where he served as an assistant professor until 2011, when he became Professor. After cortical and surgical anatomy, his research now mainly focuses on brain white matter anatomy. He runs the Fibratlas project, which aims to validate MRI tractography by dissection. He teaches general anatomy to medical students and is invited worldwide several times each year to teach surgical anatomy to neurosurgical residents

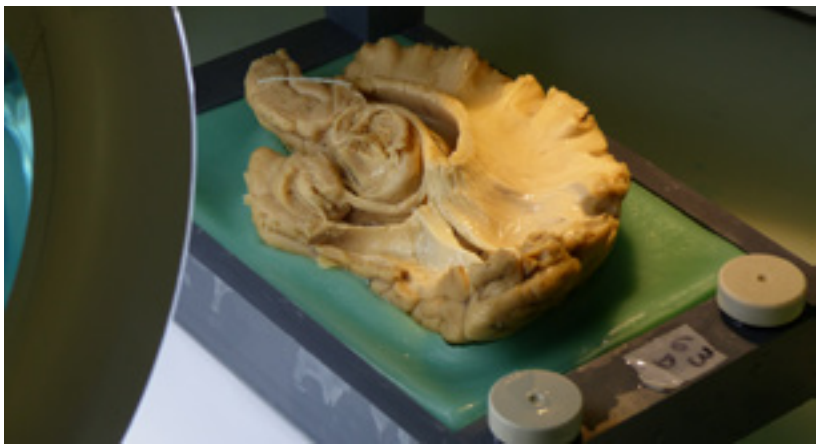
CHARACTERIZATION OF LIMBIC SYSTEM CONNECTIVITY THROUGH FIBER DISSECTION AND DIFFUSION IMAGING TECHNIQUES

This research project aims to better describe white matter tracts of the limbic system using both fiber dissection, and in and ex vivo Diffusion Weighted Imaging (DWI) techniques at various spatial resolutions. This multiple approach will: (1) improve the current anatomical knowledge on limbic connectivity; (2) validate in and ex vivo tractography by comparison to fiber dissection considered as a ground truth; (3) describe functional roles of limbic white matter tracts by studying correlations between neuropsychological alterations and microstructural changes examined by DWI.

The main white matter fasciculi of the limbic system are the cingulum, the fornix, the mammillothalamic tract and the thalamic radiations. The cingulum, the largest one, is a long association tract inside the white matter of the cingulate gyrus, which is part of the middle aspect of the cerebral hemisphere, and classically associated with emotion processing.

It has been suggested that the cingulum may also be a route for extra-limbic pathways, whose importance may be greater than previously estimated. In our laboratory, the morphology of the such limbic and extralimbic connections has been detailed using Diffusion Tensor Imaging (DTI) tractography and fiber dissection techniques. The results put a spotlight on direct frontoparietal interlobar pathways. Direct transcingular tracks between the anterior medial frontal cortex and the precuneus has been found in the great majority of the examined cerebral hemispheres with both in-vivo (DTI) and ex-vivo techniques (fiber dissection). Their terminations were detailed and corresponded mainly to the Brodmann areas (BA) 8, 9 and 32. With respect to these extensive connections, some processes that were not classically associated with the cingulum are discussed, such as the initiation of motor activity, executive functions, DMN, social cognition and consciousness. We consider that these observations plead for a pivotal rethinking of the main role of the cingulum in the human brain, as probably the primary interconnecting system of the medial aspect of the cerebral lobes.

We also examined the spatial disposition and anatomical relationships of the surrounding tracts, the cingulum subcomponents, and the diffusion characteristics of the white matter, to check for specific associations with age or neuropsychological alterations, the last part of this project. The subject has important implications in neuropsychology, for the modeling of cognitive functions, for the interpretation of manifestations of cerebral white matter diseases, and for the development of surgical approaches to the cerebral parenchyma.



FRONTIERS IN CONNECTIVITY: EXPLORING AND DISSECTING THE CEREBRAL WHITE MATTER

We are very proud to have concretized our LE STUDIUM CONFERENCE in Tours, France.

This conference illustrated the growing importance of the cerebral white matter anatomy. The recent researches on the tridimensional organization and the functional role of the white matter components was a subject of major interest. The importance of this field for the modeling of higher functions, and the progress of the treatment of cerebral tumors was deeply discussed.

The meeting was followed by a hands-on white matter dissection workshop, organized by the European Association of Neurosurgical Societies.

We will have the great pleasure and the honor to welcome among us highly qualified speakers from leading institutions in the field from different countries in Europe, North America, and South America. The meeting was marked by intense networking and discussions about possible future collaborations.

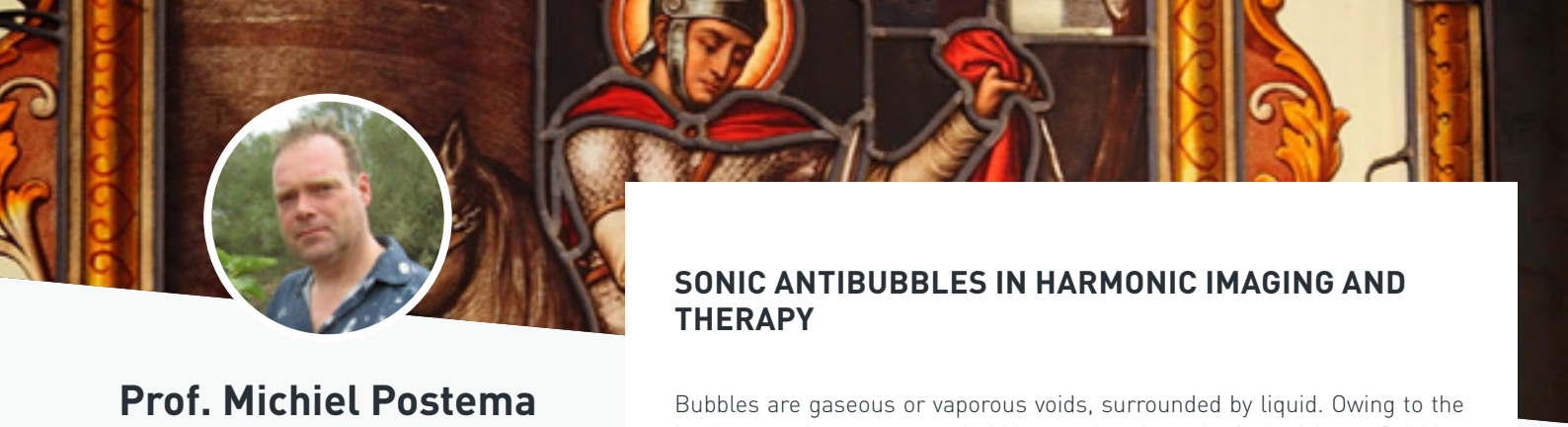
AROUND THE PROJECT

Book Chapters

1 Maldonado IL, Zemmoura I, Destrieux C. Gross anatomy of the Human Insula. In: Turgut M, Yurttas C, Tubbs RS, editors. *Island of Reil (insula) in the human brain : anatomical, functional, clinical and surgical aspects*. Cham: Springer. **2018**. p 15-22.

2 Maldonado IL, Zemmoura I, Destrieux C. Middle longitudinal fasciculus in the human brain from fiber dissection. In: Turgut M, Yurttas C, Tubbs RS, editors. *Island of Reil (insula) in the human brain : anatomical, functional, clinical and surgical aspects*. Cham: Springer. **2018**. p 71-75.

3 Destrieux C, Maldonado IL, Terrier L-M, Zemmoura I.Surgical anatomy of the insula. In: Turgut M, Yurttas C, Tubbs RS, editors. *Island of Reil (insula) in the human brain : anatomical, functional, clinical and surgical aspects*. Cham: Springer. **2018**. p 23-37.



Prof. Michiel Postema

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: University of Bergen - NO

In residence at: Imaging and Brain laboratory (iBrain) - Tours

Nationality: Dutch

Dates: February, 2017 to January, 2018

Michiel Postema graduated in Geophysics from Utrecht University. Following a Doctorate in the Physics of Fluids (Twente), he worked in research positions across the globe concentrating on medical and nonmedical microbubble behaviour in sound fields. He was appointed Professor of Experimental Acoustics at the University of Bergen in 2010, Erasmus Visiting Professor of Astrophysics at the University of Dundee in 2012, Visiting Professor of Electrical Engineering at the University of the Witwatersrand in 2015, Ordinary Professor of Ultrasound at the Polish Academy of Sciences in 2016. After his residency in France, he was granted the position of Distinguished Professor of Biomedical Engineering at the University of the Witwatersrand.
As part of the Le Studium Fellowship, Michiel successfully defended a Habilitation on the topic acoustic cells and antibubbles at the University of Tours.

Dr Ayache Bouakaz

Ayache Bouakaz is a Research Director and Team Leader at "Imagerie & Cerveau" joint research unit U1253, Inserm, University of Tours. His research focuses on imaging and therapeutic applications of ultrasound, microbubble contrast agents and transducer design. He graduated from the University of Sétif, Algeria, and obtained a PhD at the Institut National des Sciences Appliquées de Lyon, France. In 1998, he joined the Bioengineering Department at The Pennsylvania State University (USA) and later moved to the Erasmus University Medical Center of Rotterdam in the Netherlands. He is Associate editor for IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, a member of the editorial board of the Journal of Ultrasound in Medicine and Biology, and a Member of the technical committee of the IEEE Ultrasonics International Symposium.

SONIC ANTIBUBBLES IN HARMONIC IMAGING AND THERAPY

Bubbles are gaseous or vaporous voids, surrounded by liquid. Owing to the Laplace surface pressure, bubbles tend to be spherical of form. Bubbles smaller than 10 µm are referred to as microbubbles. When subjected to a sound wave, microbubbles oscillate, i.e., they repeatedly contract and expand. A microbubble oscillation radiates a sound field itself, which can be detected by a transducer or a hydrophone. So-called ultrasound contrast agents consist of microbubbles, encapsulated by elastic shells. These agents are commonly used in clinical diagnostic imaging but are also of interest in therapeutic settings. The encapsulating shells prevent the microbubbles from dissolving quickly after having been administered intravascularly into a patient.

Studying the dynamic behaviour of acoustic microbubbles has been the primary research topic of the host laboratory and the guest scientist. Specifically, we have used high-speed photography to observe microbubbles under sonication. Furthermore, we have worked on optical and acoustical theory to model and predict encapsulated microbubble dynamics.

In order to enhance ultrasound imaging, we investigated pulse forms before administering bubbles. These findings have been published.

For diagnostic imaging and drug delivery application, the dynamic behaviour of antibubbles under sonication needed to be predicted in greater detail, with a focus on harmonics generation and antibubble disruption.

An objective was to generate a mathematical model of antibubble dynamics, incorporating solid and viscoelastic shells. Furthermore, the harmonic response of antibubbles was to be studied experimentally using multi-frequency probes.

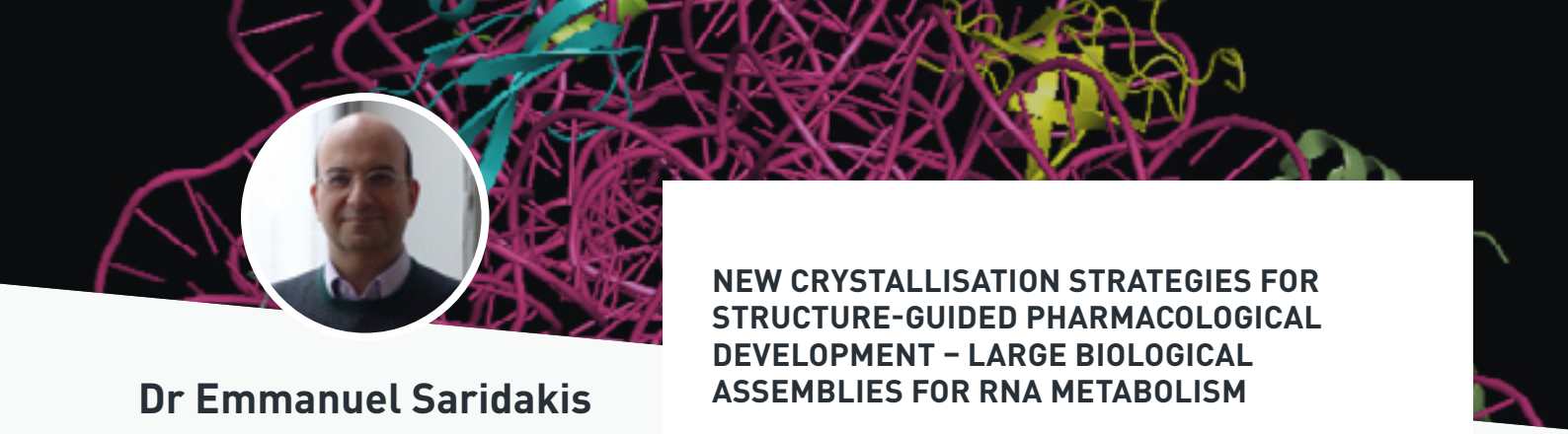
AROUND THE PROJECT

Scientific Publications

1 Postema, M.; Bouakaz, A. Acoustic bubbles in therapy: recent advances with medical microbubbles, clouds, and harmonic antibubbles, *Applied Acoustics*, **2018**,*140*, 150-152.

2 Postema, M.; Novell, A.; Sennoga, C.; Poortinga, A. T.; Bouakaz, A. Harmonic response from microscopic antibubbles, *Applied Acoustics*, **2018**, *137*, 148-150.

3 Trots, I.; Nowicki, A.; Postema, M. Ultrasound image improvement by code bit elongation, *IEEE Signal Processing Letters*, **2018**, *25*, 437-441.



Dr Emmanuel Saridakis

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

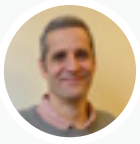
From: Institute of Nanoscience and Nanotechnology N.C.S.R. «DEMOKRITOS» – GR

In residence at: Molecular Biophysics Center (CBM) - Orléans

Nationality: Greek

Dates: January, 2017 to January, 2018

Emmanuel Saridakis is Principal Researcher at the Institute of Nanoscience and Nanotechnology, National Centre for Scientific Research "Demokritos", Athens, and an Honorary Research Fellow at the Faculty of Medicine, Imperial College London. He obtained his Ph.D. in 1995 at the Biophysics Group, Physics Department, Imperial College London. He is a protein X-ray crystallographer, focusing his research on the theory and methodology of macromolecular crystallogenesis, as well as on solving crystal structures of proteins of biomedical interest. His current projects include crystal nucleation on porous and functionalised nanomaterials, thermodynamics aspects of crystallisation, and structure determination of proteins and complexes of medical interest, with a view to rational drug design. He has 42 publications in peer-reviewed international journals (>2100 citations, h-factor 23).



Dr Marc Boudvillain

Marc Boudvillain is a Research Director with CNRS and a Principal Investigator at CBM in Orléans. Educated as a chemist, he obtained a PhD in Molecular Biology and Biophysics from the University of Orléans in 1996. From 1996 to 1999, he was a postdoctoral Research Scientist at Columbia University and Howard Hughes Medical Institute in New York, working with Anna Marie Pyle. Since 2000, he is a tenured CNRS scientist at CBM coordinating the activities of the team "Aspects Moléculaires du Vivant" and heading its RNA biochemistry research group. His main research interests revolve around structure-function relationships in RNA-based systems with a particular focus on RNA remodeling by RNA helicases. Most of his recent work has been devoted to the transcription termination factor Rho, and to the development of combinatorial RNA biochemistry tools to probe the structure and mechanisms of RNA-protein complexes.

NEW CRYSTALLISATION STRATEGIES FOR STRUCTURE-GUIDED PHARMACOLOGICAL DEVELOPMENT – LARGE BIOLOGICAL ASSEMBLIES FOR RNA METABOLISM

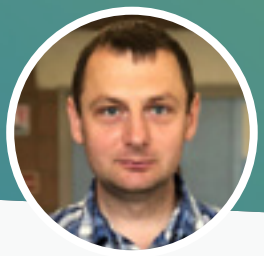
The project aims at the crystallisation and elucidation of the three-dimensional structure of the transcription termination factor Rho, a key regulator of RNA metabolism in the cell, being thus at the heart of protein expression programs. It is quasi-ubiquitous in bacteria but absent from eukaryotic organisms, which makes it a very interesting potential antibacterial pharmacological target. Besides contributing to the punctuation of transcription units in the genome, Rho mediates riboswitch-dependent gene regulation, maintains chromosomal integrity and suppresses expression of harmful horizontally-acquired genes.

The functional Rho is a homohexamer, comprising six hydrolysis pockets and multiple RNA-binding sites (which can also bind DNA). These features make its crystallisation an intricate and highly multi-parametric undertaking. In this project, we are focusing on an organism of obvious medical interest, Mycobacterium tuberculosis, the Rho factor of which presents distinct characteristics, in its primary structure as well as its functionality (it is for example refractory to the natural antibiotic bicyclomycin, the only available Rho-targeting drug).

The project has therefore a fundamental research aspect and a long-term applied aspect, namely the development and/ or optimisation of novel antibacterial drugs. As a side-benefit of this project, it provided a challenging stimulus for the development and application of more unconventional and novel crystallisation techniques and approaches.

Our work to date has resulted in the crystallisation of a single-point mutant (T501K) of M. tuberculosis Rho, and the collection of an X-ray dataset at low resolution, at the SOLEIL synchrotron. The wild-type Rho has also been crystallised, but crystals were smaller. Crystallisation was possible only after removal of a likely disordered domain of the macromolecule, by in situ proteolysis. In the process of screening for potential crystallisation conditions optimal ligands (ATP-analogues and oligonucleotides) for the M. tuberculosis Rho were discovered, information which can prove very useful for further studies.

In the framework of the project, a novel contribution to the theoretical understanding of protein crystallogenesis leading to new crystallisation screening methodology (based on the Hofmeister series of salts) has been developed, and is now being finalised for publication.



Dr Volodymyr Sukach

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: National Academy of Sciences of Ukraine - UA

In residence at: Institute of Organic and Analytical Chemistry (ICOA) - Orléans

Nationality: Ukrainian

Dates: November, 2017 to November, 2018

Volodymyr Sukach graduated from the Chemistry Department of Taras Shevchenko National University of Kyiv and received his PhD in 2007 at the Institute of Organic Chemistry (IOCh), National Academy of Sciences of Ukraine. He was appointed a permanent position as senior research scientist (2010-2017) at IOCh. Dr V. Sukach is an author of 36 journal publications, 3 book chapters, 3 patents and 27 communications in conferences. For his expertise in organofluorine chemistry, he was invited to work as a visiting scientist at Jacobs University Bremen (DFG grant "Initiation of International Collaboration", Germany, 2014). His main research activities concern the development of asymmetric organocatalytic methodologies for the preparation of chiral fluoroalkyl substituted small synthetic building blocks and heterocyclic compounds with a special focus on fluoroalkyl ketimine chemistry and medicinal chemistry

Prof. Isabelle Gillaizeau

Isabelle Gillaizeau obtained her PhD in 1997 in asymmetric synthesis from the University of R. Descartes (Paris VI) under the direction of Professor H.-P. Husson and Dr J. Royer (ICSN, Gif-sur-Yvette). She conducted postdoctoral studies first at the University College of London (98), then at Ecole Polytechnique (99) in Palaiseau and at the University of Nantes (99-2000). Since 2010, she is a full professor at the Institute of Organic and Analytical Chemistry in Orleans and the leader of the team "Methodological study in Heterocyclic chemistry and Green Chemistry." She has a longstanding expertise in the development of versatile methodologies for the synthesis of diverse original nitrogen-containing frameworks based on the catalytic functionalization of various cyclic or acyclic non-aromatic enamides.

EXPLORING THE EFFECTS OF TRIFLUOROMETHYL GROUP IN THE DESIGN OF ORGANOCATALYSTS, ENZYME INHIBITORS AND IN THE CONFORMATIONAL CONTROL OF SATURATED NITROGEN-CONTAINING HETEROCYCLES.

The trifluoromethyl group plays an important role in the design of novel pharmacologically active agents since its introduction into organic compounds often leads to improved potency, stability and activity in vivo. Our objective was to propose an interdisciplinary project including methodological studies, structure investigations, and organocatalytic transformations of a range of trifluoromethyl-containing ketimine derivatives with potent biological activity. We focused on the study of specific effects of trifluoromethyl group that could provide novel tools in molecular design of more efficient organocatalysts for asymmetric synthesis and pharmacologically promising nitrogen containing heterocyclic compounds. These effects include activation of NH-ketimine function for addition of carbon-based nucleophiles giving rise to previously unknown amino acids derivatives and contribution to the energy of protein-ligand binding. Later effect is due to a remarkable intramolecular through-space interaction of fluorine atom that is present in the ligands with electrophilic sp2-hybridized carbon atom of the protein backbone and residues.

To study this effect new trifluoromethyl substituted nitrogen containing heterocycles possessing electrophilic functional groups were synthesized and characterized as model compounds by X-ray diffraction and NMR methods as well as computational approaches. The work has established a collaboration between experienced scientists representing both IOCH NAS of Ukraine (Pr. M. Vovk, Pr. A. Rozhenko) and ICOA, University of Orleans in France (Pr. I. Gillaizeau). We synthesized novel heterocyclic compounds featuring a strong orthogonal through-space interaction between the fluorine atoms of trifluoromethyl group and the carbon atom of the corresponding electrophilic counterpart represented by protonated C=N function from the imidazoline substituent. The results of DFT and ab initio calculations supported the plausible diaxial conformation preference due to the mainly electrostatic Carbon-Fluorine orthogonal dipolar interaction that was afterwards confirmed experimentally by XRD study of the single crystal.

ß-Amino acids bearing a trifluoromethyl group at the ß-position are unique intermediates in the design of bioactive peptidomimetics, promising monoacylglycerol acyltransferase type 2 inhibitors and modulators of metabotropic glutamate receptor. As part of our ongoing research, we developed a modification of the Rodionov reaction that is perfectly applicable to arylfluoroalkyl ketones, which usually cannot be used as substrates under the standard conditions. This protocol utilizes lithium hexamethyldisilazide as an ammonia synthetic equivalent to generate the intermediate NH-ketimines for subsequent substrate-catalyzed decarboxylative addition of malonic or tartronic acid. Using the general procedure, previously challenging to prepare fluoroalkyl-substituted ß-amino acids were directly synthesized in practical and scalable fashion.

The structures of our original fluoroalkyl substituted compounds are under investigation in the in silico fragment-based design of novel protein kinase inhibitors where we focus on the trifluoromethyl substituent as a unique structural feature to achieve specific attractive interactions with the protein target. This work has been initiated in collaboration with Pr. P. Bonnet (Structural Bioinformatics and Chemoinformatics of the ICOA).

PROGRESS IN ORGANOFLUORINE CHEMISTRY

ICOA, together with LE STUDIUM Loire Valley Institute for Advanced Studies organized an international scientific meeting "Progress in Organofluorine Chemistry" in Orléans, France.

This symposium brought together an international panel of world renowned keynote speakers who presented cutting edge lectures covering recent progress and perspectives in organofluorine chemistry. Fluorine-containing compounds are of high interest in organic chemistry as they have found in a wide range of applications in pharmaceuticals, agrochemicals, medical imaging, polymers and material science. The conference aimed to highlight new synthetic strategies for fluorine incorporation into organic molecules, and to demonstrate the unique potential of fluorine in modulating their structural, physical and biological properties.

Plenary and invited lectures were complemented by the presentation of oral communications given by young scientists, as well as posters. Altogether we hope that this conference favored not only new discoveries but also the exchange of ideas for further collaborations and development.

VIN ET CHIMIE, AMIS OU ENNEMIS ?

LE STUDIUM public lecture entitled "Wine and chemistry: friends or enemies?" was presented by Dr. Pascal Bouyssou from Institute of Organic and Analytical Chemistry (ICOA/CNRS), University of Orléans.

Chemistry and wine are two words that the general public often opposes. However, chemistry is in wine! From the plants which, starting from very simple molecules, elaborate complex structures and great molecular diversity, to the bottle where the wine continues its slow evolution, the audience has discovered, through the grapevines and the cellars, an exciting story of this chemistry.

AROUND THE PROJECT

Oral Communications

1 Sukach, V.A. 4-Trifluoromethylpyrimidin-2(1H)-ones in organocatalytic decarboxylative addition of malonic acid and its derivatives. Journées de la Section Régionale Centre-Ouest (SCF), Université de La Rochelle, La Rochelle (France), February 7-9, 2018.

2 Sukach, V.A. Fluoroalkyl ketimines in decarboxylative Mannich reaction, Le Studium Conference: Progress in Organofluorine Chemistry, Orléans (France), October 15-17, 2018.

Poster

1 Sukach, V.A., Melnykov, S.V., Vovk, M.V., Gillaizeau, I. A modification of the Rodionov reaction for the synthesis of ß-fluoroalkyl ß-amino acids, XXII International Conference on Organic Synthesis, Florence (Italy), September 16-21, 2018.

2 Sukach, V.A., Melnykov, S.V., Vovk, M.V., Gillaizeau, I. Le Studium Conference: Progress in Organofluorine Chemistry, Orléans (France), October 15-17, 2018.

3 Sukach, V.A., Bertho, S., Melnykov, S.V., Vovk, M.V., Diachenko, I., Gillaizeau, I. Synthesis of ß-fluoroalkyl ß-amino acids via a modification of the Rodionov reaction, Carbohydrate and Fluorine Symposium, Poitiers (France), October 18-19, 2018.

4 Sukach, V.A., Melnykov, S.V., Vovk, M.V., Bertho, S., Gillaizeau, I. ß-Fluoroalkyl ß-amino acids – effective reagents for preparation of 3,4-dihydroquinolin-2(1H)-one derivatives, 8th International Conference "Chemistry of Nitrogen Containing Heterocycles", Kharkiv (Ukraine), November 12-16, 2018.

5 Melnykov, S.V., Sukach, V.A., Tkachuk, V.M., Vovk M.V. Organocatalytic decarboxylative addition of malonic acid, its derivatives and ketoacetic acids to 4-(trifluoromethyl) pyrimidin-2(1H)-ones, 8th International Conference "Chemistry of Nitrogen Containing Heterocycles", Kharkiv (Ukraine), November 12-16, 2018.

Dr Agnieszka Synowiec

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: University of Agriculture in Krakow - PL

In residence at: Laboratory of Woody Plants and Crops Biology (LBLGC) - Chartres

Nationality: Polish

Dates: **September, 2018 to September, 2019**

Dr Agnieszka Synowiec is a weed scientist from the Department of Agrotechnology and Agricultural Ecology at the University of Agriculture in Krakow. Her scientific interests concern weed resistance to herbicides and allelopathic interactions between weeds and crops. She also carried out research on botanical herbicides and on endomycorrhizal associations in maize at the Faculty of Land and Food Systems of University of British Columbia in Vancouver, Canada. She is a co-author of 55 peer-reviewed papers, 2 book chapters and 45 communications at national and international conferences. She is an active member of European Weed Research Society and International Allelopathy Society. At present, she is the main investigator in a national grant entitled «Anti-resistance strategy in weed management as an important factor of the sustainable development of agroecosystem" (2017-2020).

Dr Christophe Hano

Dr. Christophe Hano is associate professor, phytochemist and plant molecular biologist at the LBLGC Lab (INRA USC1328 Orleans University) working on the regulation of the biosynthetic pathways of plant specialized metabolites in relation with plant development and impact of environment. Using combined and integrated approaches coupling metabolomics, fluxomics and transcriptomics analysis the main goals of this research are to determine the favorable conditions for the production of plant specialized metabolites and to identify metabolic locks. In brief: he has published more than 60 papers in international Scientific Journals; he is secretary of the French Plant Specialized Metabolism network and member of the Phytochemical Society of Europe. He is also scientific expert for more than 50 International Scientific Journal, Editorial board members and/or Guest Editor for several Journals in the fields of plant natural products.

BIOLOGICAL EFFECTS OF ESSENTIAL OILS

Chemical intensification of agricultural production has led to significant pollution of soils and ground waters. It is also a cause of a significant decrease of biodiversity in agriculture. Taking these issues into account, there is an urgent need to find new solutions for pest management in agriculture, which are environmentally friendly and socially acceptable.

This research project involves the development of innovative methods of essential oils application, as solid preparations. Research hypothesis assumes that the chemical substances contained in the essential oils enclosed in the microcapsules, exhibit phytotoxic effect against weeds, in the absence of such effects against crops. Another assumption is that the essential oils do not decrease the soil microbial diversity or may even increase it, by stimulating the beneficial soil-borne microbiota.

There are three experiments carried out within this project.

1) Dose-response and biochemical effect of microencapsulated EOs (MEOs) on maize, Chenopodium album (L.) and Echinochloa crus-galli ((L) P.Beauv.) initial growth. The experiment is performed in the glasshouse, with five doses of each of EOs and control. Up to date, a series for maize (4 agronomic cultivars) response to the MEO of peppermint was performed. The detailed morphometrical analyses of maize enabled us to draw a dose-response curve and set a ED50 dose (a dose responsible for a 50% reduction of maize performance). Based on that the new doses of MEO of peppermint were calculated for the both weed species, and a new set of experiment is planned in January 2019. In this experiment we will also perform biochemical analyses of maize plants treated with MEOs, namely level of benzoxazonoids and abscisic acid in the maize leaves. These compounds indicate allelopathic stress in plants in response to the stress posed by the application of MEOs. (photo maize-ED50)

2) The effect of MEOs on the mycorrhizal associations on maize roots. Mycorrhizal fungi i.e. Glomus sp. are important symbiotic organisms, responsible for the improved uptake of nutrients by the plant roots, mostly phosphorus. These associations are sensitive to number of stress factors. In this experiment we study the effect of two doses MEOs on the intensity of colonization of maize roots by Glomus intraradices. The specific fungi structures, namely hyphae, vesicles and arbuscules in the maize roots are stained, and next assessed under the light microscope, using the intersection method. The first results show that the soil-applied MEO of peppermint at a high dose interrupts the development of G. intraradices, which is observed as a reduced development of hyphae and lack of arbuscules. (photo AMF-maize)

3) The effect of soil-applied MEOs on the overall microbiological activity of three different soils, using a colorimetric method. The experiment is performed in the laboratory conditions for sandy and acidic brown soil, loamy soil, and calcacerous rendzinas soil in the three temperature and four soil-humidity regimes. The soil biological activity is assessed by the spectrophotometer. The first results indicate that sandy soil with addition of MEO of peppermint, incubated for 7 days in 10 C, sustains it microbiological activity at the level of a control treatment (without the addition of MEOs). At the same time, an increased soil humidity promotes the microbiological activity of the soil.(photo sol-INRA)

Dr Thimmalapura Marulappa Vishwanatha

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: University Medical College Groningen - NL

In residence at: Molecular Biophysics Center (CBM) - Orléans

Nationality: Indian

Dates: July, 2018 to January, 2019
February, 2019 to January, 2020

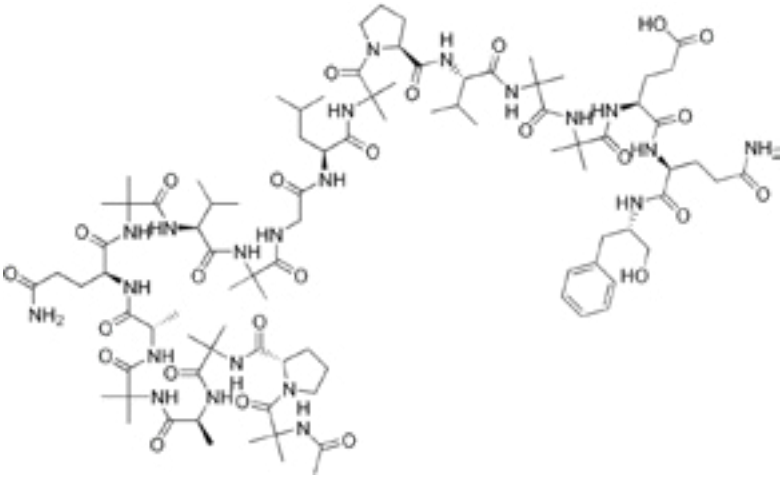
I have joined the Prof. Sureshbabu laboratory (Bangalore University, India) in July 2009 for a Ph.D program. The main objectives of my research work were the design and synthesis of a novel class of peptidomimetics. After finished my Ph.D. in 2014, Alexander Dömling (University of Groningen, The Netherlands) offered a postdoc position to work on multicomponent reactions. I am very fortunate to have had an additional experience to work on radiochemistry laboratory at the medical college under the guidance of Prof. Elsinga. I have committed for the opportunity to expand my ideas and past research activities for the synthesis of complex structures such as peptides and proteins. I worked as a postdoc in Dr. Aucagne's group on drug discovery and organosulfur-based peptidomimetic synthesis. I received few award grants such as CSIR senior research fellowship, travel grant to attend the 2018 International Symposium on Chemical Biology in Geneva.

DEVELOPMENT OF NOVEL CHEMOSELECTIVE LIGATION TECHNIQUES FOR PROTEIN SYNTHESIS

The production of proteins by chemical synthesis is a very promising alternative to biotechnological techniques for applications to the deciphering of biological mechanisms at the molecular level, drug discovery and synthetic biology. It is particularly useful for accessing site-specifically modified proteins. Current technologies focus on the modular assembly of unprotected peptide fragments, through highly selective «chemical ligation» reactions. This approach revolutionized the field some thirty years ago and is gradually being democratized for the synthesis of small proteins (50-100 amino acids). However, access to more ambitious targets in terms of size or molecular complexity remains a real tour de force.

Only a very few of such chemical ligations reactions are currently available, and the development of novel ligation techniques is a major challenge in the field. My project goal is to re-investigate a few known organic chemistry reactions and to transform them into fully chemoselective reactions compatible with protein chemical synthesis. Within this aim, I envisage to exploit these reactions by fine tuning the conditions and reagents to bring innovative applications in the field of protein chemistry.

In the first objective I propose to explore the coupling of peptide thioacids with peptide isocyanides using a methodology to date only applied to small protected peptide segments. Chemoselectivity and application to large coupling segments will be studied in detail, requiring in particular the development of a synthetic route to unprotected peptide isocyanides. In the second objective, peptide thioacids will be coupled to N-activated peptides (imidazolyl ureas) using a methodology to date only applied to carboxylic acids and not thioacids. Chemoselectivity of the reaction will be scrutinized following a similar approach as for the first objective.



Dr Vincent Aucagne

Vincent Aucagne received his PhD from the University of Orléans (2002), working with Patrick Rollin on the development of synthetic methodologies to elaborate carbohydrate mimics. Following post-doctoral research with Prof. David Leigh at the University of Edinburgh (2003-2006) in the field of mechanically-interlocked architectures and molecular machines, he returned to Orléans to join the CNRS Center for Molecular Biophysics (CBM), as a CNRS Chargé de Recherche (2006) in the group of Dr Agnès Delmas. He currently holds a Director de Recherche position, leads the "Synthetic Proteins and Biorthogonal Chemistry" research group, and is the coordinator of the "Molecular, Structural and Chemical Biology" team. His current research interests focuses on the development of synthetic methodologies

CONSORTIUM COORDINATOR

LE STUDIUM CONSORTIUM | SMART LOIRE VALLEY

LANTHANIDE-BASED AGENTS FOR SENSITIVE AND SELECTIVE NEAR-INFRARED IMAGING OF LIVING BIOLOGICALS SYSTEMS

This Consortium brings together experts in different and complementary scientific fields, in particular synthetic chemistry (organic and inorganic), physical chemistry, biology, clinical pharmacy, advanced spectroscopy, formulation chemistry, microfluidics, imaging modalities in cells and small animals, in order to achieve synergistically the common goal of creating new generations of near-infrared emitting imaging agents suitable to solve important issues in medicine such as early-stage in vivo detection of cancer or fungal infections. These imaging agents will take advantage of the unique optical properties of lanthanide(III) ions combined with a metallacrown scaffold and will be smartly formulated to address specific requirements of a particular application.

Funded in 2018, presently the Consortium is on its half-way. The two first meetings were very productive and allowed deep and fruitful discussions to crystallize ideas for the creation of near-infrared imaging agents based on lanthanide metallacrowns, make them possible to be applied for the real-time in vivo monitoring of drug delivery. The expertise of Prof. CARLOS is highly useful for the design of a new generation of nanothermometers allowing new perspectives for the monitoring of extremely small temperature changes in cells associated to changes of metabolism. The expertise of Prof. NEEDHAM is useful for the design of the delivery of these agents.

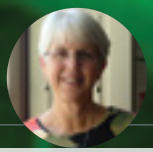
Another outcome from discussions is the design, synthesis and first tests of energy upconverting MCs. Photonic upconversion is in high demand today for biology as it allows for the specific detection of signals in complex environments and for the creation of agents with excitation and emission in the biological window. Lanthanides have an important role to play as they possess fixed electronic levels that are not affected by experimental conditions. Most of agents currently described in the literature are based on nanoparticles that are large, which constitutes a risk of disturbance of the biological system to monitor. MCs represent an attractive molecular (small size) alternative due to their rigid 3D architecture. Prototypes have been synthesized and their preliminary characterization has demonstrated promising upconversion capabilities.

Dr Svetlana Eliseeva

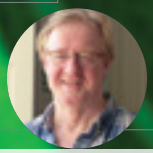
Dr. Svetlana V. ELISEEVA is a permanent CNRS researcher working at the Centre de Biophysique Moléculaire in Orléans. She graduated from Lomonosov Moscow State University (Moscow, Russia), earning a Ph.D. degree in inorganic chemistry in 2006 under the supervision of Professor Natalia P. Kuzmina. Apart from different prestigious scholarships granted by educational and scientific organizations in Russia, as well as from industrial companies, in 2011 Dr. Svetlana V. Eliseeva was awarded a Scopus Award Russia as «an author of the most significant and actual scientific publications in international literature in chemistry in 2010». She is a co-author of 83 papers in peer-review journals, including 7 reviews and 2 book chapters. She is an expert in lanthanide coordination chemistry and spectroscopy with the current interest for the design of functional (nano)materials for energy conversion and near-infrared optical imaging.

PARTNERS

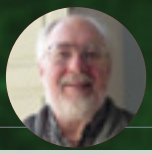
Prof. Luis Carlos,
Ph.D., is Full professor at the Department of Physics at the University of Aveiro and a vice-director of the Center for Research in Ceramics and Composite Materials (CICECO) (Aveiro, Portugal). He is an expert in luminescence nanothermometry, chemistry, formulation and physics of different nanomaterials including organic/inorganic hybrids and multifunctional probes.



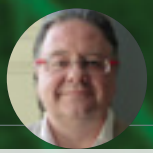
Prof. Peggy Carver,
Pharm.D., FCCP, is Associate Professor at the College of Pharmacy, and a Clinical Pharmacist in Infectious Diseases at the University of Michigan Health System (United States). She has an extensive expertise in prevention and treatment of fungal infections including clinical trials on humans.



Prof. David Needham,
Ph.D., is a Professor at the Department of Mechanical Engineering and Materials Science, Duke University (Durham, United States). He is an expert in in the fields of colloid chemistry, microcarrier engineering, fabrication of liposomes, emulsions and other micro- and nanoparticles, microcapsule technology, drug formulation and improved delivery.



Prof. Vincent Pecoraro,
Ph.D., is John T. Groves Collegiate Professor of Chemistry at the Department of Chemistry at the University of Michigan (Ann Arbor, United States). He was the first to take advantages of metallacrown architectures and currently is a world recognized expert in design and synthesis of these molecules.



Prof. Stéphane Petoud,
Ph.D., FRSC, is Professor of Chemistry and Biochemistry and INSERM research director at CBM (Orléans, France). He is an expert in lanthanide coordination chemistry and spectroscopy with a particular attention for the design of near-infrared emitting lanthanide-based imaging agents.

AROUND THE PROJECT

Scientific publications

a Lutter, J. C.; Eliseeva, S. V.; Kampf, J. W.; Petoud, S.; Pecoraro, V. L. A Unique Ln(III){3.3.1 Ga-III Metallacryptate} Series That Possesses Properties of Slow Magnetic Relaxation and Visible/Near-Infrared Luminescence, *Chem.-A Eur.* J., **2018**, *5*, 1031–1035.

b Nguyen, T. N.; Chow, C. Y.; Eliseeva, S. V.; Trivedi, E. R.; Kampf, J. W.; Martinic, I.; Petoud, S.; Pecoraro, V. L. One-Step Assembly of Visible and Near-Infrared Emitting Metallacrown Dimers Using a Bifunctional Linker. *Chem.-A Eur.* J., **2018**, *5*, 1031–1035.

CONSORTIUM COORDINATOR

LE STUDIUM CONSORTIUM | SMART LOIRE VALLEY

PHARMACOLOGICAL AND NUTRITIONAL TARGETING VOLTAGE-GATED SODIUM CHANNELS IN THE TREATMENT OF EPITHELIAL CANCERS

The primary objective of this consortium is to create a solid scientific network between internationally recognized researchers and clinicians, with different and complementary expertise and approaches, in order to develop collaborative strategies for:

1) Understanding the molecular and cellular mechanisms by which NaV channels promote cancer progression by controlling cell invasiveness and metastases development.

2) Identifying NaV channels and associated signalling pathways as cancer markers and prognostic factors.

3) Assessing the possibility that NaV channels could serve as new pharmacological targets for anticancer treatments and for reducing cancer-associated pain.

This consortium represents the unique opportunity to gather, in the Région Centre-Val de Loire, specialists of NaV channels, in different biological systems, with researchers in cancer cell biology and electrophysiology, medicinal chemists, anaesthesiologists, clinicians, surgeons, in order to develop new strategies to target epithelial cancers and associated pain. Ambitions of this consortium are first to generate a solid scientific and clinical international network specifically addressing the "involvement of Ion channels in the cancer disease". It is expected that this collaborative work will provide critical preliminary results for original research articles, reviews, patents and will support applications to European/international grants, benefit to the training of master's and PhD students and result in the generation high quality researchers with an international scientific network and lead to the organization of international scientific meetings on Sodium Channel in Physiopathology.

So far, partners of this consortium met three weeks in the Région Centre-Val de Loire: 19-23 February 2018, 02-06 July 2018 and 18-22 February 2019. To date, scientific presentations have been performed, partners applied to a Medical Research Council (UK) call for Cancer Research and Global Health Initiative, invited new potential international partners (from Spain) and specialists of animal models of cancer and dedicated imaging, initiated collaborative work that already led to the publication of one original research article (Dutta S. et al., Bioorg Med Chem. 2018 May 15;26(9):2428-2436).

Dr Sébastien Roger

Dr Sébastien Roger is Associate Professor in Physiology at the University of Tours and a nominated member of the University Institute of France (IUF). His research is performed in the "Transplantation, Immunology, Inflammation" lab, where he studies the involvement of ion channels and transporters in the invasive properties of carcinoma cells, the progression of tumours, the development of metastases. His research is aimed at exploring new therapeutic opportunities for the prevention of cancer progression.

He was awarded the Prize « Ruban Rose Avenir » in 2017. S. Roger serves as an associate editor in Scientific Reports (Nature Publishing Group), Cancer cell International (BMC, Springer Nature), Frontiers in Pharmacology and Frontiers in Cellular Biochemistry. He is co-responsible for the "Physiopathologies" axe at the Doctoral School "Health, Biological Science and Chemistry" (ED549 SSBCV, Tours-Orléans, France).

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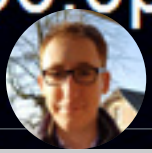
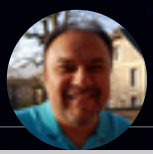
PARTNERS



Dr William Brackenbury
is Lecturer in Biomedical Sciences at the University of York (UK). He brings his expertise in electrophysiological characterisation of ion channel activity and membrane excitability in tissue slices from tumours and mouse brain.



Dr Juan Carlos Gomora
is Associate Professor at the "Instituto de Fisiología Celular » at the Universidad Nacional Autónoma de México (UNAM), in Mexico city (Mexico). He brings all his expertise in biophysics and structural modelling of ion channels, as well as his knowledge in cervical cancers and links to clinicians.

Dr Sadanandan Velu
is Associate professor in the Department of Chemistry, University of Alabama in Birmingham (AL, USA). He brings all his expertise in medicinal chemistry to design and synthetize new inhibitory molecules than will specifically block voltage-gated sodium channels expressed in cancer cells (neonatal splice variants) for new anticancer strategies.

Prof Tim G Hales
is full professor in the Division of Neuroscience, at the University of Dundee (UK). He brings his expertise in anesthetics and analgesics in order to develop new therapeutic strategies for treating cancer progression and cancer associated pain by inhibiting voltage-gated sodium channels expressed in epithelial cancer cells and nociceptive fibres.


3

EARTH ECOLOGY & ENVIRONMENT SCIENCES

HOST LABORATORIES IN EARTH ECOLOGY & ENVIRONMENT SCIENCES

UNITES ISOTOPES - BRGM

The BRGM is a public institution, created in 1959, acting as French Geological Survey since 1968. In addition to contributing to the advancement of fundamental knowledge in the field of earth sciences and resources management, its research activities aim to provide support for public policies and decision making, and also to contribute the development of innovative technologies in public-private partnership. With a staff of 1050, BRGM combines the experience and skills of specialists in the following fields: earth modelling, management of water and mineral resources, natural hazards, industrial environment and processing procedures, energy (geothermics – underground storage), environmental metrology and environmental economics.

BIOLOGIE INTÉGRÉE POUR LA VALORISATION DE LA DIVERSITÉ DES ARBRES ET DE LA FORÊT (BioForA) - UMR 0588 - CENTRE INRA VAL DE LOIRE, ONF

The UMR 0588 BioForA (ex-AGPF) is an INRA Research Unit belonging to INRA Val de Loire and located near the Orléans University campus. BioForA depends on the INRA EFPA department (Ecologie des Forêts, des Prairies et des milieux Aquatiques), which coordinates environmental studies carried out on forests, grassland and fresh waters. BioForA brings together specific skills in breeding, genetics, genomics, physiology and wood sciences applied to forest trees. BioForA develops integrative biological approaches to produce knowledge on the genetic determinism of complex traits involved in tree development (phenology, growth, wood properties) and on the mechanisms of tree adaptation to environmental constraints, such as resistances to pathogens, climate, including, through collaborations, resistance to drought. In BioForA, the breeding programs developed on different forest tree species (poplar, Douglas-fir, larch, ash, Scots pine and wild cherry) rely on innovative strategies for the selection and dissemination of genetic gains. In addition, BioForA scientists assess and manage forest tree genetic diversity to define the most effective strategies for combining short-term adaptation towards environmental and economic challenges and preserving long-term conservation of the genetic resources. Therefore, the research leads to a variety of scientific productions ranging from scientific papers to new forest varieties.

INSTITUT DE COMBUSTION AEROTHERMIQUE REACTIVITE ET ENVIRONNEMENT (ICARE) - UPR 3021 - CNRS

ICARE was founded on January 1st, 2007. It is a laboratory fully funded and managed by CNRS. It depends on the Institute for Engineering and Systems Sciences (INSIS).

It is the result of the merger of two laboratories : the "Laboratoire d'Aérothermique" and the "Laboratoire de Combustion et Systèmes Réactifs". Today, ICARE is a major player in the field of reactive systems, with leading experimental facilities, at national and even global level.

The main areas of research concern the chemical transformation of energy, the environment, propulsion and space. The laboratory develops four main research themes:

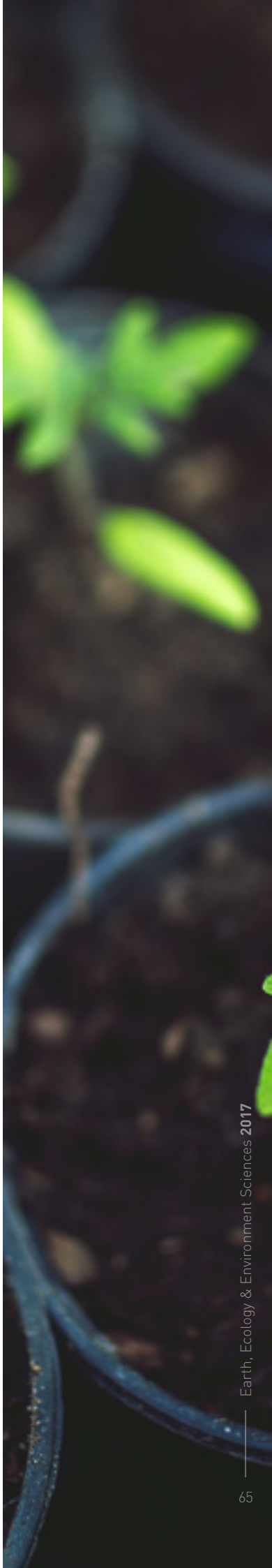
- Chemical kinetics of combustion and reactive systems
- Dynamics of combustion and reactive systems
- Atmospheric reactivity
- Space propulsion and high speed flows

INTERFACES, CONFINEMENT, MATÉRIAUX ET NANOSTRUCTURES (ICMN) - UMR 7374 - UNIVERSITÉ D'ORLÉANS, CNRS

The Research Center on Divided Materials (CRMD) was originally created as a CNRS unit in 1991. The institute is today a research unit shared by CNRS and University of Orléans. On January 1st, 2015, CMRD changed its name to become Interfaces, Containment, Materials and Nanostructures (ICMN). It is involved in research and training activities at the heart of a physicochemical multiscale approach, which addresses the intermediate material scale between nanometer and millimeter scales. The tools such as experimental methods and laboratory characterization, which include synchrotron methods and mathematical modelling, are widely used. They are applied to studies of a range of fundamental issues and their potential applications including energy storage and conversion, water pollution control and environmental protection, sustainability of heritage, aerospace, health, nanofluidic networks and nanomagnetic devices.

UNITE DE RECHERCHE ZOOLOGIE FORESTIERE (URZF) - UR0633 – CENTRE INRA VAL DE LOIRE

Until the late 1990's, the laboratory was mainly focused on the understanding of population dynamics of forest insect pests, with regard to their impact on woody plants. Since then, the mission of the laboratory has largely extended to the topic of biological invasions: (1) analysis of the mechanisms responsible for the success of forest insect pest invasions; (2) study of the genetics, physiology and behavior of insect populations expanding with global warming or newly introduced in Europe; (3) estimation of the ecological and economical risks of invasive species and design management programs. The URZF is recognized as a leading centre in ecology and genetics of forest insect pests.



Dr Natalia Kirichenko

LE STUDIUM Guest Research Fellow

From: Russian Academy of Sciences – RU

In residence at: Forest Zoology Research Unit (URZF) - Orléans

Nationality: Russian

Dates: January, 2014 to May, 2015
August, 2017 to November, 2018

Dr Natalia KIRICHENKO is a forest entomologist from the V.N. Sukachev Institute of Forestry, Russian Academy of Sciences and the Siberian Federal University, Krasnoyarsk. Her interest area covers ecology, molecular genetics, systematics, and risk assessment of invasive forest and ornamental insect pests. In the last years, she has carried out research in Asian and European botanical gardens in order to detect potentially harmful herbivorous pests and to study colonization of native and exotic plants by folivore insects. She has taken part in several EU research projects and postdoctoral programs. She is a deputy of working party «Population dynamics of forest insects» at the International Union of Forest Research Organisation. She has coauthored 42 peer-reviewed papers, one book and four book chapters, and presented about 100 communications at international conferences.

Dr Alain Roques

Dr Alain ROQUES is a former Research Director at the French National Institute for Agricultural Research (INRA). He led the Unité de Recherche Zoologie Forestière at Orléans in the period 2004-2017. During the last 10 years, he has been largely focused on biological invasions and the impact of global warming on the populations of terrestrial invertebrates. He has participated in a number of EU-funded projects dealing with biological invasions. He coordinated the inventory of alien terrestrial invertebrates in Europe realized in the DAISIE project. He was the main editor of the book 'Alien terrestrial arthropods of Europe', published in 2010, which provided the first comprehensive review of the fauna of alien terrestrial arthropods having colonized the European continent. He published more than 170 peer-reviewed papers, about 30 books and book chapters, and presented several dozens of communications at international conferences.

INTERESTING LESSONS WE CAN LEARN USING PAST HERBARIUM COLLECTIONS FOR STUDYING FOREST INSECT PEST INVASIONS

The aim of the project is to study the expansion history and the past distribution of invasive forest insect pests using historical herbarium collections. The main focus of the project is an invasive gracillariid – the lime leafminer Phyllonorycter issikii (Kumata). During the last three decades, this East Asian species has spread to most of Europe and became a pest of limes Tilia spp., especially in urban plantations.

Past herbaria provides not only important source of data for botanical studies but can also be useful for invasive ecology research. Larvae and pupae of endophagous insects, such as leafminers, found in mines in herbarized leaves could be efficiently used for genetic analysis, providing unique data from the past time.

Within the project, we intend to examine one to two century old herbarium of Tilia sampled in the Palearctic and stored in the largest European herbarium collections. We plan to sample archival insect specimens found in mines on the attacked leaves for genetic characterization of the pest expansion.

So far, we have investigated the herbarium of Tilia deposited in the two biggest herbarium collections in the Palearctic: in the Botanical Institute of the Russian Academy of Sciences (Saint Petersburg, Russia) and in the National Museum of Natural History (Paris, France) for the presence of typical mines on lime leaves in East Asia (the putative region of the insect origin of P. issikii) and in Europe (the putative region of invasion of P. issikii). Our findings support the hypothesis about recent occurrence of Tilia-feeding Phyllonorycter on the west and its long-term occurrence on the east, and provide new curious data on the pest distribution in the primarily range.

AROUND THE PROJECT

Scientific Publications

1 Kirichenko N., Triberti P., Kobayashi S., Hirowatari T., Doorenweerd C., Ohshima I., Huang G.-H., Wang M., Magnoux E., Lopez-Vaamonde C. Systematics of *Phyllocnistis* leaf-mining moths (Lepidoptera, Gracillariidae) feeding on dogwood (*Cornus* spp.) in Northeast Asia, with the description of three new species. *ZooKeys*, **2018**, *736*, 79–118.

2 Kirichenko N.I, Skvotsova M.V., Petko V.M., Ponomarenko M.G., Lopez-Vaamonde C. (2018) Salicaceae-feeding leaf-mining insects in Siberia: distribution, trophic specialization, and pest status. *Contemporary Problems of Ecology*, **2018**, *11*, 576–593.

3 Kirichenko, N., Augustin S., Kenis M. Invasive leafminers on woody plants: a global review of pathways, impact and management. *Journal of Pest Science*, **2018**, 1–14.

4 Knyazev, S.A., Kirichenko, N.I., Baryshnikova, S.V., Triberti, P. The first notes on taxonomic diversity of leaf-mining micromoths, Gracillariidae (Insecta, Lepidoptera) in Omskaya Oblast, Russia. *Euroasian Entomological Journal*, **2018**, *17*, 261–272.

Dr Max McGillen

LE STUDIUM Research Fellow
ARD 2020 PIVOTS

From: University of Bristol – UK

In residence at: Institute of Combustion Aerothermal Reactivity and Environment (ICARE) - Orléans

Nationality: British

Dates: **September, 2018 to December, 2018**
April, 2019 to September, 2019
January, 2020 to March, 2020

Dr. Max McGillen has worked in several laboratories in the UK, and has earned international experience in the USA, Ireland and France. He has worked in a variety of areas including laboratory measurements, field measurements and structure-activity relationships. This has resulted in a broad understanding of atmospheric chemistry. Max has been the recipient of an ESF exchange grant, a Marie Skłodowska Curie Research Fellowship, and is now enjoying his status as a Le Studium fellow. He is also an active member of an international expert panel on the evaluation of structure-activity relationships, and is currently leading their efforts to compile and review an extensive atmospheric kinetic database.

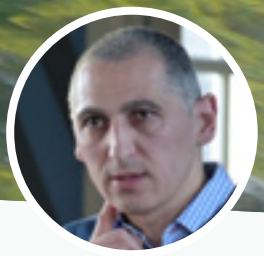
Dr Abdelwahid Mellouki

Dr Abdelwahid Mellouki's undergraduate and graduate studies were conducted in the Universities of Tours, Orleans and Paris 7 (France). He spent two years as a Research Associate at the National Oceanic and Atmospheric Administration's Aeronomy Laboratory (Boulder-Colorado). His main research fields are Chemical Kinetics, Atmospheric Chemistry, Air Pollution and Climate change.
Pr Mellouki joined the CNRS in 1992, where he is currently a Research Director at ICARE in Orléans (France), leading the Atmospheric Reactivity Group. He has been nominated National Distinguished Professor at Shandong University (China) and Guest Professor at the Chinese Academy of Science (CAS/RCEES-Beijing) and Fudan University (Shanghai). His research over the years has focused on many aspects of atmospheric chemistry, including the study of the atmospheric oxidation mechanisms of anthropogenic and biogenic carbon-containing species and halogen chemistry. He is author or co-author of over 200 scientific publications/chapters related to atmospheric chemistry.

EXPERIMENTAL MEASUREMENTS OF ATMOSPHERIC CHEMICAL REACTIONS

The goal of this project is to obtain accurate and precise data on the rates and products associated with chemical reactions occurring in the atmosphere, using a wide variety of measurement techniques available at ICARE. Some of these measurements are challenging and the fellow will be required to utilize his experience to try to address long-standing uncertainties within atmospheric chemistry. He will also helping to develop experimental protocols and techniques at the host laboratory.

Achievements so far: The fellow has been focussing on the reaction of sulphur dioxide with the OH radical. This is a very important reaction in atmosphere, since it leads to the formation of sulphuric acid, which is of crucial importance to aerosol formation, and therefore has a major effect in terms of air pollution and climate change. However, there remain some key uncertainties in this reaction rate, primarily related to the effect of pressure on this reaction. To begin with, a thorough survey of the literature regarding this reaction was performed, and the gaps in the knowledge were assessed. Accordingly the fellow has conducted a series of careful measurements in the presence of a variety of bath gases (helium, nitrogen and argon) using the pulsed laser photolysis–laser induced fluorescence (PLP-LIF) technique. The maximum pressure available to the PLP-LIF technique is ~400 Torr (below atmsopheric pressure), and therefore to complement this technique, a series of simulation chamber measurements have been made in the presence of nitrogen, oxygen, argon and air at 760 Torr. By measuring this reaction using different techniques over a wide range of conditions, we have made definitive progress regarding understanding the pressure dependence of this reaction. This allows us to compare with previous measurements, and to determine, which, if any, are accurate. It is expected that this work will result in a publication that will be of interest to the atmospheric chemical community. The fellow has also taken the responsibility of instructing a PhD student, Ms. Hajar Elothmani, in atmospheric chemistry and the techniques involved in making accurate gas-phase kinetic measurements.



Dr Marius Sebastian Secula

LE STUDIUM Research Fellow
ARD 2020 PIVOTS

From: «Gheorghe Asachi» Technical University of Iași – RO

In residence at: Interfaces, Containment, Materials and Nanostructures (ICMN) - Orléans

Nationality: Romanian

Dates: October, 2017 to October, 2018

Research interests of Marius Sebastian Secula have been mainly focused in the field of advanced technologies for water and wastewater treatment, and in particular towards electrocoagulation, electrochemical oxidation, photocatalysis, Fenton processes and coupling processes such as UV/TiO2/Fe(II)/H2O2 or Electrocoagulation/GAC. He defended his doctoral thesis in October 2007 at Gheorghe Asachi Technical University of Iasi, where has been offered a full-time position as a scientific researcher. He managed his own research projects financed through national Romanian competitions. Marius Sebastian Secula authored 46 papers published in ISI indexed journals; 32 papers presented at international conferences and 2 patents. He has co-directed 3 Postdoctoral fellows and 6 Ph.D. Students at Faculty of Chemical Engineering and Environmental Protection, Gheorghe Asachi Technical University of Iasi.

Dr Benoît Cagnon

Benoît Cagnon obtained his PhD in 2002 at the University of Perpignan on the elaboration of activated carbons with controlled texture. He joined the IUT Orléans as Associated Professor in 2004, and ICMN laboratory (CNRS) in 2012. His research activities focus on the development of water treatment technologies, and in particular on the elaboration of activated carbon materials from biomass applied in adsorption processes. He is also working on the development of new advanced oxidation processes (i.e. ozone/activated carbon coupling). His research results have been valorized in 33 publications

DEVELOPING A NEW ADVANCED TREATMENT TECHNIQUE FOR MICROPOLLUTANTS REMOVAL FROM WATER AND WASTEWATER

The presence of emerging micropollutants in surface water, groundwater and sediments is currently of major concern, which will lead to the establishment of more stringent standards for the quality of surface water, municipal and industrial wastewater, especially in the member states of the European Union.

Emerging organic micropollutants are known to be poorly removed by the conventional biological treatment methods. With regard to the possibilities of removing trace organics from waste and drinking water, the performance of various technologies, mostly conventional (adsorption, membrane and oxidation processes), have already been investigated. Recently conducted studies showed that processes such as ozonation and adsorption on powdered activated carbon are promising treatment techniques for real wastewaters containing emerging micropollutants.

For several years, the laboratory Interfaces, Confinement, Matériaux et Nanostructures (ICMN-CNRS, Orléans) has been active in the development of advanced oxidative processes, in particular the Ozone/Granular Activated Carbon combined system for the elimination of phthalates and pharmaceutical compounds. It is necessary now to develop a new advanced oxidative process by coupling several processes for the mineralization of refractory emergent organic micropllutants.

One of the goals of the present research project consists in establishing the synergistic effects of the combination of several advanced oxidation processes. It is of interest to carry out the implementation of the process and to determine the optimal conditions where the global process cumulates more synergistic effects resulting in a powerful treatment system for micropollutants.

Another goal is to establish the kinetics degradation mechanisms by coupling experimental analyses (by HPLC coupled with an electrochemical cell) and theoretical approach by modeling using chemical simulation. The degradation mechanisms of several model micropollutants will be investigated to establish optimal synergistic effects in collaboration with two academic labs. It is expected that the suggested technique to be more efficient and cost-effective towards the removal of micropollutants than most of the available techniques. The economic optimisation of this system might prove it to be a feasibly technique for practical applications or a first step towards further approaches such as the development of more efficient catalysts (aerogels, xerogels), and enhancements by means of photo-electrochemical devices.

Up to date, the experimental set-ups and methods have been established, and the required analytical apparatuses have been purchased. The experimental designs and the general approach of the studies were also established.

WATER MICROPOLLUTANTS: FROM DETECTION TO REMOVAL

The main aim of this conference was to promote multi-disciplinary collaboration and transfer of knowledge among scientists, industry and official authorities concerning the problematic of emerging water micropollutants. The attendees had the opportunity to disseminate, acknowledge and discuss of cutting edge research on the thematic of emerging water micropollutants, including the development of new sensors for in-situ monitoring, innovative devices for on-site detection or laboratory analysis, and their proper removal from water and wastewater by means of cost-effective techniques. Participants included academic researchers, scientists and specialists from water processing and associated industries. The conference topic, of particular importance, emphasized the main problematics related to water micropollutants from the point of view of both industrial and academic approaches. Several outstanding experts in the field shared their views and results during the event, favoring future collaboration among the participants.

AROUND THE PROJECT

Oral Communications

1 Marius Sebastian Secula, New perspectives of Advanced Oxidation Processes in the context of emerging micropollutants, 6éme Colloque Master Energie et Matérieux, March 16th 2018, Orleans.

2 Marius Sebastian Secula, Benoît Cagnon, Olivier Chedeville, High performance Fe-doped Mn/TiO_2 activated carbon catalyst applied in photo-Fenton-peroxone processes, Carbon, July 2018, Madrid.

3 Marius Sebastian Secula, Benoît Cagnon, Olivier Chedeville, Integrated Advanced Oxidation Processes used for the treatment of synthetic aqueous solutions containing organic micropollutants, LE STUDIUM Conference, Orléans. November 26-28th, 2018.

Prof. Vladimir Shishov

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: Siberian Federal University - RU

In residence at: Integrated biology for the enhancement of tree and forest diversity (BioForA) - Orléans

Nationality: Russian

Dates: August, 2017 to September, 2018

Vladimir Shishov is currently employed as Professor at the Siberian Federal University, Krasnoyarsk, Russia, where he is Head of the Mathematical Methods and Information Technology Department. As a scientist with a mathematical background and 24 years experience in dendrochronology and dendroclimatology, he is focused on data mining and decoding information preserved in tree rings, and on applying the data to study small and large scale systems using modern mathematical approaches. He has a particular interest in process-based tree-ring modeling and the multi-dimensional parameterization of such models.
Shishov published more than 30 papers in peer-reviewed ISI journals. He made 36 presentations to general public and experts in natural resources in the universities and research institutes of UK, USA, Australia, Spain, France, China, Finland and Russia.

Dr Philippe Rozenberg

Philippe Rozenberg is a Research Director at INRA Val de Loire, Orléans. he got a Master in ecology from the Paris VI University, a PhD degree on Forest Sciences from AgroParisTech (Paris) and an Habilitation degree from the University of Orléans. He is a research director at INRA Val de Loire, Orléans, the leader of the "genetic and Physiology of Adaptation" team of the research unit BIOFORA and a member of the INRA national scientific council. He develops a research program on "adaptation of forest trees to climate" in natural as well as in artificial forest tree populations. In this context, he investigates the evolutionary adaptation and the phenotypic plasticity of forest trees using tree- ring analysis and wood formation studies. He coordinated more than ten national and international research projects, directed eight PhD thesis and published more than sixty research articles in international scientific journals.

GLOBAL TREE-RING GROWTH EVOLUTION NEURAL NETWORK (VS-GENN)

The research led in partnership with Dr Philippe Rozenberg focuses on retrospective assessment and a short-term forecast of annual tree-ring productivity (seasonal cell production) of the major conifer plant species in terrestrial forest ecosystems around the world forced by climate and non-climatic factors.

The analysis is based on an interactive Information platform "Global Tree-Ring Growth Evolution Neural Network" and available datasets developed for the European, Asian and South American dendrochronological test-polygons.

The Global Tree-Ring Growth Evolution Neural Network is a parameterization procedure of the VS-model which combines three novel parallel processes:

- Direct parameterization based on optimization evolutional IT- algorithm;

- Proxy parameterization based on a VS-metamodel (artificial neural network which operates as direct VS-model but can produce cell profiles much faster)

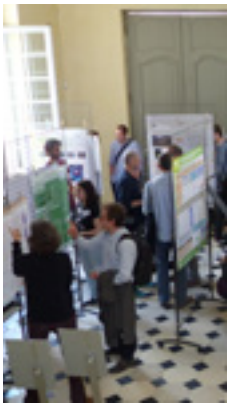
- Re-training of VS-metamodel to reduce a discrepancy between simulation tree-ring growth curves obtained by the direct and proxy parameterizations.

One of the principal project targets is to test a Global Tree-Ring Growth Evolution Neural Network (VS-GENN) as an information platform to simulate tree-ring growth of conifer species in automatic mode for the well-documented test-polygons in the Europe, Siberia and Latin America.

Instead of VS-GENN, the project uses other on-line tree-growth simulations and GIS applications developed by the authors of the project and other research teams from France and US.

Results should allow to estimate the long-term annual tree-ring productivity (cell production) of woody plants impacted by the principal climatic and non-climatic factors, and to predict tree-ring productivity in the short-term context for the research regions. VS-simulations based on direct long-term field observations for the well-documented tree-ring test-polygons in Europe, particularly in France, Asia and South America will be used as well as state-of-art techniques, including unique approaches developed by the authors.

The project has no analogues in Europe. All stated tasks are novel and are key for understanding undergoing global processes in the forest ecosystems and under observed climatic changes and disturbances. Results will impact palaeo-climate researchers, scientists studying and testing models and processes of sub-components of the climate system and a variety of climate change impacts researchers.



WOOD FORMATION AND TREE ADAPTATION TO CLIMATE

The Le Studium conference "Wood formation and tree adaptation to climate" was hold on May 23-25, 2018 in Orléans. To promote a sound and future oriented management of forest resources it is fundamental that tree breeders and forest managers select and promote individuals, provenances and species that best fit the future conditions. With this conference, we aimed at gathering experts from different disciplines to present, exchange and discuss their recent advancements related to a better understanding of plant adaptation to climate, with special focus on the trees.
The conference included five sessions:
Environmental and/or genetic control of wood formation
2)Methodological developments for the study of wood formation and tree adaptation to climate
3)Potential adaptive wood traits, future selection traits: which and why?
4)Ecophysiological approaches to wood functioning
5)Wood/Climate modeling and information systems.
Thirteen leading in the fields scientists from 11 countries were invited speakers on the event.
As a principal outcome of the event the invited experts decided to publish a special issue of the ISI journal Annals of Forest Science (under preparation)

AN ARTIFICIAL INTELLIGENCE IN THE SIMULATION OF TREE-RING GROWTH AROUND THE WORLD

The title of my public Le Studium Lecture was "An Artificial Intelligence in the simulation of Tree-Ring Growth around the world" was hold on July, 5th, 2018.

There is no classical statistical solution to reliably address the issue of severely changing forest productivity and composition under ongoing and future climate changes. Taking into account the heterogeneous tree-ring data, climate observations and reanalysis products, differently detrended indices, simulations and synthetic data, as well as the various statistical and modeling approaches, a new and integrative concept is needed: from a single approach to a Big Data approach and methods/models as interconnected components of a system based on an artificial intelligence system. Promoted VS-GENN platform could be a basis for future development of a new algorithmical tool based on artificial intelligence to resolve complex problems in forest ecology.

AROUND THE PROJECT

Scientific Publications

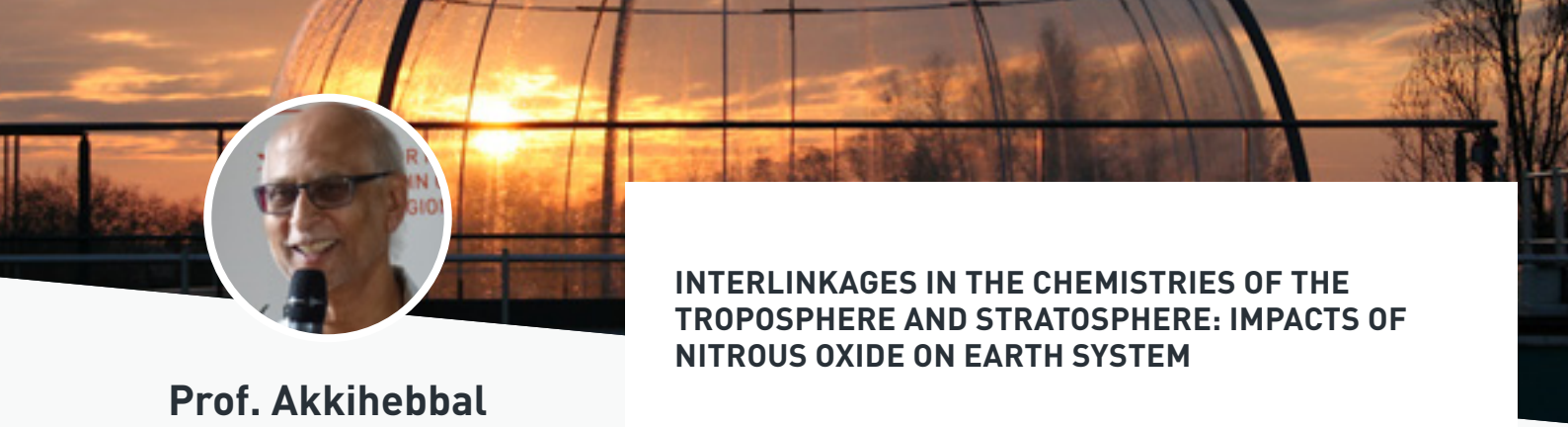
Popkova M.I., Vaganov E.A., Shishov V.V., Babushkina E.A., Rossi S., Fonti M.V., Fonti P. Modeled tracheidograms disclose drought influence on Pinus sylvestris tree-rings structure from Siberian forest-steppe, *Frontiers in Plant Science*, **2018**, *9*, 1144.

He M., Yang B., Shishov V., Rossi S., Bräuning A., Ljungqvist F.C., Grießinger J. Relationships between wood formation and cambium phenology on the Tibetan plateau during 1960-2014, *Forests*, **2018**, *9*, 2.

Oral Communication

Shishov, V. Parameterization of process-based models and neural networks: Are there any needs of their using in dendroecology. The Le Studium conference "Wood formation and tree adaptation to climate", Orleans (France), May 23-25th, 2018.

Shishov, V. Parameterization of the process-based tree-ring VS-model and its using in dendroecology (Invited lectures), The International Summer School "Tree Rings, Climate, Natural Resources, and Human Interaction", Cheryomushki, Khakassia, Russian Federaton), 12-24, August, 2018.



Prof. Akkihebbal Ravishankara

LE STUDIUM Research Professor

From: Colorado State University – US

In residence at: Institute of Combustion Aerothermal Reactivity and Environment (ICARE) - Orléans

Nationality: American

Dates: June, 2017 to July, 2017
May, 2018 to July, 2018

Ravishankara currently is a Professor in the Departments of Chemistry and Atmospheric Science at Colorado State University and a co-chair of the WMO/UNEP Science Assessment Panel on Stratospheric Ozone and a member of the Science Advisory Panel of the Climate Clean Air Coalition of UNEP. Before that he was the Director of the National Oceanic and Atmospheric Administration's Chemical Sciences Division of Earth System Research Laboratory where he served for nearly 30 years in Boulder, CO.

Prof. Ravishankara's work relates to stratospheric ozone depletion, climate change, and regional air quality.

His measurements in the laboratory and in the atmosphere have contributed to deciphering the ozone layer depletion, including the ozone hole; to quantifying the role of chemically active species on climate; and to advancing understanding of the formation, removal, and properties of pollutants

Dr Abdelwahid Mellouki

Dr Abdelwahid Mellouki's were conducted in the Universities of Tours, Orleans and Paris 7 (France). He spent two years as a Research Associate at the National Oceanic and Atmospheric Administration's Aeronomy Laboratory (Boulder-Colorado). His main research fields are Chemical Kinetics, Atmospheric Chemistry, Air Pollution and Climate change.

Dr Mellouki is currently a Research Director at ICARE in Orleans (France). His research has focused on many aspects of atmospheric chemistry, including the studies of the atmospheric oxidation mechanisms of anthropogenic and biogenic carbon-containing species and halogen chemistry. He has conducted a large number of experimental studies on the atmospheric fate of chlorofluorocarbons (CFCs) substitutes, as well as on CH4 and N2O which are considered to be important greenhouse gases (GHGs).

Dr Mellouki presented many invited talks including an invited lecture at the 1st International High-Level Forum on Toxicology and Health of Air Pollution (THAP) in Beijing, China.

INTERLINKAGES IN THE CHEMISTRIES OF THE TROPOSPHERE AND STRATOSPHERE: IMPACTS OF NITROUS OXIDE ON EARTH SYSTEM

The mission of the project lays out the key needs to better understand the role of nitrous oxide in the Earth's environment and information needed to make any policy. The major need is to quantify the emissions of nitrous oxides from various source, both natural and anthropogenic. To this end, accurate knowledge of the atmospheric lifetimes and rates of N2O loss in the various parts of the atmosphere are needed. The goal of this proposed work is to provide that information through a combination of laboratory studies, chemical calculations, field measurements, and atmospheric modeling.

The laboratory studies of the reaction of OH with N2O were completed. We have also looked at the potential removal of electronically excited OH (A2S) by N2O to explore the reactivity of this molecule. Theoretical studies were carried out in collaboration with a scientist from Lille in order to provide an explanation for the non-reactity of N2O with the OH radical. It was realized that we should also explore the potential reaction of N2O with the ubiquitous NO3 radical.

This work was carried out using a unique experimental system that was assembled in ICARE that utilized the cavity ring-down spectroscopy to detect NO3 radicals at very low concentrations (part per trillion). Based on the results from these two studies, we have been able to rule out tropospheric chemical loss of N2O. This work greatly improves our understanding of the atmospheric lifetime of N2O.

While the experimental work was ongoing, we also undertook a quantum mechanical theoretical study of the reaction of OH radicals with N2O. The study showed that the reaction of OH with N2O is very slow. Further, it suggested another pathway for this reaction where OH could add to N2O and then the adduct reacting with O2 in the atmosphere. Further calculations showed that this pathway would not be very viable in Earth's atmosphere.

In addition, with Prof. Valery Catoire, we started a project looking at the vertical profiles of nitrous oxide in the stratosphere. Observations going back to 1970s were collected, quality controlled, and analyzed. In collaboration with the National Center for Atmospheric Research at Boulder, CO, USA, the community global model was used to calculate the vertical profiles of N2O and compare them with observations. This work was done in collaboration with a post-doctoral researcher, Dr. Vanessa Brocchi, of Orleans. She came to Colorado for 4 weeks to carry out this work. Some of the results this study will be presented at the European Space Agency symposium in Essen, Germany, in the summer of 2019.

A laboratory study of the reaction of OH radicals with HNO3, a product of N2O degradation in the stratosphere, was carried out at ICARE in collaboration with Drs. Yuri Bedjanian and Mellouki. These results are being analyzed and plans are ahead for publication of this result.

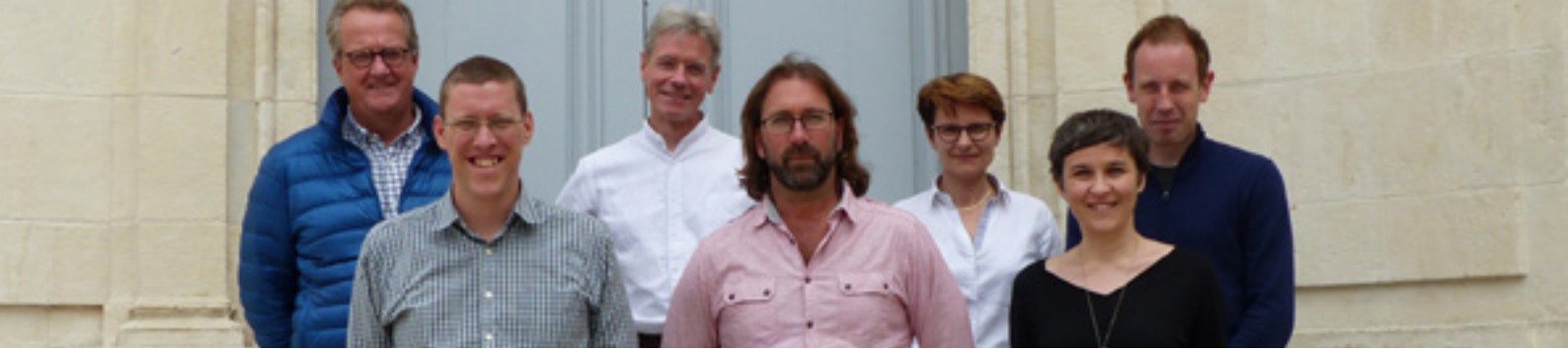
AROUND THE PROJECT

Scientific Publications

1 Nguyen, TL, Ravishankara, AR, and Stanton, JF, Analysis of the potential atmospheric impact of the reaction of N2O with OH, Chem. Phys. Lett., 2018, 708, 100-105.

2 Kinetics of the Reactions of NO3 Radical with Methacrylate Esters, Zhou, L.; Ravishankara, AR; Brown, SS; Idir, M; Zarzana, KJ; Daele, V; Mellouki, A , J. Phys. Chem., 2018, 121(23), 4464-4474, 2018, DOI: 10.1021/acs.jpca.7b02332

Despite significant improvements, serious air pollution problems still persist worldwide and are becoming more and more complex and varying from one region to another. Science and technologies are required to provide solutions and alternatives. A scientifically sound understanding is urgently needed to disclose the key reasons for regional complex air pollution problems and for the effective implementation of control measures. The 6th Sino-French Workhop on Atmospheric Environment organised in Orleans focused on air quality improvement and future challenges where the science and new technologies development constitute the backbone for any proposed solutions. The meeting brought together ninety participants, scientists from different fields (chemistry physics, meteorology, epidemiology,...), industry and representatives of local governments (e.g., cities, regions...), in order to share their recent research progress relating to regional complex air pollution. This Workshop was organised as part of the PIVOTS ARD 2020 Programme (Environmental Technology Innovation, Development and Optimisation Platforms).



CONSORTIUM COORDINATOR

LE STUDIUM CONSORTIUM | SMART LOIRE VALLEY

MULTI-ISOTOPE AND CHEMICAL TRACING FOR UNDERSTANDING THE SOURCES AND FATE OF MACRONUTRIENTS AT THE BASIN SCALE (MUTUAL)

Nitrogen and phosphorous flows induce water quality degradations which are a major obstacle for reaching the "good qualitative status" of European surface and groundwater bodies aimed by the European Water Framework Directive. A diverse array of macronutrient sources and a complex network of transport pathways and reactive transformations are evident for both groundwater and surface water receptors, creating a key challenge for the management of natural resources. This consortium gathers experience on nutrient cycling in a variety of hydroclimatic, hydrogeological and land use settings and a large variety of complementary tools in the field of environmental geochemistry. This will allow merging advanced tracer techniques into a diagnostic toolbox for characterising macronutrient sources and fate in aquatic ecosystems.

The project aims on a critical analysis of the current approaches of source and fate identification in contaminated watersheds. The project partners produce a shared data base on chemical and isotopic fingerprints of N and P sources in a diversity of catchments worldwide as basis of a common publication and common presentations. An international workshop organised in Orléans (France) will bring together international experts in the field of nutrient cycling and -tracing with a variety of regional and national stakeholders.

The first meeting from Jan. 16-20, 2017 was dedicated to a critial evaluation of the potential of multi-tracer approaches to identify and quantify nutrient sources and transfer times in groundwater.

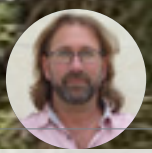
The second meeting from Dec. 4-8, 2017 was dedicated to the work on a common conceptual paper on catchments affected by N and P excess: Structure breakdown, contents to be included, the light of the current literature and the ongoing studies of all project partners.

The third meeting, from June 11-14, 2018 allowed us to advance on a common publication on the effect nitrogen fixation in soil and subsequent re-nitrification on the isotope fingerprints of nitrate. We consortium also elaborated a preliminary program and list of invited speakers for the final workshop to be held in June 2019 "N and P cycling in catchments: How can isotopes guide water resources management?".

Dr Wolfram Kloppmann

Dr Wolfram Kloppmann (HDR), task officer at the Laboratory Division of BRGM, head of the Isotope Unit from 2011 to 2017, works in a broad field of environmental issues. His specialties include chemistry and isotope characteristics of deep natural fluids including energy-relevant gases, groundwater, non-conventional water resources, water-rock interactions in aquifers, isotope fingerprinting of water contaminants, but also the identification of the provenance of cultural materials and the degradation of building stones. Most of his research work involved the use of environmental isotopes. He coordinated the BRGM research program on non-conventional water resources and alternative concepts of water management (2006-2011). He was the French coordinator of the 2014-2018 ANR-NSERC Franco-Canadian G-Baseline project on impact assessment in the field of unconventional hydrocarbons.

PARTNERS



Dr Daren Gooddy,
British Geological Survey, United Kingdom, biogeochemical cycling, hydrogeology and isotope hydrology

Prof. Berhard Mayer,
(Calgary University, Canada, isotope geochemistry of nitrate, sulphate, boron and phosphate-oxygen): He brings in his experience on the combination of hydrological, chemical, isotopic and modelling approaches to follow the fate of selected nutrient sources during transport and transformations in the water-unsaturated and water-saturated zones of small and large catchments.

Dr Dan Lapworth ,
British Geological Survey, United Kingdom

Prof. Neus Otero,
Barcelona University, Spain, isotope hydrology with a special focus on natural and induced attenuation of groundwater pollution: isotopic geochemistry in particular on analytical techniques.

Dr Ben Surridge,
Lancaster University, United Kingdom, biogeochemistry of phosphorus, nitrogen and carbon cycling in soil and freshwater ecosystems.
The consortium closely collaborates with Dr. Mathieu Sebilo UPMC, Sorbonne Université who is expert of the nitrogen cycle including isotope tracing and modelling.

AROUND THE PROJECT

Oral Communications

Kloppmann W., Otero N., Mayer B., Sebilo M., Gooddy D. C., Lapworth D., Surridge B., Petelet E., Flehoc C., Baran N. Limitations of the isotopic composition of nitrates as a tracer of their origin. European Geosciences Union General Assembly 2018, Vienna (Austria), 8-13 April, 2018.

CONSORTIUM COORDINATOR

LE STUDIUM CONSORTIUM | SMART LOIRE VALLEY

DYNAMICS OF WOOD FORMATION AND ADAPTATION OF FOREST TREES TO CLIMATE VARIATION

The first objective of DYNAWOOD is to develop a pilot study to test, compare and validate the use of dendrometer data for the assessment of the phenotypic plasticity of cambial response to climate and to use this information to study adaptation of forest trees to climate. The second objective of the project is to use already available data of the same nature to study and test the possibility to realise large-scale analysis of cambial response to climate. During the first meeting in January 2016, the partners selected two models of automatic point dendrometers and were taught how to install and run them. Seven copies of each model of dendrometer were distributed to each partner. During the same meeting, the partners and the collaborators presented their previous experience with other dendrometer types and their achievements and interest in the general research line developed by the consortium. Data management and analysis process were also presented and discussed, as well as connections with other research groups and activities.

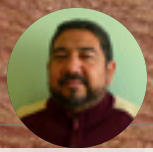
During the first experimentation period, the dendrometers were installed at the six project locations (one in each country except two in Argentina). During the second meeting (October 2016), the partners reported and exchanged about their practical dendrometer experience. The problems observed during the first experimentation period were discussed and most of them were solved. The radial growth curves recorded with the dendrometers were inspected in detail and discussed. Complete radial growth curves were available for Canada, Switzerland and France. In the two other countries, the growth curves were incomplete, in one case for technical reasons and in the other case because the growing season was just starting at the time of the meeting. The results showed that in the three locations with complete growth curves there was a great similarity between the curves. The experimental design for the second year of the project was reviewed and validated. Several decisions were implemented, in order to enlarge the study to other experiments and datasets. Finally, the decision was taken to organise a joint international conference for the Dynawood project and for the Vladimir Shishov fellowship together. This conference took place in May 2018 at The Studium, Orléans, France.

Dr Philippe Rozenberg

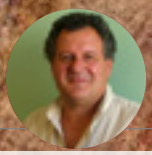
Philippe Rozenberg is a Research Director at INRA Val de Loire, Orléans. he got a Master in ecology from the Paris VI University, a PhD degree on Forest Sciences from AgroParisTech (Paris) and an Habilitation degree from the University of Orléans. He is a research director at INRA Val de Loire, Orléans, the leader of the "genetic and Physiology of Adaptation" team of the research unit BIOFORA and a member of the INRA national scientific council. He develops a research program on "adaptation of forest trees to climate" in natural as well as in artificial forest tree populations. In this context, he investigates the evolutionary adaptation and the phenotypic plasticity of forest trees using tree- ring analysis and wood formation studies. He coordinated more than ten national and international research projects, directed eight PhD thesis and published more than sixty research articles in international scientific journals.

PARTNERS

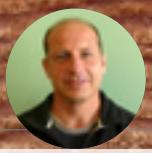
Dr Annie Deslauriers



Prof. Saúl Espinoza Zaragoz



Dr Alejandro Martinez-Meier



Dr Patrick Fonti

Dr Luc Pâques

Thanks to the diverse geographic origins of the consortium partners, the original approach proposed in the project relates to several forest tree species growing under an exceptionally large range of climates: from boreal to tropical and oceanic to semi-continental climates. Furthermore, three of the partners already had complementary practical experience of the use of permanent dendrometers and were able to teach the others the necessary technical skills. Finally, all the partners have diverse instructive views of the potential of wood formation for the study of the adaptation of forest trees to climate.

AROUND THE PROJECT

Oral Communications

1 Arian Correa-Diaz, Linking remote sensing and dendrochronology data in high-altitude forests from Mexico, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
2 Margarita Escobar, Some reflections on the use of dendrometers in common gardens, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
3 Cyrille Rathgeber, Deciphering wood formation mechanisms in larch trees along a 1,000 m elevation gradient to better understand tree adaptation and forest response to climate change, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
4 Philippe Rozenberg, Climate warming differently affects Larch ring formation at each end of its altitudinal distribution, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
5 Luc E. Pâques, Hybrid larch heterosis: is there any trade-off between growth and resistance to water stress? Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
6 Annie Deslauriers, Carbon contribution in primary and secondary growth under changing environmental conditions and defoliation in boreal forest, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
7 Patrick Fonti, XCELL - a platform for collecting dated intra-ring cell anatomical and density data, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
8 Sergio Rossi, Ecotypic differentiation in bud and xylem phenology, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
9 Marina Fonti Seasonal wood formation of Siberian larch and Scots pine in southern taiga of Central Siberia, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
10 Maria Elena Fernández, Unraveling the functional and adaptive role of Eucalyptus wood: what do we know and what do we still ignore, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
11 Alejandro Martinez-Meier, The Douglas-fir potential of adaptation to drought-fir: heritability of vulnerability to cavitation, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
12 Vladimir V. Shishov, Parameterization of process-based models and neural networks: Are there any needs of their using in dendroecology? Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.
13 Guillermina Dalla-Salda, Ecophysiological and wood density studies to elucidate Cordilleran cypress´s response to drought, Le Studium International Conference "Wood formation and tree adaptation to climate", Orléans (France), May 23 to 25th 2018.

CONSORTIUM COORDINATOR

LE STUDIUM CONSORTIUM | SMART LOIRE VALLEY

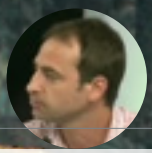
ECOHYDRAULICS AND DAM REMOVAL

The decline of the ecological integrity in rivers is a global problem, menacing water security for human beings and biodiversity at the same time. While there are great achievements concerning technologies for water quality improvement, the re-establishment of physical structures suitable for ecosystem functions remains a scientific problem. Which kind of river management and engineering can re-establish these conditions? Specifically, the issue of dam removal is currently in the focus of debate to improve the ecological continuity for sediment transport and migratory organisms. In France alone, about 60,000 obsolete weirs and dams have been identified. However, the scientific baseline for this activity is still weak. Under the auspices of the UNESCO Chair "River Culture - Fleuve et Patrimoine" directed by the PI, the consortium gathers scientists from Europe (France, Spain, Italy), Latin and North America (Argentina, USA) to review the state of the art and to develop new scientific approaches for evidence-based policies for the future (facing a current massive trend of dam construction worldwide). Researchers and engineers from the University of Tours have been studying the quantitative geophysical (sediment transport and morphology) and biological (abundances of benthic invertebrates and fish) effects of dam removal at the Maisons Rouges Dam (Vienne River) since 1998 on an annual basis. The Spanish-Italian team has monitored a large number (>20) dam removals in the past ten years and that of the USA is well-known for their work on geomorphology, endangered fish habitats and algae biomass in the Upper Colorado River. The Argentinian team has recently provided excellent studies on invertebrate-flow relationships. Gathering this expertise from different disciplines and the comparison of a one-site-long-term study with a many-sites-short term study will create an excellent setting to improve our knowledge about physical habitat management in rivers. The results of a series of workshops will be published and policy options will be debated in public.

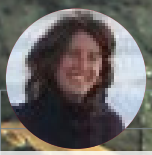
Prof. Karl Matthias Wantzen

After studies on the Rhine (German Federal Institute of Aquatic Sciences), Karl M. Wantzen worked as fellow of the Max-Planck- Society to perform his PhD on stream ecology, and to coordinate a BMBF-funded project on the Ecology of the largest wetland of the World. 2007 habilitation on biodiversity, functioning and structural dynamics of river- floodplain-corridors. > 100 publications. Since 2010 he is professor (1st class) at the University of Tours, where he lectures river ecology and management, sustainable development and tropical ecology at different faculties, and researches in the DATE team (Landscape and urban ecology, and management) of CITERES. 2014 he was awarded the UNESCO Chair on River Culture (Fleuve et Patrimoine, renewed in 2018), and in 2015, "Talent de la Région Centre" acknowledging his scientific and conceptual achievements. KMW shares the coordination of the project with Pr Stéphane Rodrigues, sediment geologist at CITERES. www.karlmwantzen.de

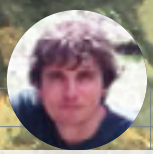
PARTNERS



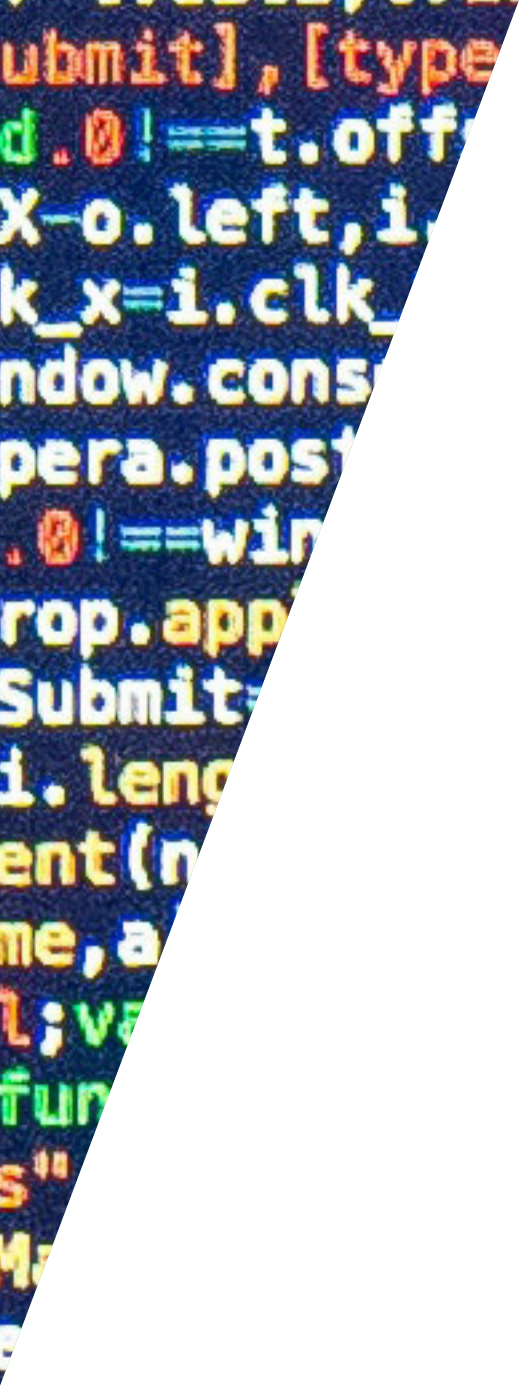
Dr Blettler Martin
(Consejo de Investigaciones Científicas y Técnicas CONICET – Argentina) are experts on benthic invertebrate ecology and ecohydraulics. Their expertise contributes to assess the changes in physical habitat structure for animals, before and after dam removal.



Prof. Askoa Ibisate González de Matauco
(University of the Basque Country UPV/EHU -Spain) is geographer and specialist for DR projects in Spain. She contributes experiences from these projects concerning both biotic and abiotic variables, but also chemical effects and the "actors' play", i.e. the interactions between the different stakeholders. She contributes to the Spanish Center for River Restoration and DamRemovalEurope



Dr Simone Bizzi
(PolyTech Milano – Italy) is landscape modeller and involved in many impact assessment and impact reduction studies in dams, collaborating with the AMBER project, the University of Berkeley, and contributes to the Italian Center for River Restoration.



COMPUTER SCIENCE, MATHEMATICS & MATHEMATICAL PHYSICS

HOST LABORATORIES IN COMPUTER SCIENCE, MATHEMATICS & MATHEMATICAL PHYSICS

INSTITUT DENIS POISSON - UMR 7013 - UNIVERSITÉ D'ORLEANS, UNIVERSITÉ DE TOURS, CNRS

The Institut Denis Poisson (UMR CNRS 7013) includes one hundred permanent professors, assistant professors and CNRS researchers, as well as thirty PhD students and postdoctoral researchers. As the result of a merger in 2018 of two laboratories, the MAPMO in Orléans and the LMPT in Tours, the Institute is bi-localized in the two cities. The activities of Orléans' branch of the Institute (former MAPMO – Mathematics Laboratory, for Mathematics, Analysis, Probability, Modeling, Orléans, created in 1994), are devoted to mathematical analysis, probabilities and mathematical physics with the focus on interactions with other branches of science, both internal and external to mathematics.

LABORATOIRE D'INFORMATIQUE FONDAMENTALE D'ORLÉANS (LIFO) – EA 4022 – UNIVERSITÉ D'ORLÉANS, INSA CENTRE VAL DE LOIRE

The Laboratoire d'Informatique Fondamentale d'Orléans (LIFO) is a laboratory of the University of Orléans and the INSA Centre-Val de Loire, officially recognised and supported by the French Ministry of Research. The laboratory is located in Orléans and in Bourges in order to develop its collaborations and to offer a window to the research in computer science in region Centre-Val de Loire. LIFO created a research federation, Fédération Informatique Centre-Val de Loire, together with the Laboratoire
d'Informatique from the University François-Rabelais of Tours. LIFO is a computer sciences research laboratory. Research projects conducted at LIFO include algorithmics, scientific visualization, machine learning, massive parallelism, model checking and system security. To provide another approach to the laboratory and to foster inter-team cooperation, the following cross-laboratory thematics are put forward:

- Massive data sets and high performance computation,
- Modelisation and algorithms, and
- Security and safety.

PLURIDISCIPLINAIRE DE RECHERCHE EN INGÉNIERIE DES SYSTÈMES, MÉCANIQUE ET ÉNERGÉTIQUE (PRISME) - UPRES 4229 - UNIVERSITÉ D'ORLÉANS, INSA CENTRE VAL DE LOIRE

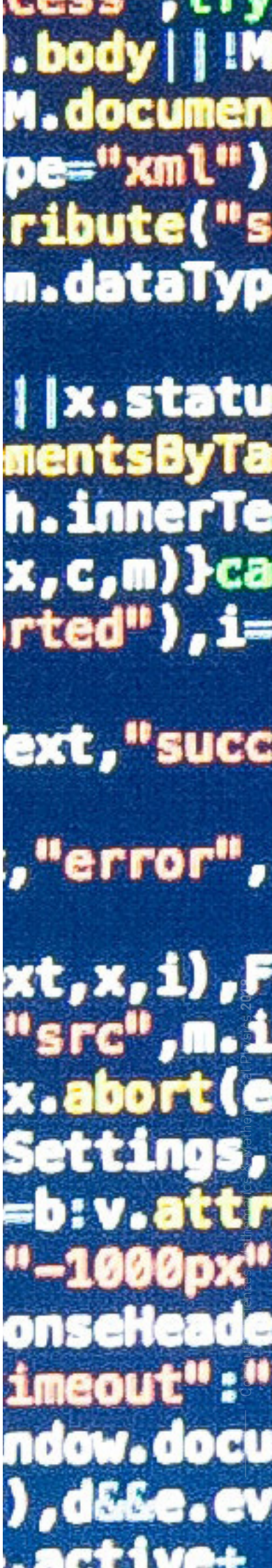
The name of the host scientist's laboratory is PRISME (Pluridisciplinaire de recherche en ingénierie des systèmes, mécanique et énergétique). It is a laboratory of University of Orléans and INSA Centre Val de Loire, labeled by the Ministry of Higher Education and Research (UPRES No. 4229). PRISME laboratory was created in January 2008 and brought together 106 researchers and 70 PhD students. The PRISME was merged by following laboratories:

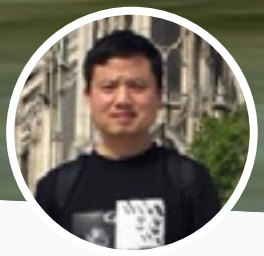
- Laboratoire Vision et Robotique (EA 2078)
- Laboratoire D'électronique, Signaux, Images (EA 1715)
- Laboratoire de Mécanique et Énergétique (EA 1206)
- Laboratoire Énergétique, Explosions, Structures (EA 1205)

The main mission of the PRISME laboratory is multidisciplinary in the general field of sciences for the engineer on a wide spectrum of disciplinary fields including:

- Burning in engines, energy,
- Aerodynamics, the mechanics of materials,
- Signal and image processing,
- Automatic,
- The robotics.

The laboratory has chosen to structure itself with scientific clusters organised into thematic axes.





Prof. Guoxian Chen

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: Wuhan University - CN

In residence at: Denis Poisson Institute (IDP) - Orléans

Nationality: Chinese

Dates: January, 2018 to January, 2019

Prof Chen is an associate professor in the school of mathematic and statistics in Wuhan University, and a Le Studium/ /Marie Skłodowska-Curie Research Fellow in the University of Orleans. He received his bachelor degree from Jishou University in 2001, master degree from Capital Normal University in 2004, and Ph.D. from Peking University in 2008 under the supervision of Prof. Pingwen Zhang and Prof. Huazhong Tang. Then he worked as a Postdoctoral Researcher at Hongkong University of Science and Technology, assistant professor at Wuhan University, Postdoctoral Researcher at RWTH Aachen University. He works in the area of numerical analysis and scientific computing and computational fluid dynamics. He focus on the numerical simulations of singular conservation laws and related applications, such as shallow water equations with bottom topography, Euler equations with gravitational potential, and the multi-component flows, etc..

Prof. Magali Ribot

Magali Ribot defended her PhD Thesis on numerical analysis for PDEs in Lyon in 2003. She became an assistant professor in Nice in 2004 and professor in Orléans in 2015. She is working mainly in the field of numerical analysis for PDEs, modeling for biology and fluid dynamics. More precisely, she is interested in well-balanced and asymptotic preserving schemes, in mixture models coupled with fluid dynamics equations and in the comparison of models of different types. She is the co-head of the PDE group in Orléans and she is organizing regularly some workshops and seminars related to mathematics for biology.

NUMERICAL SIMULATION OF SINGULAR CONSERVATION LAWS AND RELATED APPLICATIONS

Goals:

(1) apply the subcell reconstruction to discretize the new shallow water model;

(2) extend the new model on networks with application to irrigation;

(3) apply the new framework to design some new well-balanced methods to chemotaxis systems or systems with more general potentials;

(4) insert our new algorithm to softwares FullSWOF and SWASHES developed within the MAPMO.

This project will give the opportunity to invite colleagues from France and abroad, in particular enhancing the contacts between Orléans and RWTH Aachen University in a first step. An international conference will be organized on the thematics involved in the proposal.

Achievements:

(1) Has inserted the subcell hydrostatic reconstruction method to softwares FullSWOF and SWASHES;

(2) Has applied the subcell hydrostatic reconstruction method to one-dimensional parabolic-hyperbolic chemotaxis systems. The 1D code was obtained;

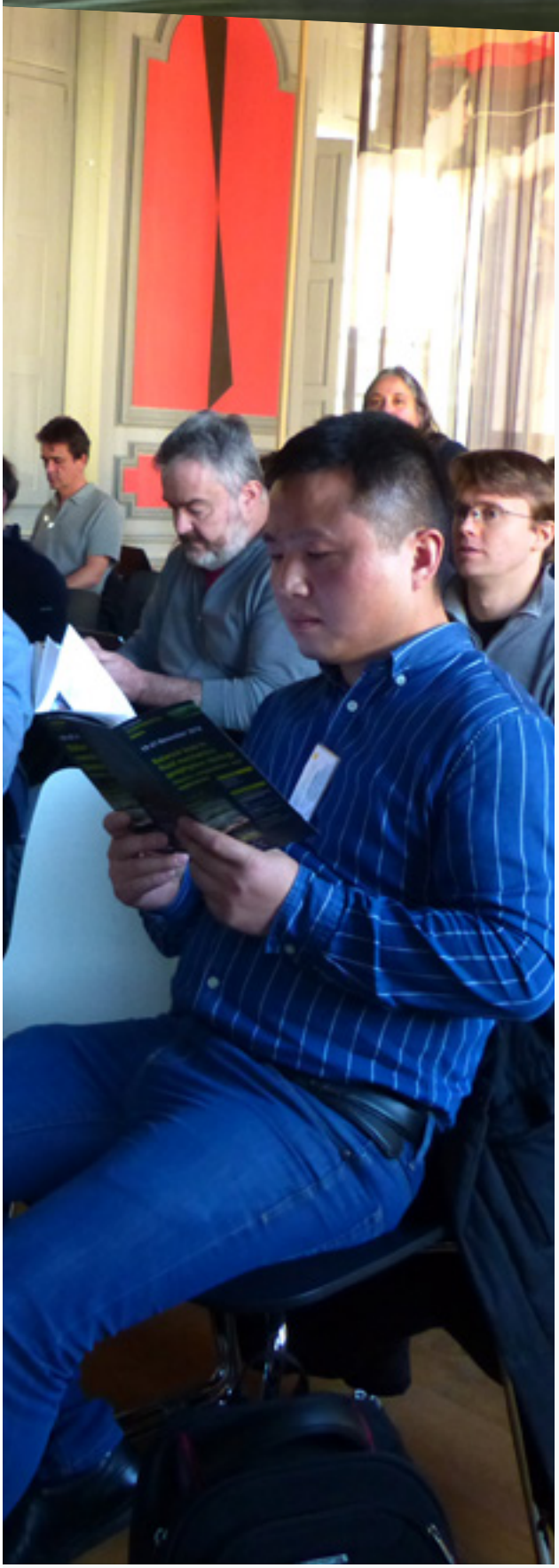
(3) We designed a scheme for the Euler equations under gravitational fields based on our subcell hydrostatic reconstruction framework. To give a proper definition of the nonconservative product terms due to the gravitational potential, we first separate the singularity to be an infinitely thin layer, on where the potential is smoothed by defining an intermediate potential without disturbing its monotonicity ; and then the physical variables are extended and controlled to be consistent with the Rayleigh-Taylor stability, which contribute the positivity-preserving property to keep the nonnegativity of both gas density and pressure even with vacuum states. By using the hydrostatic equilibrium state variables the well-balanced property is obtained to maintain the steady state even with vacuum fronts. In addition, we proved the full discrete discrete entropy inequality, which preserve the convergence of the solution to the physical solution, with an error term which tends to zero as the mesh size approaches to zero if the potential is Lipschitz continuous. The new scheme is very natural to understand and easy to implement.

The numerical experiments demonstrate the scheme's robustness to resolve the nonlinear waves and vacuum fronts;

(4) Has submitted one paper to SIAM journal on numerical analysis, another paper is preparing.

BALANCE LAWS IN FLUID MECHANICS, GEOPHYSICS, BIOLOGY (THEORY, COMPUTATION, AND APPLICATION)

Objectives: The balance principle appears as a fundamental modeling tool in a wide range of applications. In realistic applications, such as gravitational flows, hydrology, biological complex fluids, it results in highly nonlinear partial differential equations, including stiff source terms and nonconservative products, and involves multiple time and space scales. This leads to serious challenges, from both the mathematical modeling and numerical viewpoints. The aim of this conference is to bring together researchers from various domains, to discuss recent progresses in these directions, and foster interactions between disciplines to tackle new challenges
Outcomes: There were 17 speakers giving their presetations.



FLEUVES ET RIVIÈRES : DU RÉEL À L'ORDINATEUR

Speaker: Dr Pierre-Yves Lagrée, Institut Jean le Rond d'Alembert / CNRS, Sorbonne-Université – France
Importance: La vie des Orléanais est rythmée par les caprices de la Loire. Le scientifique lui voit ces caprices d'un autre œil, il cherche à comprendre et reproduire ces événements. Pour ce faire, il construit des «modèles» qui peuvent êtres soit des expériences à l'échelle réduite soit des équations mathématiques. Dans cette conférence, nous présenterons comment le «modélisateur» en mécanique des fluides traduit la réalité des écoulements de l'eau en ces équations mathématiques, puis comment ces équations sont ensuite traduites sous forme informatique pour être résolues numériquement à l'aide d'un ordinateur. Nous présenterons quelques exemples de telles modélisations au travers des cas comme ceux de la propagation de la marée, de la rupture de barrage, ou des inondations.

Prof. Yiming Chen

LE STUDIUM Research Professor

From: Yanshan University – CN

In residence at: Multidisciplinary Research in Systems Engineering, Mechanics and Energy Engineering (PRISME) - Bourges

Nationality: Chinese

Dates: April, 2016 to July, 2016
April, 2017 to July, 2017
April, 2018 to July, 2018

Yiming Chen has been a Full Professor of the College of Science of Yanshan University since 1998.
He has published more than 140 international journal articles and international conference articles and contributed 5 co-edited special books. Moreover, he has achieved 5 research projects. He is member of the Chinese Society of Induction and Applicative Mathematics, Chinese Society of Computing Mechanics and Chinese Society of Mathematics. Prof. Chen has organized two international conferences in 2010 and 2011, respectively.
Prof. Chen has earned First Award of Science and Technology Progress of China Ministry of Mechanical Industry and Third Award of Education of Hebei Province in 1999 and 2000, respectively.

Prof. Driss Boutat

Driss Boutat has been a Full Professor in ENSIB since 2008, which developed into the INSA Centre Val de Loire in 2014. From 2011 to 2017, he was the leader of Control Team in PRISME Laboratory. In 2014, he was the dean of MRI and ERE Departments in INSA CVL.
Prof. Boutat has published more than 110 international journal and international conference articles. He is selected as Associate Editor of Journal of Discrete Dynamics in Nature and Society, Associate Editor of Journal of Nonlinear Dynamics,
Prof. Boutat earned the National order of France: Order of Academic Palms Chevalier (Knight) since January 2010, the National Award for doctoral supervision and research from 2008 to 2012, and the French Excellent Scientist Award since 2012. Recently, he received the Best Paper Award in the 7th International Conference on Bio-inspired Systems and Signal Processing.

OBSERVER DESIGN FOR DISTRIBUTED-PARAMETER SYSTEMS AND FRACTIONAL ORDER SYSTEMS.

The proposed research project is on observer design for Distributed-Parameter Systems (DPSs) and Fractional Order Systems (FOSs). This is an interdisciplinary research project where the conception of observer is applied to DPSs and FOSs, and the obtained results will be applied to nonlinear acoustics and viscoelastically damped structures. New research activities are being developed, which are complementary to those of the teams involved in the project.

Estimation of the states of DPSs and FOSs is important for engineers and scientists. However, research on observer design for these systems has not been as extensive as in the case of Lumped-Parameter Systems, especially in nonlinear case. Consequently, the achievements to date of this research project are outlined as follows with the involvements of the partners:

1. Development of the Nonlinear Observer Canonical Forms for nonlinear DPSs and FOSs in order to easily apply existing observer design methods (cooperation of Prof. Chen, Prof. Boutat and Dr. Liu);

2. Design of new observers for nonlinear DPSs and FOSs (with unknown inputs or not), such as proportional and integral observers, adaptive observers, and interval observers (cooperation of Prof. Chen, Prof. Boutat and Dr. Liu);

3. Development of efficient numerical algorithm for considered equations, and new robust differentiators using wavelets, etc. (cooperation of Prof. Chen, Prof. Boutat and Dr. Liu);

4. Application of the concept of observer to solve nonlinear acoustics equations. The obtained results will also be applied to context of new ultrasonic "pulse-echo" imaging for Non Destructive Testing applications (cooperation of Prof. Chen and Dr. Dos Santos);

5. Study on various aspects of fractional models for damped structures, using observer design. In particular, the system parameters will be identified (cooperation of Prof. Chen and Dr. Serra).

AROUND THE PROJECT

Scientific publications

1 Wei, Y. Q.; Liu, D. Y.; Boutat, D.; Chen, Y. M. An improved pseudo-state estimator for a class of commensurate fractional order linear systems based on fractional order modulating functions, *Systems & Control Letters*, **2018**, *118*, 29-34.

2 Wang, L. F.; Wu, H.; Liu, D. Y.; Boutat D.; Chen, Y. M. Lur'e Postnikov Lyapunov functional technique to global Mittag-Leffler stability of fractional-order neural networks with piecewise constant argument, *Neurocomputing*, **2018**, *302*, 23-32.

3 Han, W.; Chen, Y. M.; Liu, D. Y.; Li, X. L.; Boutat, D. Numerical solution for a class of multi-order fractional differential equations with error correction and convergence analysis, *Advances in Difference Equations*, **2018**, *2018*, 253.

INSA
INSTITUT NATIONAL DES SCIENCES APPLIQUÉES CENTRE VAL DE LOIRE

Prof. Eric Goles

LE STUDIUM Research Professor

From: Adolfo Ibáñez University – CL

In residence at: Laboratory of Computer Science of Orleans (LIFO) - Orléans

Nationality: Chilean

Dates: **January, 2015 to April, 2015**
January, 2016 to March, 2016
January, 2017 to March, 2017
January, 2018 to March, 2018

Eric Goles is Doctor honoris causa from the University of Orléans, 2012. From 1981 to 2000, he was in the Engineering School of the University of Chile where he lead the first group in Chile working on discrete mathematics and computer science and formed a group dedicated to modelling and industrial applications. He was instrumental in the creation of the Centre for Mathematical Modelling, inaugurated in 2000, of which he was the first director. From 2000 to 2006, Professor Goles was president of the National Commission in Charge of Financing Scientific Research. During this period, he created the Institute for Complex Systems in Valparaiso of which he was the first director. This institute is dedicated to the study of complex systems. Since 2006 he is Full Professor and researcher at the Universidad Adolfo Ibáñez, in Chile

Prof. Nicolas Ollinger

Nicolas Ollinger is a theoretical computer scientist who joined LIFO in the University of Orléans in September 2011. His field of research includes theoretical computer science to discrete mathematics, covering topics like combinatorics on words, models of computation and complexity and decision problems for cellular automata and tiling.. He was a PhD student in Lyon in research team MC2 when the IXXI Institute emerged, then a founding member of the team Escape (équipe systèmes complexes, automates cellulaires et pavages) in Marseille where he participated to the national ANR projects Sycamore and EMC devoted to the relation in between computational models and discrete complex systems. Since 2008, he is the scientific secretary of International Federation for Information Processing (IFIP) working group on Cellular Automata and Discrete Complex Systems.

DISCRETE MODELS OF COMPLEX SYSTEMS: COMPUTATIONAL COMPLEXITY AND (UN) PREDICTABILITY, THEORY AND APPLICATIONS

Complex systems analyses investigate the emergence of complex global behavior through the local interactions of a large collection of well understood components. Interdisciplinary by nature, it encompasses problems encountered in the diverse disciplines of physics, economics, biology, mathematics, computer sciences, linguistics from which it borrows both models and tools. Discrete models of complex systems provide formal models that can be used both as modeling tools convenient for computer simulation to study particular complex systems and as a simple framework to study, define and characterize fundamental properties of complex systems. Theoretical Computer Science, through the theory of computation, provide valuable tools to design efficient algorithms or, when not possible, prove unpredictability or characterize the inherent difficulty of predictability in discrete models of complex systems like cellular automata, Boolean or regulatory genetic networks, social science models, sand piles and Ising like models. The purpose of this project is to contribute to the organization and development of the emerging research community on complex systems in the Loire Valley, disseminate tools and models from theoretical computer science among that interdisciplinary community and to confront other models to widen the scope of application of these tools. During his stay in 2015, Professor Eric Goles worked with his host scientist, Professor N. Ollinger, about freezing automata with PhD students from LIFO and DISC in Chile, on a model related with the origins of synonyms.

He participated as a keynote speaker at the fisrt Atelier MISC (Maison Interdisciplinaire des Systèmes Complexes) in Orléans in January 2015 and gave a public Lecture at Les Turbulences FRAC Centre on Complexity and calculation, drawings and mathematics in February 2016.

DISCRETE MODELS OF COMPLEX SYSTEMS

Complex systems investigate the emergence of complex global behavior through the local interactions of a large collection of well understood components. Interdisciplinary by nature, it encompasses problems encountered in diverse disciplines from physics to economics, biology, mathematics, computer sciences from which it borrows both models and tools. Discrete models of complex systems provide formal models that can be used both as modeling tools convenient for computer simulation to study particular complex systems and as a simple framework to study, define and characterize fundamental properties of complex systems. Theoretical Computer Science, through the theory of computation, provide valuable tools to design efficient algorithms or, when not possible, prove unpredictability or characterize the inherent difficulty of predictability in discrete models of complex systems like cellular automata, boolean or regulatory genetic networks, social science models, sand piles and Ising like models.
The workshop has gathered researchers from all these horizons, setting off interactions between them, a real oppurtunity to share recent results in the global perspective of discrete complex systems in active discussions lead by Prof. Eric Goles and Prof. Nicolas Ollinger.

EMEUTES DE 2005 : UNE VAGUE DE VIOLENCE CONTAGIEUSE RÉVÉLÉE PAR LA MODÉLISATION

Presented by Dr Jean-Pierre Nadal (CNRS/ EHESS), the public lecture covered the events of Autumn 2005, during which two young people died while trying to escape a police patrol ; thus riots started in a poor suburb of Paris, spread around and then in all France, hitting more than 800 municipalities and lasting over 3 weeks. Remarkably, although there were no displacements of rioters, the riot activity did travel. Thanks to an access to daily national police data, the dynamics of riot propagation were analyzed.
A parsimonious data-driven epidemic-like model, taking into account both local (within city) and non-local (through geographic proximity or media) contagion, allowed reproducing the full (day by day) time course of the riots at the scale of the country. The specificity of this model was clearly explained and compared to the modeling of the spread of infectious diseases.
Moreover, the analysis showed a precise mathematical characterization to the expression "wave of riots", and to provide a visualization of the propagation around Paris, exhibiting the wave in a way not described before. The remarkable agreement between model and data demonstrates that geographic proximity played a major role in the propagation, even though information was readily available everywhere through media. This work is the result of a large multidisciplinary collaboration involving expertise in sociology, computer science, physics, and mathematics.

HUMAN AND SOCIAL SCIENCES

HOST LABORATORIES IN HUMAN AND SOCIAL SCIENCES

CENTRE D'ÉTUDES SUPÉRIEURES DE LA RENAISSANCE (CESR) - UMR 7323 - UNIVERSITÉ DE TOURS, CNRS

The Center of Advanced Studies of the Renaissance (CESR) is the Education and Research Unit (UFR) of University of Tours and Mixed Research Unit affiliated with the CNRS. Set up through the initiative of Gaston Berger in 1956 and affiliated at that time with the University of Poitiers, the CESR became an integral part of the newly established University of Tours in 1970. Successive agreements in 1983 and 1992 enhanced the institutional links between the CESR and the CNRS. In 1996 the CESR reaffirmed its commitment to interdisciplinary research into key themes of European patrimony (for instance, around musicology, art history and the history of the book), in an accord with the French Ministry of Culture, the CNRS and University of Tours. The CESR celebrated its half-centennial in 2006. The CESR is an education and research centre, which welcomes students and researchers wishing to acquire an initial or additional university education in all domains of the Renaissance. The CESR's research programmes are structured according to disciplinary teams (history, history of art, French, neo-Latin and European literature, philosophy, musicology, history of science and techniques), research fields and team projects.

INSTITUT DE RECHERCHE SUR LES ARCHEOMATERIAUX (IRAMAT) CENTRE ERNEST-BABELON - UMR 5060 - CNRS, UNIVERSITÉ D'ORLÉANS

IRAMAT-Centre Ernest Babelon (Research Institute on Archaeomaterials) was founded in 1980 and belongs both to the CNRS and the University of Orléans. During its first years, the IRAMAT-CEB was specialised in the development and application of non-destructive techniques using nuclear methods for the characterisation of ancient coins. Then, the applications and analytical methods both diversified. Beside coins, other metallic objects, glass, obsidian, pigments and colorants were analysed by the means of laser ablation ICP-MS, X-Ray fluorescence, Scanning electron microscopy with an EDX... The originality of the laboratory is to gather historians, archaeologists and numismatists as well as chemists and physicians in the same team. Its mission is to develop new methodologies for the characterisation of ancient materials, and apply them to answer historical questions.

INTERACTIONS, TRANSFERTS, RUPTURES ARTISTIQUES ET CULTURELLES (InTRu) - EA 6401 - UNIVERSITE DE TOURS

The InTRu research unit was created in 2008 by the art historians Eric de Chassey, Jean-Baptiste Minnaert, France Nerlich and Pascal Rousseau (Université de Tours). The aim was to create a formal structure for the work they had started to carry out together with several colleagues based in other universities, and different institutions, such as museums, art schools and the Services de l'Inventaire (Inventory of Architectural Heritage), around the methodological issues and historical investigation of modes of circulation, cultural transfer and legitimisation strategies in the creative industries (visual arts, architecture, literature, etc.) and cultural practices using images.
The team decided to structure their collaboration around the following research themes: modes of cultural transfer (reception, influence, intertextualities), transmediation between the arts (visual arts, music, dance, architecture, literature) and hierarchies (image/ text, mass-culture/ high culture, banal/ unique, etc.). The idea was to advance the study of cultural circulation, by looking beyond simple shifts from one medium to another, to consider the recycling, translation or transformation of images, and to look at practices and knowledge acquisition. With an emphasis on interdisciplinary approaches, the team decided the different themes should not be closed entities, but rather they should form the building blocks for thinking together about epistemological questions.

LABORATOIRE D'ECONOMIE D'ORLEANS (LEO) - UMR 7322 - UNIVERSITÉ D'ORLÉANS, CNRS

LÉO is a research center supported by the CNRS and the University of Orléans (France). It was created on 1 January 1996 following the merger of the Orleanais Institute of Finance (created in 1974) and the Center for Research on Employment and Production (created in 1984). Initially located in Orléans, LÉO is the only research center in Economics in the region Centre-Val de Loire. Since January 2013, it has been designed to welcome, in addition to Orleans colleagues, the researchers in Economics of the University of Tours.
LÉO has about 42 permanent researchers (full professors and associate professors) and 37 PhD students. LÉO is specialised in three research areas: (1) Macroeconomics and Finance, (2) International Economics and Sustainable Development and (3) Econometrics.

HOST LABORATORIES IN HUMAN AND SOCIAL SCIENCES

POUVOIR, LETTRES, NORMES (POLEN) - EA 4710 - UNIVERSITÉ D'ORLÉANS

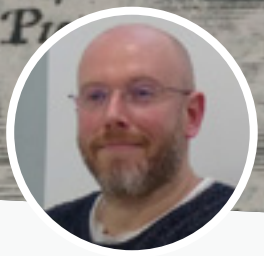
Emerging from the collaboration of literary historians belonging to the META research laboratory and the "Littératures et civilisations" and "Savoirs et pouvoirs de l'Antiquite à nos jours" research centres, the PoLeN (Pouvoirs, Lettres, Normes) research laboratory is a pluridisciplinary group of researchers from the fields of history, literature, linguistics, anthropology and law. It comprises three main research centres - on late medieval culture, early modern culture, and modern and contemporary culture - each of which is dedicated to investigation of the ways in which texts from a range of historical periods engage with questions of power and authority, particularly as regards their role in the dissemination of the discourses that prescribe societal norms in any given period and in the potential resistance to these norms.

CITÉS, TERRITOIRES, ENVIRONNEMENT, SOCIÉTÉS (CITERES) - UMR 7324 - CNRS, UNIVERSITÉ DE TOURS

The multidisciplinary research unit (UMR) CITERES was created in 2004 to strengthen and structure the research capabilities of the University of Tours on the topic of "Villes et Territoires." CITERES was founded in 2008 and has been at the forefront of research in the experience of the spatial, territorial and political dimensions of cities and societies. It has established a history of original research, which has strongly influenced the course of scholarly work on the urban environment in France and is taking a leading part in the international debates. Its expanded program benefits from a multidisciplinary team of specialists from the sociology, geography, anthropology, history, economics, urban planning, history, and political science.
CITERES is organized into four research teams. These research groups work on the cross-cutting and emerging themes, favor the creation of new research collectives and collaborate internationally with researchers across the globe. Among its institutional missions are; strengthening internationalization of research and publications and supporting cross-disciplinary actions and emerging issues.

ÉCOLOGIE - DESIGN - NUMÉRIQUE (ÉCOLAB) - ECOLE SUPÉRIEURE D'ART ET DE DESIGN D'ORLÉANS

The general orientation of ECOLAB is defined by an ecological reflection in the broad sense (environmental, social, technical, mental) resting on the idea that any conception, production, and exchange activity is defined by a set of relations where each element of the system has an influence on all the others. It is more clearly about understanding how design, as a form of thought and rational creation, can enlighten, deepen and transform the way in which ecology and digital technology determine contemporary human life. According to such a perspective, ecology and digital technology are not considered as simple themes but as new research conditions similar to experience, creation and society. By encouraging collaborative practices between young creators, researchers and producers from different cultures and countries, this relational and critical approach questions the classic industrial principles to experiment new ecosystems where methods of conception, production, representation and exchange are reconfigured.



Dr Renaud Adam

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: University of Liège – BE

In residence at: Center of Advanced Studies of the Renaissance (CESR) - Tours

Nationality: Belgian

Dates: October, 2017 to September, 2018

Dr. Renaud Adam is a book historian, specialized in the early modern period. He is also teaching history of the book in the Renaissance at the University of Liege. He previously worked for Fund National of Research (Belgium) under the supervision of Prof. A. Delfosse at the University of Liège, in the Royal Library of Belgium and in the University Library Moretus Plantin in Namur (Belgium). He has collaborated with collective and interdisciplinary research projects devoted to the study of the urban history of the historical Low Countries, the spread of Italian culture in French-speaking Europe and the role of print revolution in the diffusion of medieval French texts. He was invited to give lectures in different countries of Europe as well as in America, and he published nine books, written alone or in collaboration. His last book, devoted to the spread of printing press in the Low Countries, has been issued on November 20.

Prof. Chiara Lastraioli

Prof. Chiara Lastraioli is the director of the Maison des Sciences de l'Homme Val de Loire. Professor of Italian Studies at the CESR and at the Faculty of Languages and Literatures of the University of Tours, her teaching and research explore the relation of Italian and French Renaissance Literatures to theology, propaganda, book trade and the history of scholarship. She is in charge of the "Bibliothèques Virtuelles Humanistes" program (CESR) and she has published numerous essays on Renaissance authors and printers. Recently she has published a monographic volume on Pasquinate, grillate, pelate e altro Cinquecento librario minore. She's also the coordinator of the EDITEF project on Italian Books and Book Collections in Early Modern French Speaking Countries, financed by the "Agence Nationale pour la Recherche", and the project ECRISA (L'Ecriture, ses supports, ses archives) financed by Region Centre Val de Loire.

BIBLIOPOL@: THE BOOK MARKET IN THE RENAISSANCE BETWEEN FRANCE AND THE LOW COUNTRIES

This project aims to renew our knowledge of cultural exchanges between France and the Low Countries during this crucial period of transitions between Middle and Modern Ages. This phenomenon will be explored through the still widely under-exploited prism of early modern books circulation between these two countries.

This project starts from the fact that if we are now in position – thanks to valuable works – to evaluate with any degree of confidence the number of books published in France and in the Low Countries in the Renaissance, where and when, we are still not yet able to say which books – with the same degree of confidence – were really bought from a country to another and read there; leading de facto to an incomplete and partial assessment of the cultural substratum of these two countries. To narrow the field of research, which could otherwise result unmanageable, the best solution is to focus on the transnational book trade. This is surely one of the most efficient ways to understand how and which books were in movement, how they travelled across borders and, by extension, the nature of cultural exchanges between France and the Low Countries in the early modern period.

The book trade is made of two principal components: men and books. This is why the attention is focused on the circulation of books and the men behind it. The project "Bibliopol@" will rely on a dual and complementary corpus: inventories of bookshops and archives materials involved in this business. It will cover the second half of the 16th century, a period of intense economic activities between the two countries interrupted by the difficult context of the War of Religions in the 1580s.

The project «Bibliopol@» ended on September 30, 2018. Our work mainly concentrated on the circulation of books between France and the Low Countries and on the lost production of 16th-Century Parisian printers. One of the major achievements is the launch of the digital tool Bibliopol@: Materials to be of use to the history of the trade of books in the Renaissance. This website hosts the electronic edition of the unedited archives written by inquisitors in the wake of the visits carried out, at the request of the Governor of the Low Countries in 1569, within the bookshops of the city of Mons in the County of Hainaut.

LOST IN RENAISSANCE

The symposium Lost in Renaissance – held in Maison Rabelais at Tours (September 20-21, 2018) – explored this period by reversing the paradigm that defines it. Indeed, if the scientific community agrees to characterize the Renaissance as the time of rediscovery of antiquity, we analysed it through the prism of disappearance. The aim was to concentrate on the losses encountered by Europe's intellectual, literary, artistic and material heritage during the 15th-17th centuries as a result of the great religious, political, cultural and technical upheavals that affected this territory. The angle of approach chosen for this colloquium was that of the book, considered in its materiality or for its content as a witness, victim or vector of the offences made against the heritage during the Renaissance. This colloquium gathered researchers from Belgium, Spain, France, Scotland and from Italy.

COMMENT PARLE-T-ON DE LA RENAISSANCE AUJOURD'HUI ? ENTRE FÉTICHISATION PATRIMONIALE ET RENAISSANCE BASHING

The invention of the printing press by Gutenberg in the mid-fifteenth century is one of the most important technical advances in history. It had a profound impact on European civilization and gave birth to the first great "media revolution". The immediate effect was to multiply the number of books in circulation and to reduce their cost. Booksellers had to deal with multiple hundreds of copies, rather than in single copies as at the manuscript age. Until now, research on the early history of printed books has been mainly focused on the world of printers, the production of books and on lectors and their reading practices. Some recent works have highlighted the fact that the engine and the frame of the Gutenberg revolution lied precisely in the structures and the evolution of book diffusion. My conference focused on the trade relations between France and the Low Countries which have never been the subject of systematic analysis. This is not only a chapter of economic history; it is also an accurate point of view to think about the most fundamental cultural trajectories.

AROUND THE PROJECT

Publications

- Adam, R. La réception imprimée de Galien dans les anciens Pays-Bas au XVI[e] siècle, in A. Verbanck-Pierard (ed.), *Au temps de Galien. Un médecin grec dans l'empire romain*, Paris, Somogy, édition d'art, **2018**, p. 272-278.

- Adam, R. Spanish Books in Michiel van Hamont's Bookshop (1569): a Case Study of the Distribution of Spanish Books in Sixteenth-Century Brussels, in *Quaerendo: A Journal Devoted to Manuscripts and Printed Books*, 48 (**2018**), p. 300-316.

- Adam, R. *Vivre et imprimer dans les Pays-Bas méridionaux (des origines à la Réforme)*, 2. vols., Turnhout, Brepols, **2018**.

- Adam, R. *Bruxelles et le livre : regard sur cinq siècles d'histoire (xvie-xxe siècle)*, Geneva, Droz, 2018 *(Histoire et civilisation du livre : revue internationale*, t. 14).

Prof. Graeme Boone

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: The Ohio State University – USA

In residence at: Center of Advanced Studies of the Renaissance (CESR) - Tours

Nationality: American

Dates: July, 2017 to July, 2018

Graeme Boone is Professor of Music at the Ohio State University. From 2013–2017, he was Director of the Center for Medieval and Renaissance Studies there, producing or managing a course curriculum, lecture series, colloquia, conferences, and other activities. He has served on the Board of Directors of the American Musicological Society and has chaired several of its committees; he was recently nominated for the positions of both Vice-President and President. He is currently on the Executive Committee of the regional centers association of the Medieval Academy of America, and serves on the editorial boards of several musicological journals. Boone has received numerous research grants from Ohio State, and his book Patterns in Play (1999) was selected as the inaugural volume of the American Musicological Society monograph series. In 2015, he was an Invited Scholar at the Center for the History of Emotion in Australia.

EMOTION IN DUFAY

The central goal of the project was to construct, in scholarly terms, an approach to the study of emotion in the music of Guillaume Dufay (c. 1397–1474). Dufay is commonly regarded as the most accomplished composer of the emergent Renaissance in music, and his compositions are thought to convey a intensity and variety of emotive expression. But this quality, as in most fifteenth-century music, has never been properly modeled or investigated in a scientific manner.

Achievements of the project to date include the elaboration of a background of affective social spheres around Dufay, as modeled from a wide variety of fifteenth-century writings, and taking account of recent multi-disciplinary emotion research. This involved readings in the domains of literary theory, history, analysis, and poetic repertories of the earlier 15th century; sociological studies of 15th-century lifestyles, communities, artistic organizations, economic and bureaucratic structures; analysis of historical sources and pertinent philosophical and theological writings, regarding the topics of soul, subjectivity, affectus, and mental faculties; study of medieval perception and modeling of the senses, of the body, of music, of sound; and study of the medieval medical understanding of the relationship between music, harmony, emotion, health, and the body. In conjunction with systematic analysis of Dufay's compositions in different genres, this research has allowed me to develop an unprecedented understanding of Dufay's musical-affective horizons and techniques, which are sometimes quite different from those we take for granted in music today.

A special focus of research turned out to be a reading of the voluminous theological and sermonic writings of Jean Gerson, chancellor of the University of Paris and important writer on both music and emotion in the early fifteenth century. Gerson developed a sophisticated theory of musical expression that used learned compositional elements to illustrate ways in which music could embody intense affectivity and spirituality. Though considerably older than Dufay, Gerson had a connection to the young composer through the prelate Pierre d'Ailly, who appears to have been close to both figures; and Dufay's works show highly innovative traits that appear to reflect some of the same musical-affective qualities we find in Gerson's highly original thought.

During the year, I met with many musical scholars regarding my research and organized a workshop (discussed below) with four of them; this collaboration is now ongoing.

I also pursued research on the relationship between architectural and musical design in the period of Dufay's lifetime, studying numerous 15th-century buildings, reading extensively in architecture history, and meeting with architectural historians to discuss this relationship. I gave several lectures on the topic, and initiated a scholarly collaboration with CESR researcher Vasco Zara, who is active in this same area.

Prof. Philippe Vendrix

Philippe Vendrix is the former Director of the Centre d'Etudes Supérieures de la Renaissance (2008-2015). He obtained his PhD in 1991 in musicology with the highest distinction from the examination jury at the University of Liège. He has been a member of Council of the American Musicological Society, 2001-2004. Elected in 2010 to the Alumni College of the Belgian Royal Academy. He has editorial management responsibilities of various collections including Ricercar. He is on the editorial board of leading publications in musicology and a member of the Scientific Council of Répertoire International de Littérature Musicale, New York and the European Science Foundation. He is currently the president of the University of Tours.

AFFECTIVE HORIZONS OF 'SONG' IN THE LONG FIFTEENTH CENTURY

My Le Studium Conference was a workshop, entitled 'Affective Horizons of 'Song' in the Long Fifteenth Century.' It was held at the CESR in Tours on June 27–28, 2018. The objectives of the workshop were to share interdisciplinary scientific perspectives on emotion and music in the 15th century, relative to the research programs of four scholars: Professor Martine Clouzot (Medieval History), Université de Bourgogne–Franche Comté; Professor Nathalie Dauvois (French Literature), Université Sorbonne-Nouvelle, Paris; Professor Wolfgang Fuhrmann (Musicology), Johannes Gutenberg University, Mainz; and Jacomien Prins (Philosophy), Herzog August Bibliothek, Wolfenbüttel. The outcomes of the event were a highly productive discussion, drawing connections between French literature, art, philosophy, and music in the 15th century, and a plan for further collaboration, which has resulted in a session on 'Music, Emotion, and Ethics, 1400–1600,' to take place at the annual Renaissance Society of America meeting in Toronto (March, 2019).

AROUND THE PROJECT

Oral Communications

1 Boone, G. 'Music and Architecture: A Shared Aesthetic of the Flamboyant.' FAB–Musiconis, Institut national d'histoire de l'art, Lecture, Paris, Jan. 12, 2018.

2 Boone, G. 'Architecture et polyphonie au XVe siècle: Une esthétique partagée du flamboyant.' Unité de recherche 'Transitions', Lecture, Université de Liège, Apr. 18, 2018.

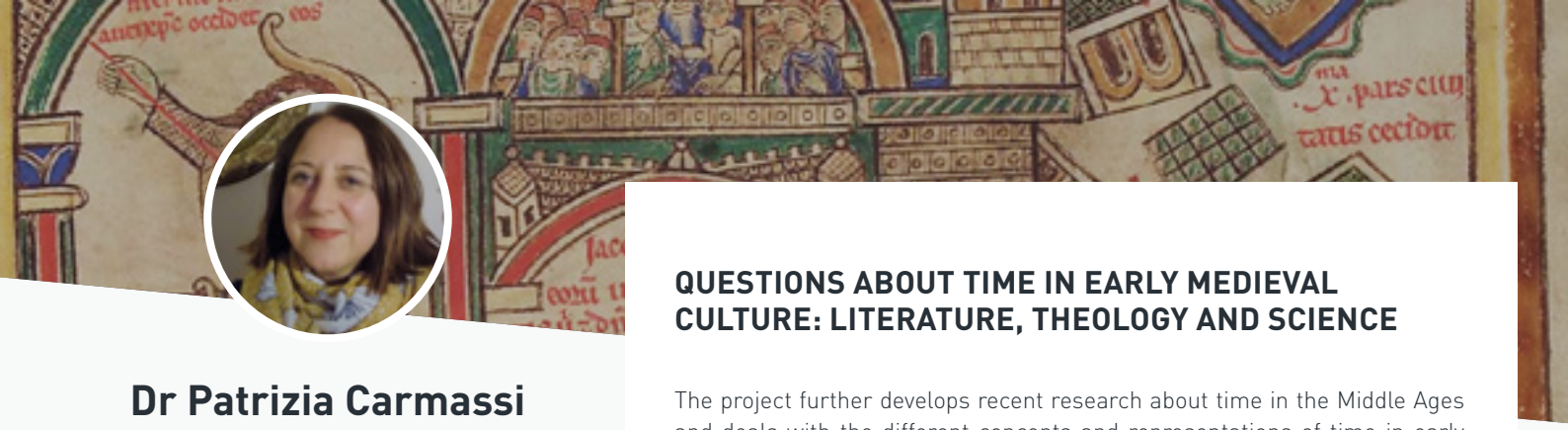
3 Boone, G. 'Visualizing Improvisational Composition.' Material Cultures of Music Notation: An Interdisciplinary Conference, Lecture, Utrecht University, April 21, 2018. (Also: Chair, Print Cultures session at this conference.)

4 Boone, G. 'Pratique et imaginaire musicaux chez Gerson.' Conférence 'Jean Gerson écrivain', Lecture, Université de Montpellier III, April 4, 2018.

5 Boone, G. 'Slow art. Une apologie de la sensibilité flamboyante.' Séminaire Ricercar, 'La musique au XVe siècle: Nouvelles perspectives de recherche', Lecture, CESR, Tours June 11, 2018.

6 Le Studium Workshop: Affective Horizons of 'Song' in the Long Fifteenth Century, Organizer and Chaire, CESR, Tours, June 27–28, 2018.

7 Boone, G. 'The Musical World of Jean Gerson.' Lectures in Musicology, the Ohio State University, October 2018.



Dr Patrizia Carmassi

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: University of Freiburg – DE

In residence at: POuvoirs, LEttres, Normes (POLEN) - Orléans

Nationality: Italian

Dates: April, 2018 to May, 2019

Dr Patrizia Carmassi studied at the University of Pisa and received a PhD in Medieval History from the University of Münster. In recent years she worked as a researcher at the Herzog August Bibliothek, Wolfenbüttel, and at the Research Center for Medieval and Early modern period of the University of Göttingen. Her research approach is characterized by interdisciplinary methodology, study of original manuscript sources and international networking. She has been curator of manuscript exhibitions in German cultural institutions and has organized lecture series and many international conferences of which she has edited or coedited the volumes of the proceedings. Her main research interests are history of medieval culture, medieval liturgy, Latin philology, text and image relationships, palaeography, codicology, history of libraries and book collection in the medieval and the early modern period

Prof. Jean-Patrice Boudet

Jean-Patrice Boudet is professor of Medieval History (University of Orléans) since 2004. He heads the Centre d'Etudes Supérieures sur la Fin du Moyen Âge, the Medievist team at the POLEN laboratory. He is also responsible for the «Sciences of quadrivium» division of the Institut de Recherches et d'Histoire des Textes, UPR 841 of the CNRS. He is an expert on the cultural and political history of the late Middle Ages, especially in astronomy, astrology, divination and magic. He was awarded by the CNRS bronze medal in 1997. His book, Entre science et nigromance. Astrologie, divination et magie dans l'Occident médiéval (XIIe-XVe siècle), Paris, Publications de la Sorbonne, 2006, was awarded by the premier prix Gobert of the Académie des Inscriptions et Belles-Lettres. He is currently pursuing research on Alfonsine astronomy and the relationship between astrology and politics in the Middle Ages and the Renaissance.

QUESTIONS ABOUT TIME IN EARLY MEDIEVAL CULTURE: LITERATURE, THEOLOGY AND SCIENCE

The project further develops recent research about time in the Middle Ages and deals with the different concepts and representations of time in early medieval sources. The research corpus is based on manuscripts preserved mostly in Orléans. The aim is to investigate this corpus in order to understand which ideas of time were transmitted and how they could probably coexist, function or interact in a specific period (IX-XI c.) in the Benedictine monastery of Fleury. This monastery was famous for keeping the relics of Benedict. Due to the early medieval translation of the relics to Fleury one important aspect of consideration of time was the understanding of the past events in relation with the present and the role of actualization for the constitution of a legitimate identity for the monastic community. The research during the first period of the fellowship has already shown that not only the historiographic and hagiographic production in the monastery are important for the comprehension of the ideas of time in Fleury, including eternity and the eschatological dimension of time, but also the codicological strategies which were consciously adopted during the medieval book production. Moreover, we observe the coexistence of further traditional systems of theological, natural and liturgical definition and interpretation of time, which were transmitted in the monastery through patristic and liturgical literature, later on also through philosophical texts, already before the time of the well-known computistic studies by Abbo of Fleury. At the level of the personal and common perception of time, the strong normative character exerted by the liturgical practices and the monastic rule, and customary are also to be considered with regard to their impact on the religious community. The observation of the chosen topic (time) across heterogeneous sources can contribute to the reconstruction of the intellectual background of a specific community and to outline challenges, innovations and dynamics in medieval thought. Furthermore, up to now there has been no sufficient attention to the manuscript transmission of contents and their material aspects concerning time in the manuscripts of Fleury; this kind of analysis will enhance the understanding of the techniques of acquisition, discussion and development of knowledge during the Middle Ages.

A second field of investigation about time in the Middle Ages is represented by the analysis of the encyclopedic work produced by a canon of Saint-Omer in the 12th century, the so-called Liber Floridus. In this case the different aspects of time, theories and sources which converged in one work, and the changes in the traditional views about time and cosmology through the reception of new scientific texts are examined through a transdisciplinary and international conference in March 2019. This conference aims to enrich the methodical debate and to produce new scientific results on an important medieval text which has not yet been critically edited.

AROUND THE PROJECT

Scientific publication:

Carmassi, P. Theological Issues and Traces of Controversies in Manuscripts Transmitting Works of the Church Fathers, in Mariken J. Teeuwen und Irene van Renswoude (ed.), The annotated Book in the Early Middle Ages: Practices of Reading and Writing, Turnhout 2018 (Utrecht Studies in Medieval Literacy 38), pp. 743-764.

Prof. Carmen Díaz Orozco

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: University of the Andes - VE

In residence at: RÉceptions et MÉdiations de LIttératures et de Cultures Étrangères et comparées (RÉMÉLICE) – Orléans

Nationality: Venezuelan

Dates: July, 2018 to July, 2019

Professor and senior researcher at the Los Andes University, in Mérida, Venezuela
Coordinator of the Master's Degree in Ibero-American Literature. Gonzalo Picón Febres» Literary Research Institute. 2011 - 2013.
Director of the Literary Research Institute «Gonzalo Picón Febres». 2004 - 2007.
Founder of the Collection «Cuadernos de Crítica y Ensayo».He has also co-published 11 books with university departments (Vicerrectorado Académico, ULA) and private publishers
Winner of the Latin American and Caribbean Social Thought Anthologies Contest. CLACSO. Buenos Aires, 2016. ISBN 978-987-722-256-2
Program to Stimulate Innovation and Research (PEII). Researcher Level A-2. Board of Directors of the National Observatory of Science, Technology and Innovation. Caracas - Venezuela. 2013 - 2015.
Researcher Stimulus Program. University of Los Andes. ULA, Merida - Venezuela. 2005 - 2012.

Prof. Brigitte Natanson

Deputy Director of the REMÉLICE Laboratory. Research Project Coordinator: «Participation Feminine and Nations in Construction in Latin America of the Nineteenth Century» of the REMÉLICE group. Professor in the Spanish Department of the Faculty of Arts and Human Sciences since September 2010 (HDR supported in November 2009). Lecturer between 1992 and 2009 at the University of Nancy 2. She teaches lectures, tutorials and seminars in Bachelor's degree and Master's Research and Master's Teaching in LLCE and LEA. Latin American civilization, literature and theatre courses.
Elected member of the CEVU since 2012. Treasurer of the ALMOREAL Association.
-«De la inmigración al exilio, cómo se nombra al extranjero: del "ruso", "tano", "turco", "gallego" al "sudaca" o al "che", del Río de la Plata a España)», in La part de l'Étranger, HispanismeS, n°1, January 2013, pp. 26-51.

PARTICIPATION OF WOMEN AND NATIONS UNDER CONSTRUCTION IN LATIN AMERICA IN THE NINETEENTH CENTURY: THE COMMITMENT OF MARIQUITA SÁNCHEZ AND JUANA MANSO IN EDUCATION IN ARGENTINA

Participation of women and nations under construction in Latin America in the nineteenth century: the commitment of Mariquita Sánchez and Juana Manso in education in Argentina

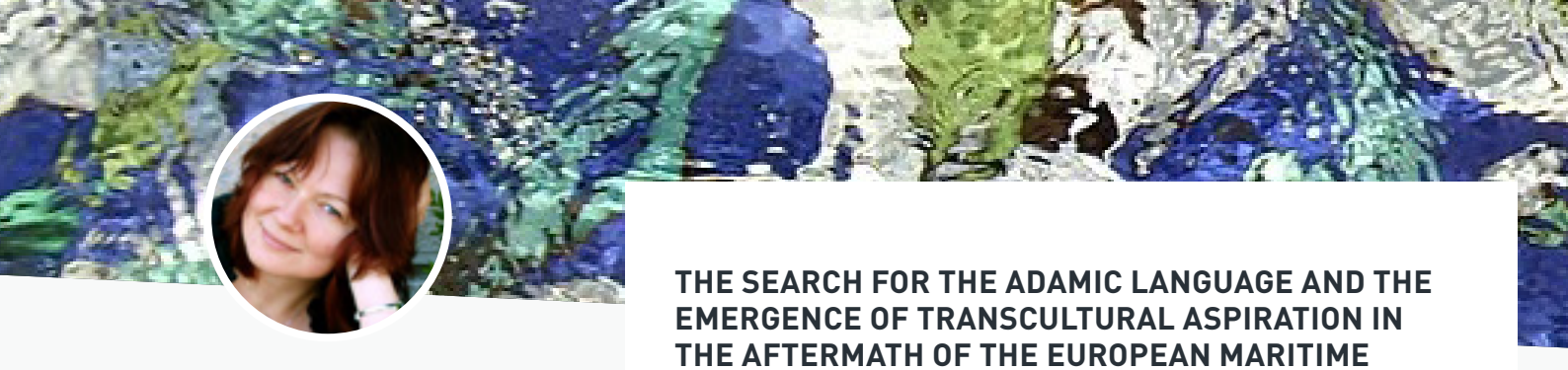
The purpose of this project is to select, compile and translate the writings of these two intellectuals, in two separate volumes, the establishment of a critical edition of their complete works, as well as the creation of a bilingual website, able to offer French-speaking public access to first-hand and valuable materials, inaccessible to this day in the French academic world.

On a first fact-finding mission, the periodical El Correo de Ultramar was entirely revised after a search for information on Juana Manso's educational, literary and publishing activities. Description: Contains news from all over Europe. The longest section is the one that reviews the Spanish press. In the first three months of 1850 there is a section about books published in Spain, in March, this section disappears. In the rest of the year literary news is non-existent.

From January 1851, the fortnightly edition of the newspaper indicates the existence of a «magnificent volume», destined to the collection, of the supplement «The Illustrated Museum». Something similar happens with another supplement: «The Illustrated Overseas Courier» whose copies are published although under the title «Illustrated Literary Part of The Overseas Courier». With regard to the latter, it should be noted that many of the descriptions of costumes in the articles in the «Revue de l'industrie et de la mode» section refer to images that do not appear in the copies of the «Literary Part...» consulted in the BNF.

The section Revue de l'Industrie et de la mode (in Spanish and French), signed by the Viscountess of Renneville, contains an interesting summary of the latest Paris fashion.

The Ultramar Courier, revised from 1853 to 1858, is a magazine illustrated with rich engravings distributed in sections among which stand out the travel section and the representation of the national types of the visited regions. The «Scientific Bulletin» section also stands out, with curiosities about science and a few articles about regional customs. The section dedicated to news about regional customs in America is just as important as the same section dedicated to the presentation of European types and customs. Volume I (January - June 1853) does not contain any news about the work and/or Labor of Juana Manso or Mariquia Sánchez in Argentina. In fact, it does not present any news about customs, civil works, scientific, educational, cultural advances or writers of the Río de la Plata.



Dr Ewa Anna Łukaszyk

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: University of Warsaw - PL

In residence at: Center of Advanced Studies of the Renaissance (CESR) - Tours

Nationality: Polish

Dates: September, 2017 to August, 2018

Ewa Łukaszyk, Prof. PhD habil.; former professor at the interdisciplinary Faculty "Artes Liberales", University of Warsaw, currently guest reseracher at Leiden University. Specialized in comparative literary and cultural studies, with competences in Romance and Orientalist area. In her extensive track of publications (approx. 200 items, including 6 authored books), the major group has been dedicated to Portuguese and Lusophone topics. She has realized various research projects financed by Polish institutions as well as the Calouste Gulbenkian Foundation and Instituto Camões in Portugal. Since 2012, she has been working on the innovative, comprehensive approach to the transcultural dimension of the human symbolic activity, realizing several interconnected projects (the research on Adamic language being one of them) and building up a theoretical language especially destined to the analysis of transcultural problems.

Prof. Marie-Luce Demonet

Prof. Marie-Luce Demonet, specialised in the relationships between literatures, languages and theories of the sign in the Renaissance (Les Voix du signe, 1992). Member of the Institut Universitaire de France (2005-2015) distinguished with Légion d'Honneur. She has published several studies on Montaigne and edited a digital edition of the Essais and the manuscripts of Montaigne (projet ANR « MONLOE », « Montaigne à l'œuvre »), as well as approx. 30 articles on Rabelais. She is also responsible for several other digital editions, including all the writings of Rabelais and their sources (projects Rablissime et ReNom). Responsible 2011-2015 of the consortium CAHIER (« Corpus d'Auteurs pour les Humanités. Informatisation, Edition, Recherche ») and other projects related to digital humanities.

THE SEARCH FOR THE ADAMIC LANGUAGE AND THE EMERGENCE OF TRANSCULTURAL ASPIRATION IN THE AFTERMATH OF THE EUROPEAN MARITIME DISCOVERIES

The aim of the project consisted in introducing a historical perspective into the state-of-the art reflection on transcultural perspectives in the present-day humanities. This aim has been achieved, in the first place, through the textual analysis of the works of the French heterodox thinker Guillaume Postel, as well as the historical context of his activities, that permitted to evaluate the weight of transcultural transgression and the inscription into the political projects of his time. A special attention has been paid to the stakes and implications of his Oriental project, implying both philological work of Postel, such as his grammar of Arabic, and his activity related with his participation in the French embassy to Turkey.

The stake of the project was to put in the limelight the early-modern origins of the universalist ideas, concentrating on the unfalsified aspect of translocal / transconfessional / transcultural collaboration in pursuit of a crucial, common intellectual cause that in the early-modern epoch was epitomized by the recuperation of the primordial language of the humanity. The aspect focused has been the relationship between the problem of the lost primordial tongue and the valorization of intellectual activity beyond the cultural frontiers as well as the idea that the lost path of truth (via veritatis perdita) can only be found through the confrontation with otherness. The charismatic figure and the writings of Guillaume Postel exemplify a coherent line of thinkers that are to be found not only in France, but even more importantly in the Iberian Peninsula (Llull, Barros, Vieira) that saw the necessity of transcultural and transreligious dimension in their intellectual activity.

The central hypothesis of the project concerned the early-modern emergence of the transcultural aspiration, i.e. the desire of crossing the cultural frontier in search of intellectual or spiritual accomplishment. Such terms as "transculture", "transculturation", "transculturality", "transcultural" (writing, comparativism, etc.) have already entered the current language of humanities; nonetheless, the predominant optics associate the transculturality with the present-time conditions of global mobility. This is why it has been crucial for this project to treat transculture as a phenomenon of the past and study it in a diachronic perspective: as a tradition forming a consistent stream of ideas binding together not only the European, but also the Mediterranean history of ideas. What is more, this Mediterranean and Iberian phenomenon finds its global projection in the aftermath of the European maritime discoveries.

The general lines and the target of this theoretical innovation was presented at LE STUDIUM Thursday seminar and situated the research on Adamic language in relation to the larger project: "Defining the symbolic space: From a cluster of transcultural case studies to a topological conceptualization". A short monograph in Polish under the title Humanistyka, która nadchodzi. W poszukiwaniu kondycji transkulturowej ("The coming humanities. In search of the transcultural condition", Warsaw 2018) explaining the idiosyncratic aspects of this theoretical approach was prepared. The host laboratory CESR also benefited from informal talk: "Pour une Renaissance transculturelle?», explaining what the transcultural studies are and what importance this inspiration might be for the research on the Renaissance.

TRANSCULTURAL MEDITERRANEAN: IN SEARCH OF NON-ORTHODOX AND NON-HEGEMONIC UNIVERSALISM(S)

The conference "Transcultural Mediterranean: in search of non-orthodox and non-hegemonic universalism(s)", took place at the Centre des Études Supérieures de la Renaissance on 30-31.05.2018. The aim was to create a space of discussion concerning the transcultural dimension of the Mediterranean understood as a region defined, in the first place, by the phenomena of exchange and circulation of ideas. The Mediterranean crossroad between Europe, Middle East and Africa, fully established already at the end of Antiquity, takes a new shape at the brink of late Middle Ages and early Modernity. The proposed approach is to identify the spheres of interference between the Islamic and Christian worlds (contemplated in their plurality and mutual inter-penetrability). The meeting brought together experienced and young colleagues from several countries both in Western and Eastern part of Europe. As a highlight of the event, two leading scholars in the field had been present: prof. Stefan Sperl from SOAS, London, and prof. György Endre Szönyi,Central European University, Budapest.

RAMON LLULL, OU COMMENT COMMUNIQUER AVEC L'AUTRE

Public LE STUDIUM Lecture under the title "Ramon Llull, ou comment communiquer avec l'autre" was held by prof. Josep E. Rubio Albarracin from the University of Valencia. The speaker is one of the leading scholars specialized in the study of the medieval Catalan philosopher and theologian, Ramon Llull. He has been Research Fellow of the Alexander von Humboldt Foundation at the University of Fribourg. In 2012, he was guest professor at Sorbonne (Chaire Pierre Abelard de philosophie medievale). In his lecture, he presented Ars Lulliana, one of the most fascinating works of medieval speculation. Its aim was to provide the humanity with a universal tool of communication, less deficient than languages commonly spoken. That ideal tool was supposed to help people cross the cultural borders, namely the one that was the most important in medieval times, dividing Christians and Muslims. That Utopian aim of finding a common truth beyond the cultural peculiarities is still important for the society today.

Publications

1 Łukaszyk, E. Humanistyka, która nadchodzi. W poszukiwaniu kondycji transkulturowej, Warszawa, *DiG*, **2018**. (book)

2 Łukaszyk, E., "Congregatio mundi today. New perspectives on Guillaume Postel (1510-1581)", *Primerjalna Kniževnost*, **2018**, *41*, 191-199.

Jens Christian Moesgaard

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: National Museum of Denmark - DK

In residence at: Archeomaterials Research Institute - Ernest-Babelon Center (IRAMAT-CEB) - Orléans

Nationality: Danish

Dates: September, 2017 to September, 2018

Jens Christian Moesgaard is a historian specialised in medieval numismatics. Graduated from the University of Copenhagen in 1992, he worked at museums in France (Evreux, Rouen) and England (Cambridge) until 1997 when he joined the National Museum of Denmark as Assistant Keeper of the Royal Collection of Coins and Medals. His research field is coin production and coin circulation in France and Scandinavia in the Middle Ages. He aims at using coins as evidence for political, institutional and economic history. He has in particular worked on Viking coinages and the archaeological context of coin finds. He was visiting professor at l'Ecole Pratique des Hautes Etudes in 2015 and has been awarded with the Holger Hede medal (Danish Numismatic Society), the jeton de vermeil of the French Numismatic Society and a free-of-charge membership of the Swedish Numismatic Society.

Dr Marc Bompaire

The project was hosted by Marc Bompaire assisted by Guillaume Sarah who we wished to present here as well, considering there were actually 2 host scientists.
Marc Bompaire studied at École des Chartes and is Doctor in History. He is specialised in medieval monetary history. He was Assitant Keeper at the Cabinet des Médailles of the Bibliothèque nationale in Paris before joining the CNRS in 1989, first as researcher and since 2003 as director of research at IRAMAT-CEB in Orléans. He directed the ANR-project « La filière de l'argent au haut Moyen Âge » that lead to the publication in 2017 with G. Sarah of Mine métal monnaie Melle. Les voies de la quantification monétaire au haut Moyen Âge. Since 2004, he holds a chair of Numismatics and monetary economy in the Medieval West at Ecole Pratique des Hautes Etudes. He is or has been director of 7 doctoral theses. He has been member of Comité national de la Recherche scientifique and president of Société française de numismatique. He is director of Revue numismatique and member of the board of 5 other French and foreign journals.
Guillaume Sarah holds a PhD in Chemistry of the University of Orléans. He works as a researcher for the CNRS at the IRAMAT-CEB in Orléans since 2011 and assistant director of this laboratory since 2018. He is specialised in the archaeometallurgical study of ancient coins mostly for the medieval period. He also has a strong involvment in the fields of experimental archaeometallurgy, mining and metallurgical archaeology and digital humanities. He co-supervises or co-supervised 4 PhD students. He co-directed the publication of 2 books and authored or co-authored nearly 50 publications.

COINS, DIES, SILVER: FOR A NEW APPROACH TO THE MAKING OF THE FEUDAL PERIOD

The project aims at using new evidence and methods to shed light on the transition from the centralised 9th-century Carolingian state of Charlemagne's heirs to the decentralised feudal principalities of the 10th-12th centuries. Coinage is an official institution, and studying it informs us about the state of society and the organisation of the administration. This evidence is the more precious for periods when written sources are very scarce, leaving many lacunae in our knowledge.

At a first glance, 10th-century coinage seems disorganised. One easily gets the impression of an erratic variation in minting over time and from place to place, consistent with the idea of an unstable political situation. But what if the scarcity of some coin types was just a result of a low survival rate?

Normandy has been chosen as case study. Indeed, the coinage struck in the name of the Duke shows a great variety of coin types that can be dated quite closely which makes it suitable for this kind of study.

In order to asses the importance of coinage in society, one must estimate how large the mint output was. No mint accounts survived for this period, but as the existing specimens carry minor variations in the motive and the inscriptions, they must have been struck by many different dies and consequently in large numbers. The die studies conducted within this project confirm that the coinage was much larger than expected from the scarcity of surviving specimens of some of the rare types.

The coin finds reveals that non-Norman coins as well as older local Norman coins were to a large extent excluded from circulation. The Duke probably had revenues in the form of fees from the compulsory exchange of foreign and old coins, as documented for later periods. This reflects a well-organised managed currency that must have required a stable administrative set-up to handle the production and the income, as well as a firm control system of the coin circulation.

The silver content of the coins is a key factor of the monetary policy of the coin issuer. The project has largely benefitted from the collaboration with Guillaume Sarah from host laboratory IRAMAT that is world leading in the field of the study of the metal composition of coins. 157 coins from the collections of the BnF, the Musée des Antiquités of Rouen and Mont-Saint-Michel have been analysed for the project. The results show a rather firm control of the silver content. Quite unexpectedly, a case of two distinct silver standards at the same time has been detected. A minute change in the design of the coin allowed for the initiated to distinguish between the good and the base coins.

Summing up, the study of Norman coinage in the 10th century shows a large and well-managed production and a firm control of the circulation. Exchange fees provided income for the duke. This reflects a well-organized stable administration and an ability of controlling society.

The results of the project, including a full catalogue of all known specimens of Norman coins of the 10th century, will be published in a monograph by J. C. Moesgaard and G. Sarah.

COINS AND CURRENCY IN THE 10TH AND 11TH CENTURIES: ISSUING AUTHORITIES, POLITICAL POWERS, ECONOMIC INFLUENCES

The objective of the conference "Coins and currency in the 10th and 11th centuries: issuing authorities, political powers, economic influences" was to make historians, archaeologists and numismatists meet in order to facilitate the collaboration between the disciplines for the benefit of historical knowledge. Through a series of regional case-studies – Normandy, Loire Valley, Brittany, Burgundy, Flanders, Auvergne, Switzerland etc. – various approaches were investigated: coin production as exercise of power, coin use in written sources, the study of metal composition etc.
This conference was the second venue of a double conference. The first venue was organized in Paris by BnF and EPHE. It took a look at various methodological aspects. Various scenes of coin use: towns, emporia, villages, castles etc. as well as a broader European perspective on England, Germany and Italy.The joint publication of the proceedings of both conferences is in process. It will probably become a standard reference for the political and economic history of the 10th-11th centuries, which is crucial for the making of Europe.

LES VIKINGS EN FRANCE : LE TÉMOIGNAGE DES MONNAIES

The public Le Studium lecture titled « Les Vikings en France : le témoignage des monnaies » was given by the Le Studium Fellow J. C. Moesgaard October 11, 2018. It presented a survey of the relatively few Viking coins found in France. A first glance at this evidence leaves the impression that the Vikings mainly went to Brittany. This is evidently not true. Indeed, the discovery of a Viking coin does not necessarily imply the presence of a Viking. Coins are meant to circulate from hand to hand. Looking closer at the finds, it turns out that some of them most have belonged to local people. As foreign coins, Viking coins ought to have been exchanged into local coins, but precisely in Brittany, local rivalry between princes and Viking occupation during the decades around 900 implied a breakdown of the usual control of the currency. This case study may serve as a warning to take historical evidence at face value without analyzing it thoroughly.

AROUND THE PROJECT

Publications

J. C. Moesgaard & G. Sarah, Un affaiblissement secret à Rouen vers 970/975, Bulletin de la Société française de numismatique, 2018, p. 247-254.Transcultural Mediterranean: in search of non-orthodox and non-hegemonic universalism(s), Tours, 30-31 maja 2018", Kultura – Historia – Globalizacja, no 23/2018, p. 181-185. (conference report)

Prof. Beany Monteiro

LE STUDIUM Guest Research Fellow

From: Federal University of Rio de Janeiro – BR

In residence at: Écologie - Design - Numérique (ECOLAB) - Orléans

Nationality: Brazilian

Dates: April, 2018 to September, 2018

PHD degree in Product Engineering and Product Management, Federal University of Rio de Janeiro. Associate Professor at Federal University of Rio de Janeiro, and coordinator of the Laboratory of Design, Innovation and Sustainability of the School of Fine Arts of the Federal University of Rio de Janeiro. The teams of Labdis have been grouped according to the projects being developed and all those initiatives had financial support from Brazilian governmental bodies: 1) Design in Popular Enterprises, 2) Footprint at Schools and 3) Autonomous Education Network in Design received governmental grants

DESIGN AND SOCIAL INNOVATION: RESEARCH ON THE INTERACTIONS BETWEEN SOCIAL ACTORS AND OBJECTS DESIGNED IN EMANCIPATOR PROCESS TO GENERATE AUTONOMOUS KNOWLEDGE IN DESIGN

My project focused on three main goals:

1. To develop an enabling platform that allows the advance of interactions between the social actors of University Extension, in order to contribute with interactions within and between different universities in Brazil and in other countries.

2. To design that platform within a concept of open network so that the autonomy of actors is preserved and new platforms can be generated from same principle, but with new interaction purposes.

3. To implement an international laboratory engaged in the three axes - teaching, research and extension in Design - making it possible to internationalize extension and to open up for new fields of research and action in Design. In the School of Fine Arts/UFRJ, two undergraduate subjects – Introduction to Extension in Design and Extension in Design – are based on this research and on my academic experience acquired between 2006 and 2015 as coordinator of the Laboratory of Design, Innovation and Sustainability (LABDIS/EBA/UFRJ) and, since 2011, as Associate Director of Extension at the School of Fine Arts.

Dr Ludovic Duhem

Ludovic Duhem is a philosopher. He is currently the head researcher of ÉSAD Orleans and ÉSAD Valenciennes, where he teaches art and design philosophy. His researches are based on the relationship between aesthetics, technique and politics with a critical focus on Gilbert Simondon's genetic and relational thinking. Professor Duhem is the author of more than 30 articles, of "Faille du capitalisme et rénchantement du monde (L'Harmattan, 2006) and of Simondon and aesthetics press). He is co-editor of the book Ecosocial Design. Convivialités, pratiques situes et nouveuax comuns, edited by It: éditions and published by ÉSAD Valenciennes.

Prof. Temenuga Trifonova

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: York University - CA

In residence at: Interactions, Transferts, Ruptures artistiques et culturelles (InTRu) - Tours

Nationality: Bulgarian

Dates: June, 2018 to May, 2019

Temenuga Trifonova is an Associate Professor of Cinema and Media Studies at York University in Toronto. She is the author of the monographs Warped Minds: Cinema and Psychopathology (Amsterdam UP, 2014) and The Image in French Philosophy (Rodopi, 2007), and editor and contributor of the collections Contemporary Visual Culture and the Sublime (Routledge, 2017) and European Film Theory (Routledge, 2008). She has been/will be a visiting fellow and/or artist at the Waseda Institute for Advanced Studies in Tokyo (2019), the New York University Center for European and Mediterranean Studies (2017), the American Academy in Rome (2015), the Brown Foundation at the Dora Maar House (2013), Fondation des Treilles (2013) and Pushkinskaya 10 Art Centre, St. Petersburg (2013). Trifonova is also a published novelist (Tourist, 2018 and Rewrite, 2014) and award-winning filmmaker.

Prof. Raphaële Bertho

Raphaële Bertho is Assistant professor of Arts and History of photography at Tours University and director of Intru laboratory. Her research focuses on the institutional, artistic, professional and vernacular uses of photography and visual representations of the territory since 1945 in resonance with political philosophy. She collaborate since 2012 with the French group of photographers France(s) Liquid Territory, which questions the possibility of representing a national territory at the time of the European construction and in an international context. She was the curator in 2017 of two exhibition with the Bibliothèque nationale de France. Her work focuses on publics commission of artistic photography in Western societies from the 1970s on, in particular in the United States, East Germany and Italy. Her analyses consider as much the images as the conditions of creation and reception.

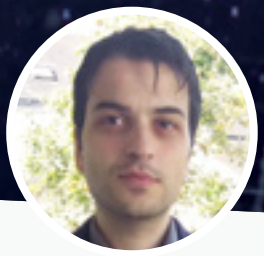
ON THE RUINS AND MARGINS OF EUROPEAN IDENTITY IN CINEMA: EUROPEAN IDENTITY IN THE ERA OF THE GLOBAL

The history of the idea of 'European identity' can be described as a constant oscillation between two poles, one instrumental or pragmatic, the other affective and, on the other hand, as a continuous and unresolved conflict between the belief in some ineffable European 'ethos' and the outright rejection of the very idea of 'European identity'. Over the last several decades the increased mobility of large groups of people has influenced the socio-geographical fixity of a continent of nation-states, putting in question both the concepts of 'national identity' and 'European identity'. Europe has seen a trend of populist right-wing parties, riding on the wave of multicultural backlash across Europe, gaining widespread support with slogans purporting to save ethno-nationalist culture from the threat of immigrants. The Brexit referendum, following a prolonged political campaign of heightened anxiety over border control and anti-immigrant hostility, was simply the most dramatic expression of the crisis of European identity. The degree to which the migrant crisis represents a significant challenge to European identity and its core Enlightenment values, including liberty, justice, citizenship and hospitality, can be gauged by considering the ongoing debates around national identity and nationalism, the failure of multiculturalism, European integration, borders and bordering, the Other, and cosmopolitanism as a potential way of rethinking of European identity.

The film scholarship exploring the increasingly prominent place of migration in European cinema, and the ways in which the figure of the migrant (and that of the refugee) has challenged established notions of 'European identity', is rapidly growing.

In my research project I aim to demonstrate two things. First, in contemporary European cinema it is becoming increasingly difficult to separate stories about migration from stories exploring life under the conditions of neoliberalism in general. Second, the fact that recent films frame the refugee crisis as a primarily 1) socioeconomic, 2) racial, or 3) ethical issue suggests the continued relevance of Europe's core Enlightenment legacy embodied in the values of liberty, equality, hospitality, fraternity etc. and, further, and at the same time points to migration as an "ever-deferred confrontation with the European Question as a problem of race and postcoloniality" (Nicolas de Genova).

Since the start of my fellowship 6 months ago I have written a first draft of the historical/theroretical part of my book (230 pages) and I have about 100 pages of notes on individual films.



Dr Massimiliano Traversino Di Cristo

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

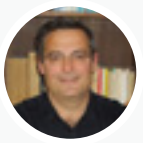
From: University of London – UK

In residence at: Center of Advanced Studies of the Renaissance (CESR) - Tours

Nationality: Italian

Dates: October, 2017 to December, 2018

Dr Massimiliano Traversino Di Cristo obtained his Ph.Ds in Law, Theology, and Humanities from the Universities of London (Birkbeck College), Geneva, and Trento, respectively. His main research interests lie in the fields of Legal History, Moral Philosophy, and Church History, with special attention to late-mediaeval and early-modern history of ideas. Co-founder and co-director, along with Dr Anton Schütz, of the Centre for Research in Political Theology at the Birkbeck College School of Law of University of London, Traversino Di Cristo was Le Studium/ Marie Skłodowska-Curie Research Fellow and Le Studium Guest Researcher at the Centre d'Études Supérieures de la Renaissance of University of Tours respectively from October 2017 to October 2018 and from then to December 2018.



Dr Paul-Alexis Mellet

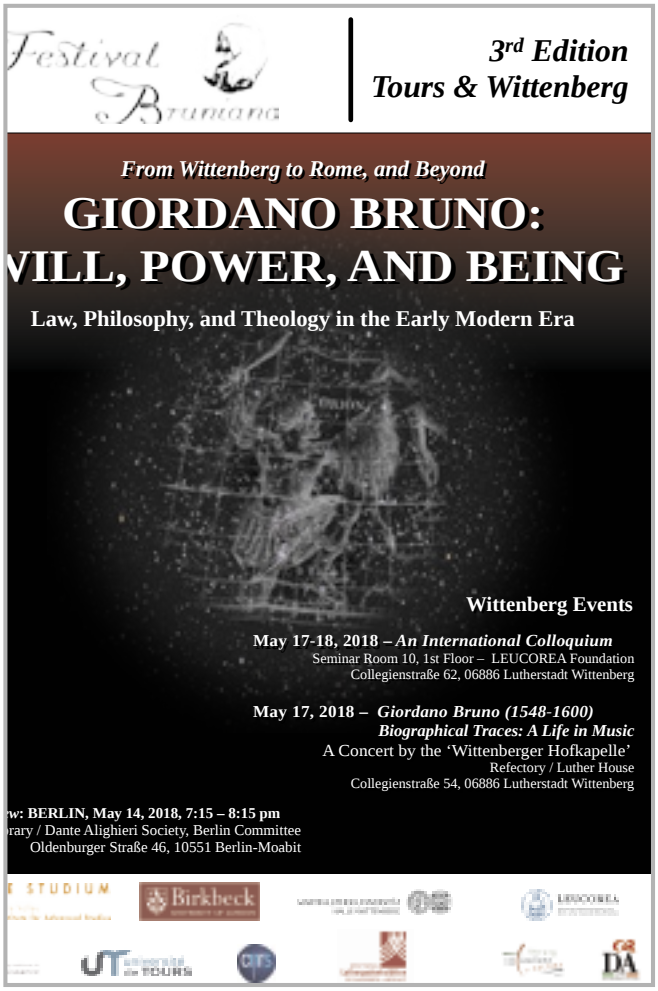
After concluding his studies in Philosophy (Paris IV/ Paris-Sorbonne), Prof. Paul-Alexis Mellet aroused his interests in History by obtaining an 'agrégation' certificate (Paris I/Panthéon-Sorbonne) and by writing a thesis (Université de Tours/CESR) on Protestant Monarchomachs—jurists, diplomats, and theologians who theorized armed resistance against tyrants (issued by Droz in 2007). His present interests are central to the concern of religious warfare in Renaissance Europe and he devoted his recent HDR thesis (Paris IV/Paris-Sorbonne) to a research on the remonstrances that were printed during such epoch. His position consists in showing that during the conflicts of this time, all the parties involved (Catholics, Protestants, Royalists) undertook permanent efforts to restore peace and establish justice.

WILL, POWER, AND BEING: UNCOVERING THE ANCIENT AND MEDIAEVAL BLUEPRINTS OF THE SIXTEENTH-CENTURY QUESTION OF POWER

Throughout the 20th century, an impressive amount of scholarship was devoted to the origin of the concepts of the prince and sovereignty. By focusing on the ancient and mediaeval sources of 16th-century authors, I tried to determine the degree to which the modern fate of the notion of power depended on ancient and mediaeval debates. I paid special attention to the ethical, anthropological, and legal questions implied in the European encounter with the 'New World'. Despite its broad relevance to studies on early modern era, this subject has often been disregarded with respect to the history of the concept of power. My analysis helped me trace this subject within the most central debates of the last decades of the 16th century. I concentrated on two Italian exiles religionis causa, Giordano Bruno and Alberico Gentili, for the reason that these authors help us take a closer look at the doctrinal trends on Native Americans that are contemporary with both Renaissance and Reformation. When formulating their ideas, both Bruno and Gentili had recourse to the earlier work of other 16th-century authors like Francisco de Vitoria and Bartolomé de Las Casas and were moved to comment on the European political events and the expansionism that they witnessed in their own time. Through Bruno's and Gentili's eyes, I showed the interrelation between the discussion on Native Americans and a variety of sources of modern history of ideas, which span early-modern philosophy, cosmology, theology, and public and international law.

WILL, POWER, AND BEING: LAW, PHILOSOPHY, AND THEOLOGY IN THE EARLY MODERN ERA

- The title of my Le Studium Conference was Giordano Bruno: Will, Power, and Being: Law, Philosophy, and Theology in the Early Modern Era. This event was part of an international cooperation (please see 'Conferences and Paper Presentations' above for further details).
- Objectives: Starting from a re-evaluation of Christianity after Luther's Reform, the event aimed to discuss Giordano Bruno's contribution to the history of modern ideas by focusing in particular on theological, moral, and legal-political aspects of his philosophy, and by comparing his views to other significant 16th-century writers. Special attention was paid to Bruno's last philosophical teaching: his Wittenberg period, the 'Frankfurt trilogy', the treatises on magic, and the trial documentation.
- Outcomes and highlights concerning the speakers: leading scholars on Bruno and on other 16th-century authors participated in this event. A volume of proceedings will be issued by Garnier in 2019 (please see 'Publications' above for further details).



AROUND THE PROJECT

Monographs

• *Against the Backdrop of Sovereignty and Absolutism: The Theology of God's Power and Its Bearing on the Western Legal Tradition, 1100-1600* (revised version of my Ph.D. thesis, currently under review at Brill Publishers).

Journal Articles

• 'The Classic Age of the Distinction between God's Absolute and Ordered Power: In, Around, and After the Pontificate of John XXII (1316-34)', *Franciscan Studies* 76 (2018), pp. 207-65;

• 'La questione della *potentia Dei absoluta* in Alberico Gentili alla luce della sua adesione al luteranesimo', *Il pensiero politico* 51/2 (2018), pp. 173-95;

• 'La questione della *potentia Dei absoluta* in Alberico Gentili: l'adesione sui generis al luteranesimo in quanto elemento storico-genealogico della riflessione sui concetti del principe e della sovranità', in V. Lavenia, ed., *Alberico Gentili: Diritto internazionale e Riforma*. Atti della XVI Giornata Gentiliana (San Ginesio, 19-20 set. 2014), Macerata: EUM, 2018, pp. 113-145;

• 'Jacopo Aconcio : breve biografia di un "eretico minore" del Cinquecento', *Mediterranea. International Journal on the Transfer of Knowledge* 3 (2018), pp. 213-17.

Dr Tijen Tunali

LE STUDIUM / Marie Skłodowska-Curie Research Fellow

From: University of New Mexico – USA

In residence at: (CItés, TERritoires, Environnement, Sociétés (CITERES) - Tours

Nationality: Turkish

Dates: September, 2018 to August, 2019

I received my doctoral degree in art history and criticism from the University of New Mexico in 2015. I have a MA degree in art history and visual studies from the University at Buffalo, a BA degree in fine arts (painting) from the Binghamton University and a BS degree in Economics from the Istanbul University. My work is published in peer-reviewed journals of various, and in volumes by Routledge, Palgrave Macmillan, and the Liverpool University Press. I have presented my work at 20 international conferences around the world. I have received competitive fellowship and scholarships such as Phyllis Muth Scholarship for Fine Arts, Terra Foundation's Curatorial Grant, Dissertation Fellowship of Latin American and Iberian Institute of the University of New Mexico, and Distinguished Graduate Research Award at the Central European University, Hungary.

ART AND THE CITY: URBAN SPACE, ART AND SOCIAL MOVEMENTS

The research has the following scientific goals:

1. To examine how the spatial and aesthetic urgencies of the Western capitalist city produced exclusionary planning processes, through the fragmentation of urban space and how that have influenced contemporary art's production.

2. To test the hypothesis that the shared and active interactions between the urban dwellers and art can subvert the authoritative and conservative logic and pattern—a possible aid for democratic politics. For this, it analyzes how the artistic interventions shape our perceptual and sensual encounters with the city.

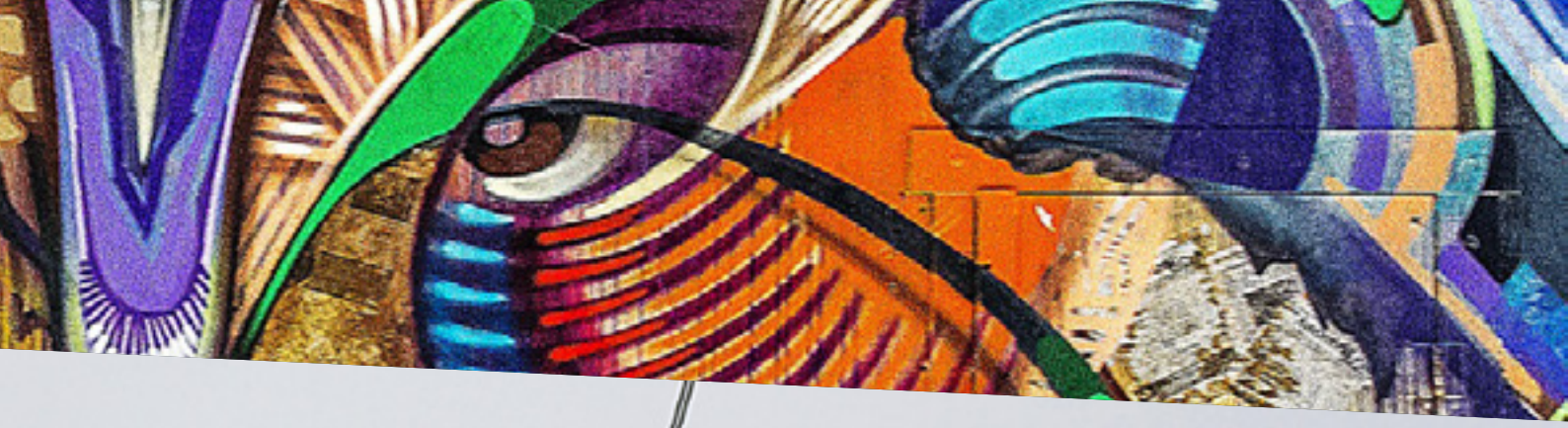
3. To capture the aesthetic struggles in the urban social movements from the point of antagonistic aesthetics that creates the basis for envisaging participatory democracy. With researcher's conceptualization of "carnival aesthetics," the aim is to construct a compelling ground for the intersection of aesthetics and politics through and beyond the existing approaches to "protest art," and "political art."

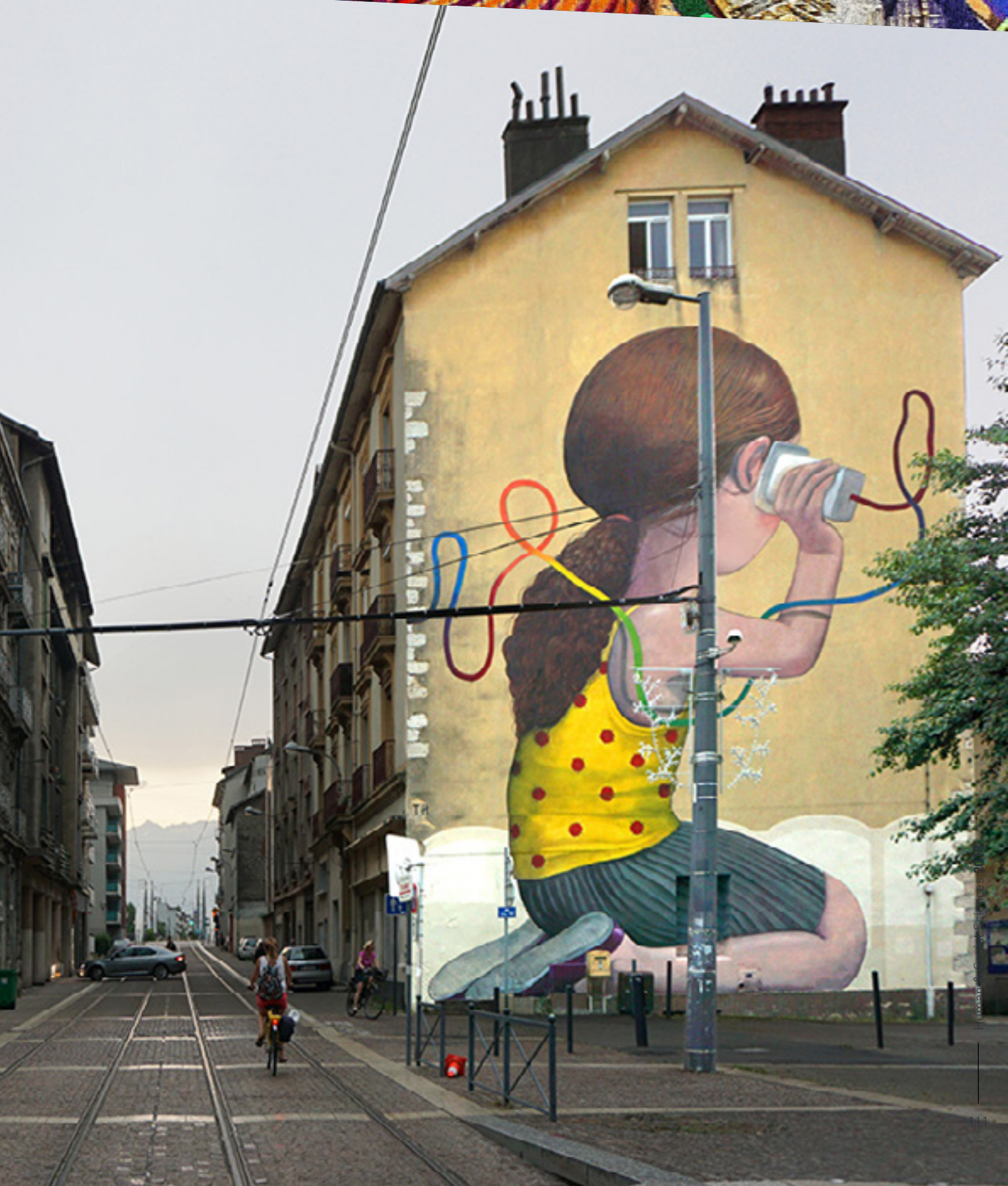
4. To introduce humanities perspective of the aesthetic contestations in the research of urban space, which addresses art as a specified and privileged aesthetic practice that sits in the intersections between cultural practices and social terrain of conflict. This research combines humanities and social science methods to close the gap and as such uses empirical data to extend the aesthetic enquiry rather than superseding or supplanting it.

5. To untangle the methodological problem: How can the inherent value of aesthetic practice be acknowledged in social science research that attempts to wrench an effective response into a reflective space where it can be 'made sense of'?

Dr Gülçin Erdi Lelandais

I received my PhD in Sociology in 2006 from the Institute of Advanced Studies on Social Sciences in Paris. I have served as lecturer and researcher at different universities in France and spent time as a Marie Curie Research Fellow in the Framework FP7 of European Commission at the Department of Politics and International Studies at the University of Warwick. I'm currently a permanent CNRS Researcher at the Center for Research on Cities, Territories, Environment and Societies (CITERES) at the University of Tours and scientific secretary of CNRS's research cluster «Spaces, Territories and Society». My research focuses on the analysis of contentious politics, spatial configurations, everyday resistance practices inside the city and urban transformation. I've published several articles in journals, such as International Journal of Urban and Regional Research and Citizenship Studies.






BAR

TRANSDISCIPLINARY APPROACH

Emblematic of the transdisciplinary approach developed by LE STUDIUM Loire Valley Institute for Advanced Studies since 2010 to energize the regional scientific community exchanges are LE STUDIUM THURSDAYS monthly seminars.

These cross-disciplinary meetings take place every first Thursday of the month, gathering LE STUDIUM Research Fellows and Professors in residence, their laboratory hosts and guests from the scientific, industrial and institutional sectors. Each month, two of them are invited to present their research project and scientific objectives.

All international researchers visiting the Centre-Val de Loire region are invited to attend these meetings.
Regional PhD students of Doctoral Schools have the possibility to register and attend these seminars to enlarge their scientific field and discover new disciplines. A regular attendance enables them to validate credits.

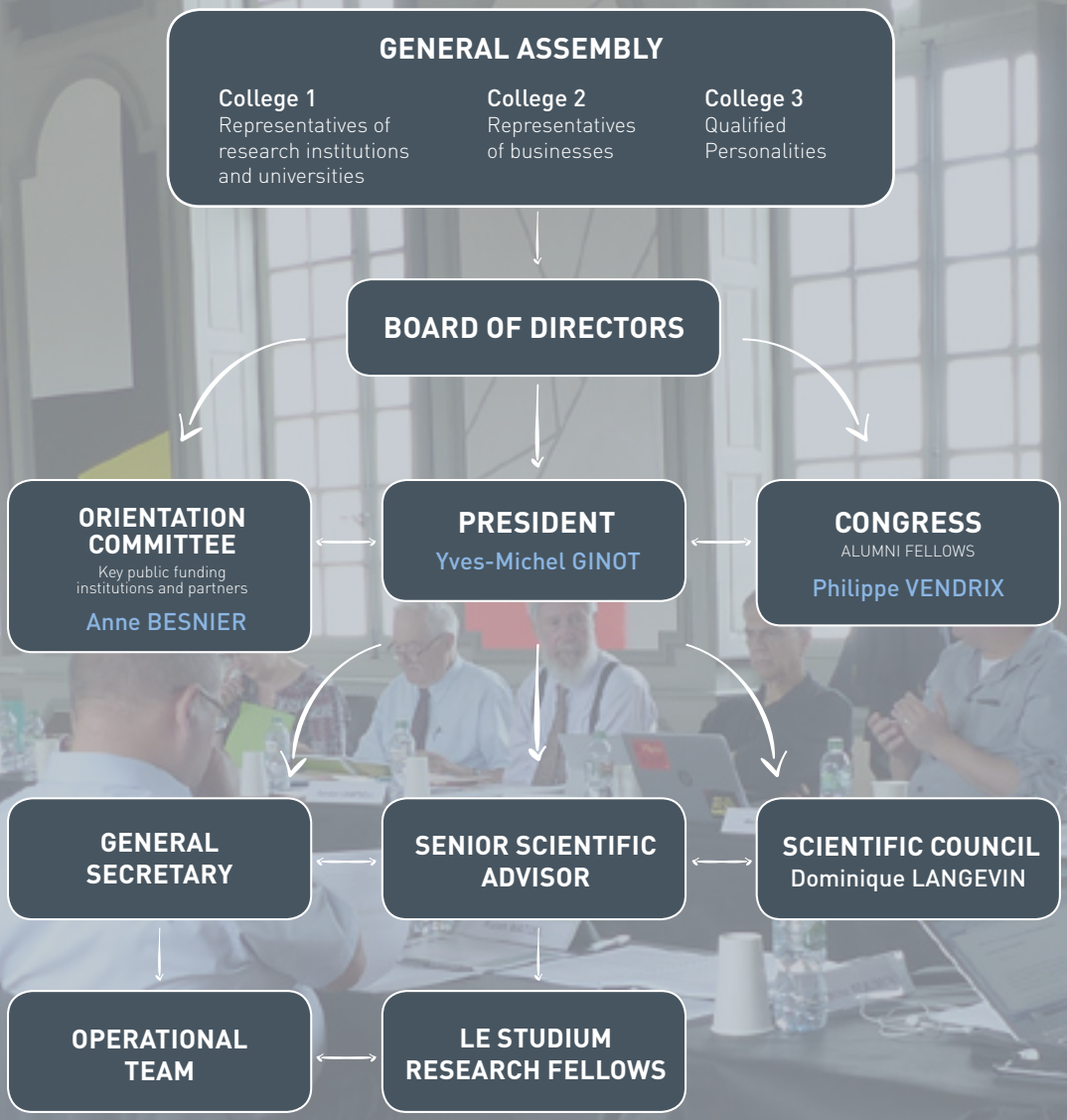
LIFE OF INTERNATIONAL RESEARCHERS IN THE REGION CENTRE-VAL DE LOIRE

In all regional cities (Blois, Bourges, Chartres, Orléans and Tours) LE STUDIUM Research Fellows and Professors benefit from exceptional living and working conditions. Well established research institutions and laboratories offer their office and equipment facilities and LE STUDIUM offers fully furnished residences and high-quality integration support and assistance. During their residency time in the region, each of them has the opportunity to attend many international events and to organize at least a major one.

In Orléans where LE STUDIUM headquarters are located, Research Fellows are regularly welcomed in the heart of the city in the prestigious Hôtel Dupanloup, the International University Centre for Research. This 16th century former bishop's residence has been brightly renovated using patrimony's architects and designers' talents and offers a prestigious modern and ancient decor to all scientific events. Walking distance from the Hôtel Dupanloup in Orléans, LE STUDIUM houses Research Fellows and Professors in a newly renovated castle of the 18th century, Le Chateau de la Motte Sanguin. This impressive building offers seven apartments with a view over the Loire river, a terrace and a garden in which to relax. In the dynamic city of Tours, LE STUDIUM maintains a few private residencies in the city centre. Tours is a university town with a highly developed touristic and cultural offer.

Every year social and networking events are organised giving international LE STUDIUM Fellows and Professors a chance to discover more of the regional scientific and cultural environment and deepen their interdisciplinary exchanges.

GOVERNANCE



LE STUDIUM Loire Valley Institute for Advanced Studies is a non-profit organisation of Law 1901 registered in 1996 in Orléans, France. It is administered by a General Assembly of Members, a Board of Directors, an Orientation Committee and a Management team. The General Assembly of members is composed of 3 collegia:

- **Representatives of research institutions and universities,**
- **Representatives of businesses,**
- **Qualified personalities,**

and meets annually to review past year's activities. Every four years, this General Assembly reviews the composition and elects a new Board of Directors. Local and regional institutions are represented at LE STUDIUM Orientation Committee. The Board of Directors and the Orientation Committee meet two to three times a year to review the activities according to an agreed strategic plan. The Board of Directors prepares reports and decisions to be submitted to the General Assembly. The President of LE STUDIUM is appointed for four years and reports to the Board of Directors. LE STUDIUM President oversees the activities performed by a small dynamic team based in Orléans.

SCIENTIFIC COUNCIL

LE STUDIUM Scientific Council establishes the final ranking of applications and recommends fellowship, professorship and consortium awards. It is composed of independent external senior scientists who gather once a year in June to analyse the scientific reviews provided by a pool of more than 600 experts and to finalize the selection of the Smart Loire Valley General Programme for Research Fellows who will next come in residence and other awards such as Professorship or Consortium. The Scientific Council members are also regularly consulted for their expertise to perform independent evaluations in the course of required recruitments occurring across the Ambition Research Development 2020 programmes.
For the campaign and call for applications 2018-2019, LE STUDIUM Scientific Council members were:

PRESIDENT

Dominique LANGEVIN
Research Director at CNRS, Physics and Engineering Sciences, Laboratory of Solid State Physics at the University of Paris-Sud-Orsay- FR

MEMBERS

Dominique ALLART
Professor, Director of Service d'Histoire et Technologie des Arts plastiques (Temps modernes), University of Liège - BE

Laura BACIOU
Professor, Biophysicist, Laboratory of Physical Chemistry at the University of Paris-Sud - FR

Jean-Claude BERNIER
Professor, Chemistry and Interfaces in Physics and Biology, Strasbourg - BE

Gordon CAMPBELL
Professor in Renaissance and seventeenth century studies, University of Leicester - UK

James A. DIAS
Professor, Biomedical Sciences, University of the State of New York - USA

Jean ETOURNEAU
Professor, Solid State Chemistry/Materials Science, ICMCB-CNRS, University of Bordeaux - FR

Laurent FRANCIS
Professor of Information and Communication Technology, Electronics and Applied Mathematics, University of Louvain - BE

Mark GOERBIG
Professor Theoretical Physiscs, CNRS Research Director, Laboratoire de Physique des Solides, Université Paris-Sud, Saclay - FR

Marc GOUJON
Social and Human Sciences, French National Scientific Research Centre - FR

Aylin Carla HANYALOGLU
Doctor in Molecular Biology, Imperial College London, Faculty of Medicine - UK

David HULMES
Research Director in biology, Centre National de Recherche Scientifique, Ecole Normale Supérieure of Lyon - FR

Piotr LAIDLER
Professor, Head Chair of Medical Biochemistry, Jagiellonian University Medical College, Krakow - PL

Federica MIGLIARDO
Professor in Biophysicist, Universita' degli Studi di Messina, Italy / Institut de Biologie Intégrative de la Cellule, CNRS, Saclay - FR

Michael MORIARTY
Professor Early modern period of French literature, Cambridge - UK

John O'BRIEN
Professor, Director of Studies in the School of Modern Languages and Cultures, Durham University - UK

David OGDEN
Director of Research, Laboratory of Brain Physiology and Biophysics, University Paris-Descartes, Paris - FR

Alain PAVE
Professor, Biometrics and Evolutionary Biology, Lyon. Member of the Academy of Technologies - FR

Alain PRIOU
Professor, Physics, Université Paris Ouest Nanterre La Défense - FR

Jean-Pierre SAMAMA
Research Director in biophysics, Centre National de Recherche Scientifique, Synchrotron Soleil - FR

Alain THOREL
Doctor in physico-chemistry, MINES ParisTech - FR

Ralph WATZEL
Professor, Geology and geophysics, President of the Federal Institute for Geosciences and Natural Resources (BGR), Hannover - DE

Friedrich-W WELLMER
Professor, Geology and geophysics, Former President of the Federal Institute for Geosciences and Natural Resources - DE

PERMANENT GUESTS: REPRESENTATIVES OF HIGHER EDUCATION INSTITUTIONS, RESEARCH ORGANIZATIONS AND REGIONAL INSTITUTIONS

Anne BESNIER
Vice-President Higher Education and Research, Region Centre-Val de Loire (2016-2019)

Ary BRUAND
President University of Orleans, represented by Ioan TODINCA, Vice-President Research

Nicolas DUBOULOZ
President Centre Inra Val-de-Loire

Jean-Marie CASTELAIN
Director for Higher Education, Research and Transfers of Technology, Region Centre-Val de Loire

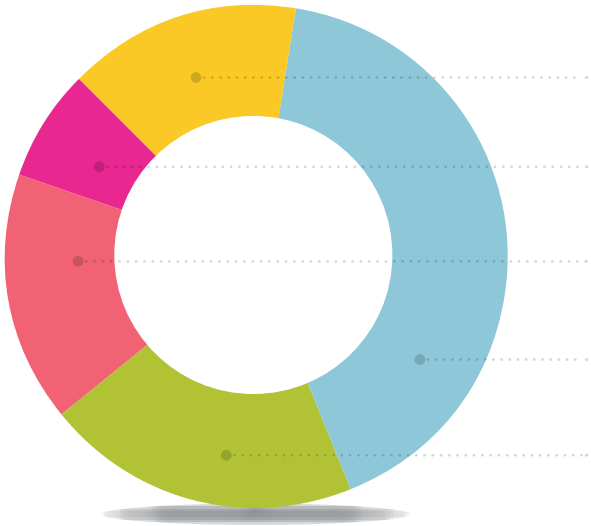
Yves-Michel GINOT
Director of Pharmaceuticals Innovation, Servier Group, Orléans, FR, LE STUDIUM President

Philippe SIMONNETTI
Scientific Assistant, CEA Le Ripault, Tours

Philippe VENDRIX
President University of Tours, represented by Emmanuel LESIGNE, Vice-President Research

ORIGIN OF LE STUDIUM RESEARCH FELLOW

THEMATICS REPARTITION SINCE 1996



EARTH, ECOLOGY AND ENVIRONMENTAL SCIENCES
15%

COMPUTER SCIENCE, MATHEMATICS AND MATHEMATICAL PHYSICS **7%**

HUMAN AND SOCIAL SCIENCES
16%

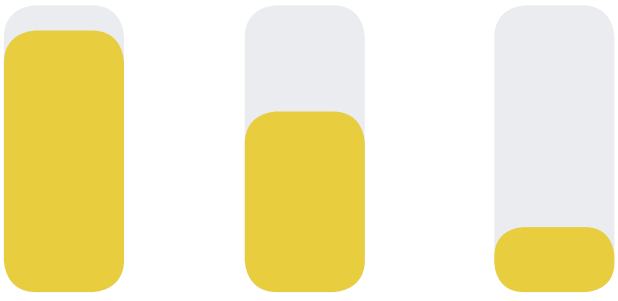
LIFE AND HEALTH SCIENCES
41%

MATERIALS AND ENERGY SCIENCES
20%

IN REGION CENTRE VAL DE LOIRE SINCE 1996

2018 FINANCIAL DATA

2018 EXPENDITURES REPARTITION



1 909 902 €	666 886 €	155 098 €
SMART LOIRE VALLEY GENERAL PROGRAMME	AR2020 REGIONAL PROGAMMES	GENERAL ADM. & HUMAN RESOURCES COSTS

2018 FINANCIAL RESOURCES	2 529 515 €
REGION CENTRE VAL DE LOIRE	60%
EUROPEAN FUNDS	28%
UNIVERSITY OF TOURS	4%
ORLEANS METROPOLE	2%
PRIVATE COUNTRIBUTIONS	4%
VARIOUS	1%

2018 EVENTS PANORAMA

2018

JANUARY

11 Jan — **Ethics, Law, and Anthropology in Bruno, Gentili, and the Sixteenth-Century Debate on Native Americans**
Dr Massimiliano Traversino Di Cristo (CESR)
CESR, Tours

11 Jan — **The Book Market between France and the Low Countries in the 16th Century**
Dr Renaud Adam (CESR)
CESR, Tours

FEBRUARY

1 Feb — **Macrobiome: how helminths shape our immune system**
Dr William Horsnell (INEM)
Hôtel Dupanloup, Orléans

1 Feb — **Stem cells & cancer stem cells: Regenerative medicine and cancer**
Prof. Marek Los (CBM)
Hôtel Dupanloup, Orléans

7 Feb — **Alzheimer**
Recherche et aspects cliniques
Dr Isabelle Arnal, Dr Anne Fourest-Lieuvin (CHU - CEA - CNRS / INSERM) & Dr Jean Yves Lemonnier (CHR)
Hôtel Dupanloup, Orléans

19-23 — **Pharmacological and nutritional targeting of voltage-gated sodium channels in the treatment of epithelial cancers - 1st meeting**
Dr Sébastien Roger (N2C)
Villa Rabelais, Tours

MARCH

1 Mar — **Coinage of 10th century Normandy: Prestige, Revenue and Administrative Challenge for the Duke**
Dr Jens-Christian Moesgaard (IRAMAT-CEB)
Hôtel Dupanloup, Orléans

1 Mar — **Anion Chemistry on Titan**
Dr Ján Žabka (LPC2E)
Hôtel Dupanloup, Orléans

19-21 — **Discrete Models of Complex Systems**
Prof. Eric Goles and
Prof. Nicolas Ollinger (LIFO)
Hôtel Dupanloup, Orléans

19 Mar — **Emeutes de 2005 : une vague de violence contagieuse révélée par la modélisation**
Dr Jean-Pierre Nadal (EHESS)
Hôtel Dupanloup, Orléans

26-28 — **Neurotransmitters: non-neuronal functions and therapeutic opportunities**
Dr William Horsnell and
Dr Bernhard Ryffel (INEM)
Hôtel Dupanloup, Orléans

26 Mar — **Pesticides et système nerveux : des interactions suspectes**
Prof. Stéphane Mortaud (INEM)
Hôtel Dupanloup, Orléans

APRIL

5 Apr — ***Pharmacological and nutritional targeting of voltage-gated sodium channels in the treatment of cancers***
Prof. Emre Erdem (GREMAN)
Villa Rabelais, Tours

5 Apr — **Role of functional nanomaterials for energy harvesting. Future energy systems, challenges and opportunities**
Dr Sébastien Roger (N2C)
Villa Rabelais, Tours

11 Apr — **Vallée des Métiers de Beauté en Afrique : présentation et projets**
Mr Patrice André and Mr Marc Olivier
Hôtel Dupanloup, Orléans

26-27 — **Giordano Bruno: Will, Power, and Being - Law, Philosophy, and Theology in the Early Modern Era From Wittenberg to Rome, and Beyond - Bruno Festival, 3rd edition**
Dr Massimiliano Traversino and
Dr Paul-Alexis Mellet (CESR)
CESR, Tours

MAY

3 May — **Fluorine as a key element in modern drug discovery and development**
Dr Volodymyr Sukach (ICOA)
Lab'O, Orléans

3 May — **Novel electrode and electrolyte materials for electrochemical energy storage: Future of Li-ion batteries and Supercapacitors**
Dr Satyajit Phadke (PCM2E)
Lab'O, Orléans

14 May — **Lanthanide-Based Agents for Sensitive and Selective Near-Infrared Imaging of Living Biologicals Systems - 1st meeting**
Dr Svetlana Eliseeva (CBM)
Hôtel Dupanloup, Orléans

16-18 — **Advances in Space Mass Spectrometry for the Search of Extraterrestrial Signs of Life**
Dr Ján Žabka and Dr Christelle Briois (LPC2E)
Hôtel Dupanloup, Orléans

16 May — **Poussières cométaires : collectes en Antarctique et missions spatiales**
Dr Cécile Engrand (CSNSM)
Hôtel Dupanloup, Orléans

22 May — **DYNAWOOD (Dynamics of wood formation and adaptation of forest trees to climate variation) 4th meeting**
Dr Philippe Rozenberg (INRA) and
Dr Alejandro Martinez-Meier (INTA)
Hôtel Dupanloup, Orléans

23-25 — **Wood formation and tree adaptation to climate**
Prof. Vladimir Shishov and
Dr Philippe Rozenberg (BioForA)
Hôtel Dupanloup, Orléans

23 May — **À la recherche du bois perdu : le bois archéologique, témoin de notre passé**
Prof. Nicola Macchioni (IVALSA)
Hôtel Dupanloup, Orléans

30-31 — **Transcultural Mediterranean: in search of non-orthodox and non-hegemonic universalism(s)**
Dr Ewa Anna Łukaszyk and
Prof. Marie-Luce Demonet (CESR)
CESR, Tours

30 May — **Ramon Llull, ou comment communiquer avec l'autre**
Prof. Josep Enric Rubio Albarracín
CESR, Tours

JUNE

11 Jun — **Multi-isotope and chemical tracing for understanding the sources and fate of macronutrients at the basin scale (MUTUAL) - 3rd meeting**
Dr Wolfram Kloppmann (BRGM)
Hôtel Dupanloup, Orléans

11-13 — **Stem cells & cancer stem cells: Regenerative medicine and cancer**
Prof. Marek Łos and
Dr Catherine Grillon (CBM)
Hôtel Dupanloup, Orléans

11 Jun — **Est-ce parce qu'elles sont immortelles que les cellules souches sont fascinantes ?**
Dr Laurent Cherlonneix
Hôtel Dupanloup, Orléans

25-29 — **Ecohydraulics and dam removal - 2nd meeting**
Prof. Karl Matthias Wantzen (CITERES)
University pole of Chinon, Chinon

27 Jun — **Modern aspects of Plant in Vitro Technology**
Prof. Bilal Haider Abbasi,
Prof. Nathalie Guivarc'h (BBV) and
Dr Christophe Hano (LBLGC)
University of Tours, Tours

27 Jun — **Affective horizons of 'song' in the long fifteenth century**
Prof. Graeme Boone and
Prof. Philippe Vendrix (CESR)
CESR, Tours

JULY

2 Jul — **Pharmacological and nutritional targeting of voltage-gated sodium channels in the treatment of epithelial cancers - 2nd meeting**
Dr Sébastien Roger (N2C)
Villa Rabelais, Tours

5 Jul — **Numerical methods for Balance laws with the singularity in fluid mechanics, geophysics, biology**
Prof. Guoxian Chen (CNRS)
Hôtel Dupanloup, Orléans

5 Jul — **An Artificial Intelligence in the Simulation of Tree-Ring Growth around the World**
Prof. Vladimir Shishov (BioForA)
Hôtel Dupanloup, Orléans

9 Jul — **Plasmas for skin treatments and potential for cosmetics**
Dr Endre Szili (GREMI and CBM)
CNRS, Orléans

AUGUST

27-29 — **Frontiers in Nanomaterials for Energy Harvesting and Storage**
Prof. Emre Erdem and
Dr Guylaine Poulin-Vittrant (GREMAN)
Hôtel de Ville, Tours

27 Aug — **Réduire la taille des matériaux pour améliorer leurs performances et leur efficacité énergétique**
Prof. Mario Maglione (CNRS)
Hôtel de Ville, Tours

SEPTEMBER

3 Sep — **Towards improving abiotic stress tolerance in rice**
Prof. Ashwani Pareek (LBLGC)
Hôtel Dupanloup, Orléans

6 Sep — **Plant Cell Culture for Phytochemical Production: Pros and Cons**
Dr Bilal Haider Abbasi (BBV) (LBLGC)
UFR Sciences Pharmaceutiques, Tours

10-12 — **The 6th Sino-French Joint Workshop on Atmospheric Environment**
Prof. Abdelwahid Mellouki and
Dr Véronique Daële (ICARE)
Hôtel Dupanloup, Orléans

20-21 — **Lost in Renaissance**
Dr Renaud Adam and
Prof. Chiara Lastraioli (CESR)
Villa Rabelais, Tours

20 Sep — **Comment parle-t-on de la Renaissance aujourd'hui ? Entre fétichisation patrimoniale et Renaissance bashing**
Prof. Jean-Marie Le Gall (IHMC)
Villa Rabelais, Tours

27-28 — **Malaria - Current status and challenges**
Dr Norinne Lacerda-Queiroz and
Dr Valérie Quesniaux (INEM)
Hôtel Dupanloup, Orléans

27 Sep — **Malaria : une maladie qui a changé le cours de l'Histoire**
Dr Norinne Lacerda-Queiroz and
Dr Nicolas Riteau (INEM)
Hôtel Dupanloup, Orléans

OCTOBER

4 Oct — **Recombinant Intrabodies as Potential Therapeutics for Amyotrophic Lateral Sclerosis**
Dr Denis Reis de Assis (iBrain)
University Library of Les Tanneurs, Tours

4 Oct — **Gray matter, white matter, and the ongoing history of the distribution of mental functions**
Prof. Igor Lima Maldonado (iBrain)
University Library of Les Tanneurs, Tours

11-12 — **Coins and currency in the 10th and 11th centuries: issuing authorities, political powers, economic influences**
Jens Christian Moesgaard, Prof. Marc Bompaire, Bruno Foucray and Dr Guillaume Sarah (IRAMAT-CEB)
Hôtel Dupanloup, Orléans

11 Oct — **Les Vikings en France : le témoignage des monnaies**
Jens Christian Moesgaard (IRAMAT-CEB)
Hôtel Dupanloup, Orléans

15-17 — **Progress in Organofluorine Chemistry**
Dr Volodymyr Sukach and Prof. Isabelle Gillaizeau (ICOA)
Hôtel Dupanloup, Orléans

15 Oct — **Vin et chimie, amis ou ennemis ?**
Dr Pascal Bouyssou (ICOA)
Hôtel Dupanloup, Orléans

15 Oct — **Lanthanide-Based Agents for Sensitive and Selective Near-Infrared Imaging of Living Biologicals Systems - 2nd meeting**
Dr Svetlana Eliseeva (CBM)
Hôtel Dupanloup, Orléans

NOVEMBER

2 Nov — **Questions about time in early medieval culture: literature, theology and science With some regards croisés on contemporary art**
Dr Patrizia Carmassi (POLEN)
FRAC, Orléans

19-21 — **Balance laws in fluid mechanics, geophysics, biology (theory, computation, and application)**
Prof. Guoxian Chen and
Prof. Magali Ribot (IDP)
Hôtel Dupanloup, Orléans

19 Nov — **Fleuves et rivières : du réel à l'ordinateur**
Dr Pierre-Yves Lagrée (d'Alembert)
Hôtel Dupanloup, Orléans

26-28 — **Water micropollutants: from detection to removal**
Dr Marius Secula, Prof. Christine Vautrin-Ul and Dr Benoît Cagnon (ICMN)
Hôtel Dupanloup, Orléans

DECEMBER

5-6 Dec — **Frontiers in Connectivity: Exploring and Dissecting the Cerebral White Matter**
Pr Igor Lima Maldonado and
Prof. Christophe Destrieux (iBrain)
Faculty of Medicine, Tours

6 Dec — **Use of cultured lung epithelial cells to study chronic inflammatory lung disease**
Prof. Pieter Hiemstra (CEPR)
Amphi Beaumont, Tours

6 Dec — **Severe malaria: what can we learn using experimental murine models?**
Dr Norinne Lacerda-Queiroz (INEM)
Amphi Beaumont, Tours

2019

Themes in color

- CONFERENCE
- PUBLIC LECTURES
- THURSDAY
- SUMMER SCHOOL
- RENCONTRE LEONARDO
- CONSORTIUM
- AFFILIATED EVENTS
- EXPERTS DAYS
- WORKSHOP

LIST OF RESEARCHERS IN RESIDENCE IN 2018

SMART LOIRE VALLEY GENERAL PROGRAMME

Dr RENAUD ADAM
Bibliopol@: The book market in the renaissance between France and the low countries
October 2017 - October 2018
In residence at : Centre d'Études Supérieures de la Renaissance (CESR) - UMR 7323 - Université de Tours, CNRS
Host scientist : Prof. Chiara Lastraioli

Prof. MADJID BIROUK
Spray combustion: on the vaporization process of micro droplets
September 2017 – August 2018
In residence at : Institut de Combustion Aérothermique Réactivité et Environnement (ICARE) - UPR 3021 - CNRS
Host scientist : Dr Christian Chauveau

Prof. GRAEME BOONE
Emotion in Dufay
July 2017 - July 2018
In residence at : Centre d'Études Supérieures de la Renaissance (CESR) - UMR 7323 - Université de Tours, CNRS
Host scientist : Prof. Philippe Vendrix

Prof. YIMING CHEN
Observer Design for Distributed-Parameter Systems and Fractional Order Systems
April 2018 - June 2018
In residence at : Pluridisciplinaire de recherche en ingénierie des systèmes, mécanique et énergétique (PRISME), Université d'Orléans, Insa Centre Val De Loire
Host scientist : Prof. Driss Boutat

Dr KRISTINA DJANASHVILI
Responsive Nanozeolites: Smart Porosity and Surface Tailoring for Multimodal Imaging and Therapy of Cancer
January 2017 - January 2018
In residence at : Centre de Biophysique Moléculaire (CBM), UPR 4301, CNRS
Host scientist : Dr Eva Jakab-Toth

Dr EMRE ERDEM
Investigation of intrinsic and extrinsic defect centers of ZMO Nanowires for Nano-Generators
December 2017 - September 2018
In residence at : Groupe de Recherche en Matériaux, Microélectronique, Acoustique et Nanotechnologies (GREMAN) - UMR 7347 - Université de Tours, CNRS, INSA-CVL
Host scientist : Dr Guylaine Poulin-Vittrant

Prof. ERIC GOLES
Discrete models of complex systems: computational complexity and (un)predictability, theory and applications
Januray 2018 - March 2018
In residence at : Laboratoire d'Informatique Fondamentale d'Orléans (LIFO) – EA 4022 – Université d'Orléans, INSA Centre Val De Loire
Host scientist : Prof. Nicolas Ollinger

Dr WILLIAM HORSNELL
Targeting acetylcholine receptors to enhance immunity to acute viral infection
July 2017 - July 2018
In residence at : Immunologie et Neurogénétique Expérimentales (INEM) - UMR 7355 - CNRS, Université d'Orléans
Host scientist : Dr Bernhard Ryffel

Dr NATALIA KIRICHENKO
Interesting lessons we can learn using past herbarium collections for studying forest insect pest invasions
August 2017 - August 2018
In residence at : Unité de Recherche Zoologie Forestière (URZF) - UR 0633 - Centre INRA Val de Loire
Host scientist : Dr Alain Roques

Dr NORINNE LACERDA QUEIROZ
Study of pulmonary damage in experimental severe Malariav: Malaria-Associated acute respiratory distress syndrome (MA-ARDS) and Malaria Sepsis Induced by secondary bacterial infection
October 2017 - October 2018
In residence at : Immunologie et Neurogénétique Expérimentales (INEM) - UMR 7355 - CNRS, Université d'Orléans
Host scientist : Dr Valérie Quesniaux

Prof. MAREK ŁOS
Effects of electro-conductive, biomaterial-based tissue scaffolds on stem cells and transdifferentiation-derived somatic cells
October 2017 - September 2018
In residence at : Centre de Biophysique Moléculaire (CBM) - UPR 4301 - CNRS
Host scientist : Dr Catherine Grillon

Dr EWA ANNA ŁUKASZYK
The search for the adamic language and the emergence of transcultural aspiration in the aftermath of the european maritime discoveries
September 2017 – August 2018
In residence at : Centre d'Études Supérieures de la Renaissance (CESR) - UMR 7323 - Université de Tours, CNRS
Host scientist : Prof. Marie-Luce Demonet

Dr JENS-CHRISTIAN MOESGAARD
Coins, Dies, Silver: For a new approach to the making of the Feudal period
September 2017 – August 2018
In residence at : Institut de Recherche sur les Archéomatériaux (IRAMAT) Centre Ernest-Babelon - UMR 5060 - CNRS, Université d'Orléans
Host scientist : Dr Marc Bompaire

Prof. MICHIEL POSTEMA
Sonic antibubbles in harmonic medical imaging and therapy
February 2017 - January 2018
In residence at : Imagerie et cerveau (IC) - U930 - INSERM, Université de Tours
Host scientist : Dr Ayache Bouakaz

Prof. AKKIHEBBAL RAVISHANKARA
Interlinkages in the chemistries of the troposphere and stratosphere: impacts of nitrous oxide on Earth system
May - July 2018
In residence at : Institut de Combustion Aérothermique Réactivité et Environnement (ICARE) - UPR 3021 - CNRS
Host scientist : Dr Abdelwahid Mellouki

Dr EMMANUEL SARIDAKIS
New crystallization strategies for structure-guided pharmacological development – Large biological assemblies for RNA metabolism
January 2017 - January 2018
In residence at : Centre de Biophysique Moléculaire (CBM), UPR 4301, CNRS
Host scientist : Dr Marc Boudvillain

Prof. VLADIMIR SHISHOV
Global Tree-Ring Growth Evolution Neural Network (VS-GENN)
August 2017 - September 2018
In residence at : Amélioration Génétique et Physiologie Forestières (AGPF) - UMR 0588 - Centre INRA Val de Loire
Host scientist : Dr Philippe Rozenberg

Dr VOLODYMYR SUKACH
Exploring the effects of trifluoromethyl group in the design of organocatalysts, enzyme inhibitors and in the conformational control of saturated nitrogen-containing heterocycles
November 2017 - November 2018
In residence at : Institut de Chimie Organique et Analytique (ICOA) - UMR 7311 - CNRS, Université d'Orléans
Host scientist : Pr Isabelle Gillaizeau

Dr MASSIMILIANO TRAVERSINO DI CRISTO
Will, Power and Being: uncovering the ancient and mediaeval blueprints of the sixteenth-century question of power
October 2017 - October 2018
In residence at : Centre d'Études Supérieures de la Renaissance (CESR) - UMR 7323 - Université de Tours, CNRS
Host scientist : Dr Paul-Alexis Mellet

Dr JÁN ŽABKA
Very high resolution mass spectrometry for space applications
July 2017 - July 2018
In residence at : Laboratoire de Physique et Chimie de l'Environnement et de l'Espace (LPC2E) - UMR 7328 - CNRS, Université d'Orléans
Host scientist : Dr Christelle Briois

Prof. MAXWELL HINCKE
Evolution of Innate Immunity at Biomineralized Barriers
March 2018 - May 2018
In residence at: Biologie des oiseaux et aviculture - BOA UMR - Centre INRA Val de Loire, Université de Tours
Host scientist: Dr Sophie Rehault-Godbert

Prof. DMITRI KHARZEEV
Chiral matter: theory and applications
June 2018 - August 2018
In residence at: Institut Denis Poisson - UMR 7013 - Université d'Orléans - Université de Tours - CNRS
Host scentist: Dr. Maxim Chernodub

Prof. BEANY MONTEIRO
Design and Social Innovation : research on the interactions between social actors and objects designed in emancipator process to generate autonomous knowledge in Design
April 2018 - August 2018
In residence at: ECOLAB - Ecole Supérieure d'Art et de Design Orléans
Host Scientist: Dr Ludovic Duhem

Dr PATRIZIA CARMASSI
Questions about time in early medieval culture: Literature, theology and science
April 2018 - May 2019
In residence at: POLEN (POuvoirs, LEttres, Normes) - CNRS - Université d'Orléans
Host scientist: Prof. Jean-Patrice Boudet

Dr TIJEN TUNALI
Art and the city: urban space, art and social movements
September 2018 - August 2019
In residence at: CITERES UMR 7324 - CNRS - Université de Tours
Host scientist: Dr Gülçin Erdi Lelandais

Prof. ANAND YETHIRAJ
Studying the fundamentals of macromolecular transport and kinetic processes in skin models
September 2018 - August 2019
In residence at : Molecular Biophysics Center (CBM) UPR 4301 - CNRS
Host scientist: Prof. Francesco Piazza

Dr AGNIESZKA SYNOWIEC
Biological effects of essential oils
September 2018 - August 2019
In residence at: Laboratoire de Biologie des Ligneux et des Grandes Cultures (LBLGC) EA1207 - Université d'Orléans
Host scientist: Dr Christophe Hano

Prof. CARMEN DIAZ OROZCO
Participation of women and nations under construction in Latin America in the 19th century: the commitment of Mariquita Sánchez and Juana Manso in education in Argentina
July 2018 - July 2019
In residence at: REMELICE - Université d'Orléans
Host scientist: Prof. Brigitte Natanson

Dr MARCELO GUSTAVO LORENZO
Genomics of learning and memory in disease vector insects
May 2018 - May 2019
In residence at: Institut de Recherche sur la Biologie de l'Insecte (IRBI) UMR 7261 - CNRS - Université de Tours
Host scientist: Prof. Claudio Lazzari

Prof. TEMENUGA TRIFONOVA
On the Ruins and Margins of European Identity in Cinema: European Identity in the Era of the Global
June 2018 - May 2019
In residence at: InTRu (Interactions, Transferts, Ruptures artistiques et culturelles) EA 6301 - Université de Tours
Host scientist: Prof. Raphaële Berthot

PROGRAMME ARD 2020 COSMETOSCIENCES

Dr BILAL HAIDER ABBASI
Strategies to enhance cosmeceuticals in in vitro cultures of herbal plants
January 2018 - September 2019
In residence at : Biomolécules et Biotechnologies Végétales (BBV) EA2106 - Université de Tours / Laboratoire de Biologie des Ligneux et des Grandes Cultures (LBLGC) EA1207 - Université d'Orléans
Host scientists: Prof. Nathalie Guivarc'h (BBV) and Dr Christophe Hano (LBLGC)

Dr YURI DANCIK
Molecular imaging using Raman spectroscopy: from fundamental research to industrial applications
October 2018 - March 2019
In residence at: Nanomédecines et Nanoprobes (NMNS) EA6295 - Université de Tours
Host scientist: Dr Frank Bonnier

PROGRAMME ARD 2020 BIOMEDICAMENTS

Dr FREDERIC JEAN-ALPHONSE
Targeting CGPR with antibodies
November 2018 - November 2019
In residence at: Physiologie de la Reproduction et des Comportements - Centre INRA Val de Loire - CNRS - Université de Tours - IFCE
Host Scientist: Dr Eric Reiter

Prof. PIETER HIEMSTRA
Development and application of well-differentiated culture models of primary airway epithelium from various sources
September 2018 - December 2018
In residence at: Centre d'Étude des Pathologies Respiratoires (CEPR) - Université de Tours - Inserm
Host scientist: Dr Mustapha Si-Tahar

PROGRAMME ARD 2020 PIVOTS

Dr MARIUS SECULA
Developing a new advanced treatment technique for MPs removal from water and wastewater
October 2017 - October 2018
In residence at : Interfaces, Confinement, Matériaux et Nanostructures (ICMN) - UMR7374 - CNRS - Université d'Orléans
Host scientist : Dr Benoît Cagnon

Dr MAX McGILLEN
September 2018 - December 2018
Atmospheric chemical processes and new advanced instrumentation for Atmospheric Reactivity Platform
In residence at: Institut de Combustion Aérothermique Réactivité et Environnement (ICARE) UPR3021 - CNRS - INSIS
Host scientists: Prof. Abdelwahid Mellouki & Dr Véronique Daële

PROGRAMME ARD 2020 LAVOISIER

Dr SATYAJIT PHADKE
Energy storage systems – Storage 1
January 2016 - June 2019
In residence at : Physico-Chimie des Matériaux et des Electrolytes pour l'Energie (PCM2E) - EA6299 - Université de Tours
Host scientist : Prof. Mérièm Anouti


Catherine BEAUMONT
Philippe SIMONETTI
Emmanuel LESIGNE
Ioan TODINCA

SMART LOIRE VALLEY GENERAL PROGRAMME AWARDS - SELECTION OF CAMPAIGN 2018

LE STUDIUM RESEARCH FELLOWSHIP

Dr Roman KONOPLYA
Testing strong gravity via black holes Materials and Energy sciences
From: Eberhard Karls Tubingen University, Germany
Host scientist: Prof. Sergey SOLODUKHIN IDP, CNRS, Université d'Orléans, Université de Tours

Prof. Ilija STEFANOVIĆ
The role of impurities on cold plasma polymerization of ultrathin conductive films and nanostructures
From: University of Belgrade, Serbia
Host scientist: Prof. Eva KOVACEVIC GREMI, CNRS, Université d'Orléans

Dr Wolfgang WISNIEWSKI
Mechanisms of glass crystallization analyzed by electron backscatter diffraction (EBSD
From: Jena University, Germany
Host scientist: Dr Mathieu ALLIX CEMHTI, CNRS

Dr Tahar AIT-ALI
Developing and exploiting an intestinal organoid infection model to understand the pathogenesis of L. intracellularis
From : The University of Edinburgh, United Kingdom
Host scientist: Dr Ignacio CABALLERO ISP, Centre INRA Val de Loire, Université de Tours, IFCE

Dr Nicolas RITEAU
Role of self-nucleic acids as danger signals activating STING signaling pathways in pulmonary disorders
From : INEM, CNRS, Université d'Orléans
Host scientist : Dr Isabelle COUILLIN INEM, CNRS, Université d'Orléans.

Dr Thimmalapura Marulappa VISHWANATHA
Development of novel chemoselective ligation techniques for protein synthesis
From: CBM, CNRS
Host scientist: Dr Vincent AUCAGNE CBM, CNRS

Prof. John TERBLANCHE
Do temperature-oxygen interactions modulate the responses of insects to climate variability?
From: Stellenbosch University, South Africa
Host scientist: Dr Sylvain PINCEBOURDE IRBI, CNRS, Université de Tours.

Dr Carmen DIAZ OROZCO
Participation of women and nations under construction in Latin America in the nineteenth century: the commitment of Mariquita Sánchez and Juana Manso in education in Argentina
From : Universidad de Los Andes, Venezuela
Host scientist : Dr Brigitte NATANSON REMELICE, Université d'Orléans

Prof. Richard FREEDMAN
CRIM : The Renaissance Imitation Mass
From: Haverford College, Pennsylvania, United States of America
Host scientist: Dr Philippe Vendrix, CESR, CNRS, Université de Tours

Dr Margriet HOOGVLIET
Religious «lieux de savoir» in premodern Tours and Orléans: A Social and Spatial Approach to Religious Reading in French (c. 1450-c. 1550)
From: University of Groningen, The Netherlands
Host scientist: Prof. Chiara LASTRAIOLI CESR, CNRS, Université de Tours

Dr Tijen TUNALI
Art and the City: Urban Space, Art and Social Movements
From: CITERES CNRS. Université de Tours
Host scientist: Dr Gülçin ERDI LELANDAIS CITERES, CNRS. Université de Tours

Dr Arlette RICHAUD TORRES
Coordination compounds as antioxidants: activity evaluation by combining first-principle calculations and solid-state NMR
From : Universidad Autónoma Metropolitana, Mexico
Host scientist : Dr Pierre FLORIAN, CEMHTI, CNRS

Prof. Manuela SIMONI
Pleotropism of gonadotropin action
From: University of Modena and Reggio Emilia, Italy
Host scientist: Dr Pascale CREPIEUX PRC Center INRA Val de Loire, Université de Tours, CNRS, IFCE

LE STUDIUM RESEARCH PROFESSORSHIP

Prof. Igor DENYSENKO
Modeling of reactive plasmas for nanoparticle synthesis
From: Karazin Kharkiv National University, Ukraine
Host scientist: Dr Maxime MIKIKIAN GREMI, CNRS, Université d'Orléans

LE STUDIUM RESEARCH CONSORTIUM

Dr Eric LESPESSAILLES
Knee Osteoarthritis Predictive Imaging Consortium
Host laboratory: I3MTO, Université d'Orléans

Dr Robert COURTOIS
Assessment of Risk of Sexual Assault (ARSA): psychological adjustment, neuropsychological and psychiatric determinants
Host laboratory: PAV, Université de Tours

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