New Technologies and frontiers of science

Basic Sciences and their applications

First InPrInt Seminar

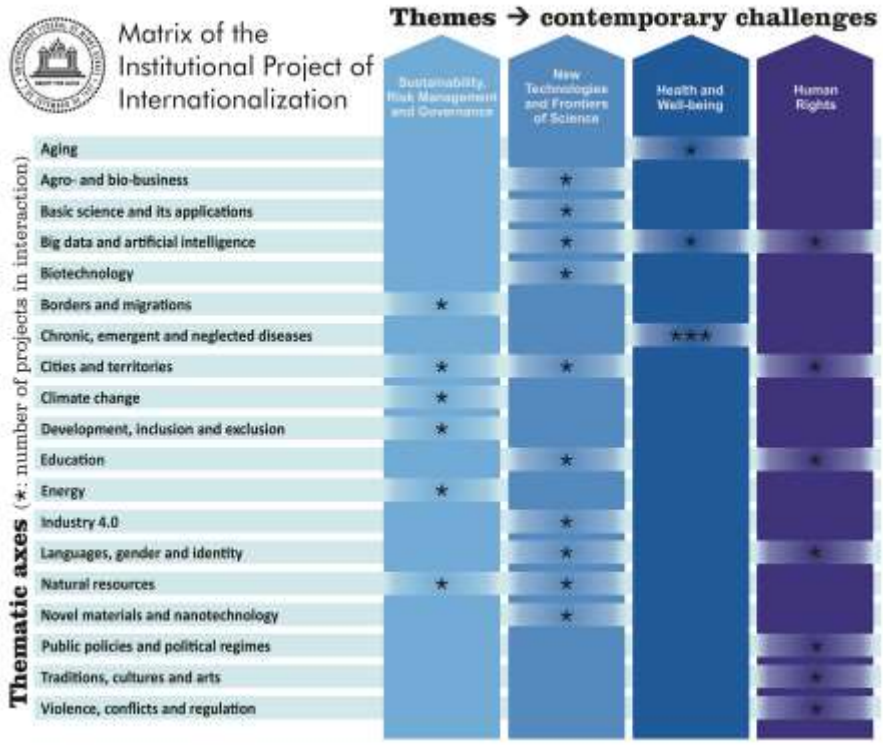
Partnership Building towards

Stronger Engagement in International Collaboration

UFMG, Belo Horizonte

19-23 November 2018

How PrInt/UFMG changes the ways we collaborate



- Actions building on a matrix of four themes (contemporary challenges) and 28 thematic axes (projects) aligned with the United Nations Sustainable Development Goals
- PhD Programs are expected to work together with partner institutions abroad to develop cross-cutting research aligned with the PrInt/UFMG themes and projects
- Funding will be allocated to outgoing and incoming mobility actions within the four themes by means of internal calls

PrInt/UFMG mobility goals

- To foster and enhance **collaboration with partner universities** worldwide by means of joint innovative research and capacity building of human resources
- To consolidate the **training and experience abroad** of UFMG faculty members with both a junior and a senior profile as visiting professors at partner universities
- To **train PhD students** abroad through internships at partner universities with a strong focus on cotutelle (double PhD degrees)
- To **recruit postdoctoral fellows and early-career researchers** with experience abroad to work at UFMG within the PrInt themes and projects
- To **attract** internationally renowned **visiting professors** with highly recognised experience for short stays (15 days) at UFMG

PrInt/UFMG mobility actions

OUTGOING

- PhD mobility grants for internships abroad (six to twelve months)
- Junior Professor grants for visiting professorships abroad (six months)
- Senior Professor grants for visiting professorships abroad (six months)

INCOMING

- Postdoctoral grants for activities at UFMG (12 months, renewable)
- Early-career researcher grants for activities at UFMG (12 months, renewable)
- Senior Professor grants for international visitors at UFMG (15 days)

UFMG Graduate programs taking part in the project on Basic Science and their applications

Csaba Schneider (csaba.schneider@gmail.com)- **Mathematics**

Emmanuel Araújo (emmanuel@fisica.ufmg.br) - **Physics**

Érika Cristina Jorge (erika.cris.jorge@gmail.com) - **Cell Biology**

Grace Schenatto Pereira Moraes (graceschenatto@gmail.com) - **Neuroscience**

Jenner Karlisson Pimenta dos Reis (jenner@ufmg.br) - **Animal Science**

Lirlândia Pires de Souza (lipsousa72@gmail.com) - **Clinical and Toxicological Analyses**

Lucas Bleicher (lbleicher@gmail.com)- **Bioinformatics**

Raphael Escorsim Szawka (reszawka@gmail.com)**–Biological Sciences: Physiology and Pharmacology**

Rosangela Helena Losch (loschi@est.ufmg.br) - **Statistics**

Santuza Teixeira (santuzat@ufmg.br) - **Biochemistry and Immunology**

Sebastián Urrutia (surrutia@dcc.ufmg.br)- **Computational Science**

Telma Cristina Ferreira Fonseca (telmafonseca@nuclear.ufmg.br) - **Nuclear Sciences and Techniques**

Willian R. Rocha (wrochaufmg@gmail.com) - **Chemistry**

Partner institutions willing to collaborate with UFMG in this project (so far)

Original proposal

ParisTech, University of Rome Tor Vergata, University of Münster, University of Glasgow, McGill University, Maastricht University, INRA-France, University of Warwick, Imperial College London, Vrije Universiteit Amsterdam, University of Southampton, University of Georgia

Here today with us

University of Glasgow

Dr. Cristina Persano

Universidad de Sevilla

Dr. Carmen Vargas

New collaborations will be most welcome

We have also demonstrated a long history of successful collaborations with researchers and Institutions (~100) from diverse countries (~36)

Publications, grants, double PhD degrees, visiting professorships, …

Basic Sciences at UFMG have a long history of internationalization

UBA
Pontificia Universidad Católica del Perú
University of the Republic

Universidad Santiago de Chile
Universidad de la Serena
Universidad Nacional de Colombia

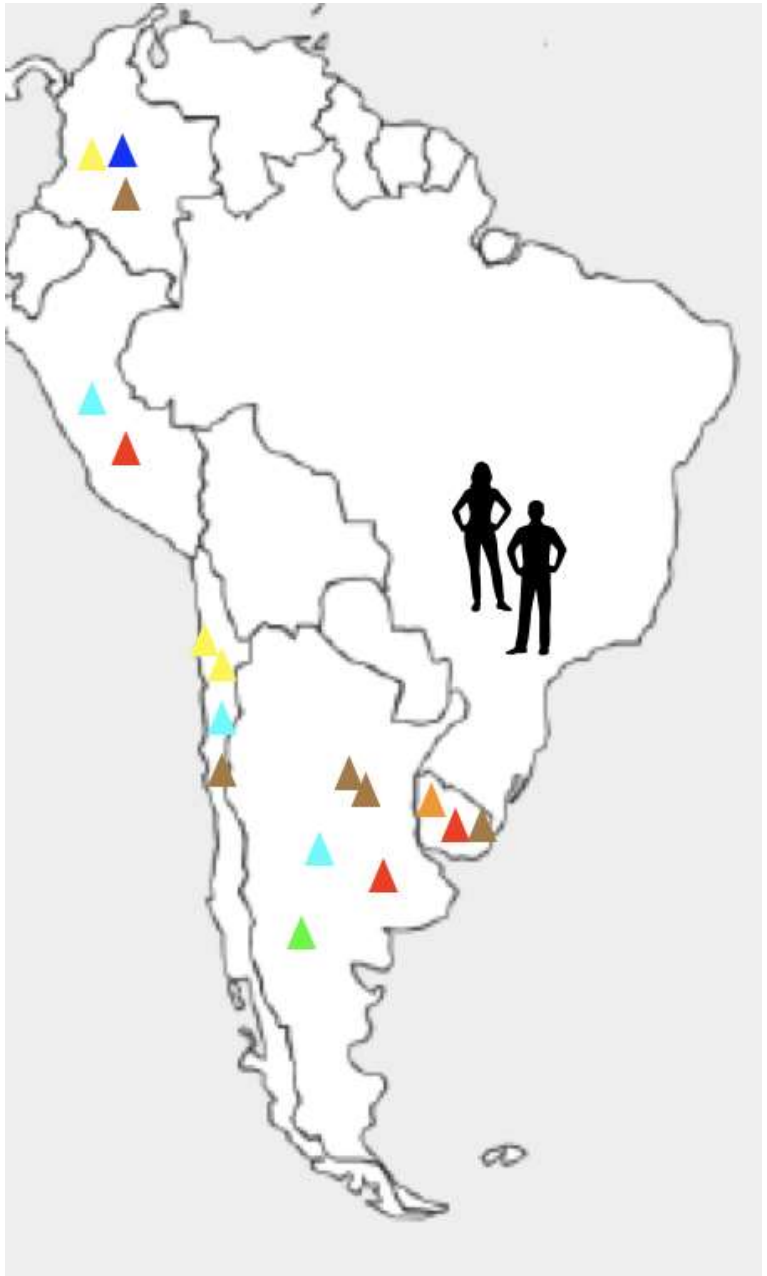
Universidade Industrial de Santander

UBA

Universidad de la Republica Uruguay

National Institute of
Agricultural Research
University of Córdoba
Agreement
Ministry of Livestock,
Agriculture and Fishery,
Veterinary Laboratory
Division Instituto Nacional
de Tecnología
Agropecuaria (INTA)
Universidad André Bello

Pontifícia Universidad Católica de Chile
UBA
PUC



Mathematics
Physics
Chemistry
Biology
Neuroscience
Nuclear
Pharmacy
Animal Science
Statistics

Basic Sciences at UFMG have a long history of internationalization

Centro de Investigación en Matemáticas
Universidade Autónoma
Memorial University
University of Waterloo
University of Wisconsin
Oklahoma State University
Cornell University
New York University
University of Connecticut
Flórida International University
Pennsylvania State University
Rutgers - The State University of New Jersey
Columbia University
Babson College
University of Central Florida
Universtity of Maryland
Stanford University
Pennsylvania State University
University of California
The University of Georgia
University of California Bercikey
Universidad de Havana
Université Laval
University of Ottawa
University of Oklahoma
Virginia Commonwealth University
University of Western Ontario
Florida University
Walsh University
University of Akron
University of Western Ontario
University of Pittsburg
Yale University
Harvard University
MIT
McGill University
University of Illinois at Chicago
Columbia University
University of Maryland
University of Massachusetts

University of Montreal
Vanderbilt University
Robarts Research Institute

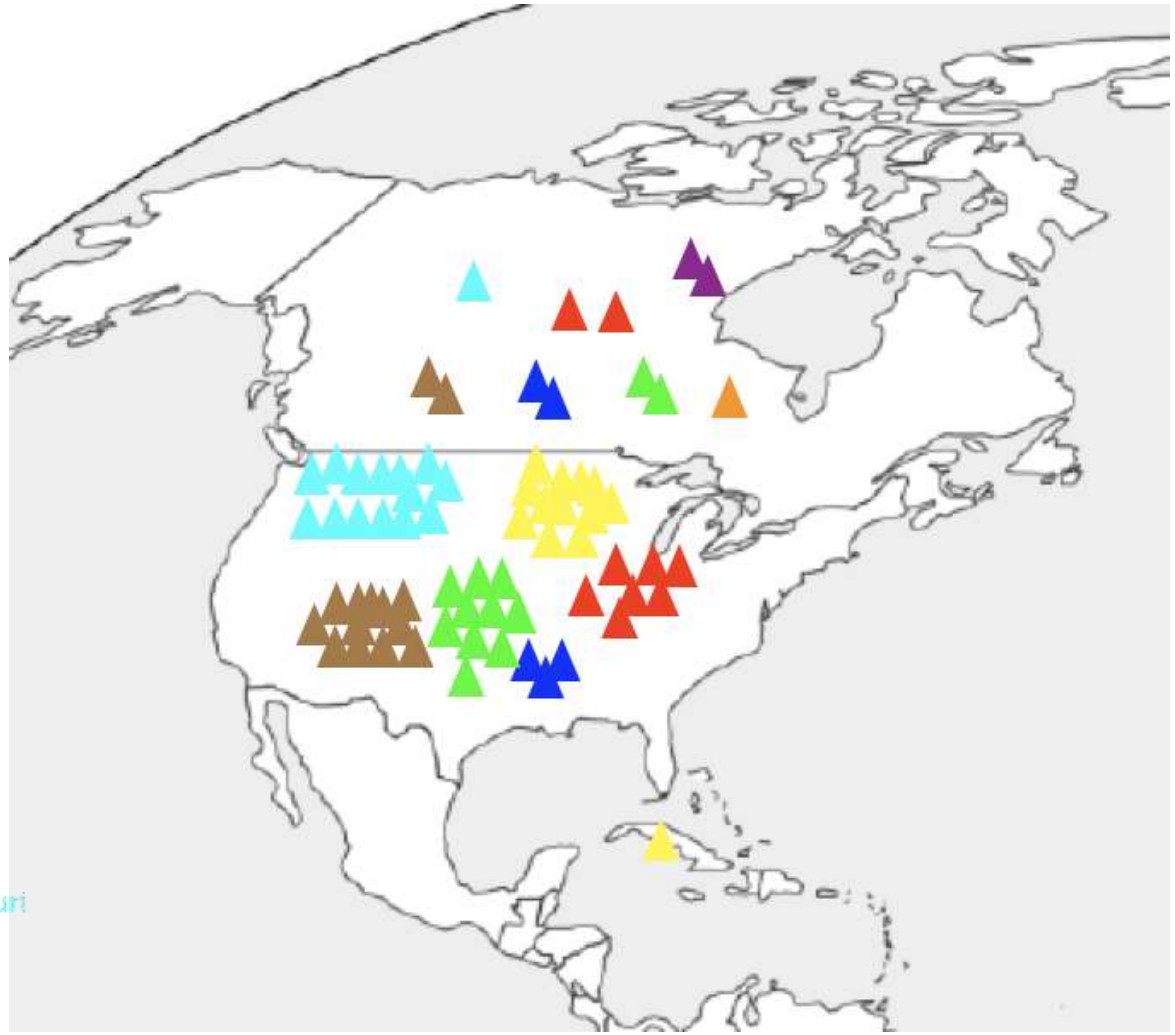
Universidade de Otawa
University of Texas at Austin

The Scripps Research Institute

University of Minnesota
Texas A &M University
University of Georgia
Virginia Tech Institution
University of California Davis
Nacional Animal Disease Center
University of Alberta
University of Saskatchewan
University of Kentucky
Louisiana State University
University of Wisconsin
Colorado State University
University of Tennessee
University of Saskatchewan

University of Connecticut
Duke University
Boston University
Harvard Medical School
Florida State University
University of Texas-Austin
Johns Hopkins University
University of Virginia
University of Massachusetts Amhest
Purdue University
Cornell University University of Missouri
Stanford University
North Caroline State University
Simon Fraser University
Virginia Commonwealth University

NIH



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UFMG

Jülich Supercomputing Centre
Weierstraß-Institut
Ghent University
Université de Rouen, Haute-Normandie
Aix-Marseille Université
Université de Lille I
École Polytechnique, Palaiseau
École Normale Supérieure
Université Paul Sabatier
University of Crete
Université de Roen
Universidad de Valladoid
Universidad de Cantábria
Universitat Politecnica de Catalunya
Universitad de Sevilla
Rijksuniversiteit te GroningenUniversity Siegen
Rijksuniversiteit te Leiden
University Siegen
ETH-Zurique
Università degli Studi Roma Tre
Università della Basilicata, Potenza
Università di Roma "La Sapienza"
Seconda Università di Roma ``Tor Vergata"
Terza Università di Roma
Università di Palermo
Gran Sasso Science Institute, L'Aquila
Università di Cagliari
Jaggielonnian University, Cracóvia
IMPAN
Universidade de Lisboa
Universidade de Coimbra
Universidade Nova de Lisboa
University of Sheffield
University of St Andrews
University of Southampton
University of Warwick
University of London
Babeş-Bolyai" University of Cluj-Napoca
Chalmers University of Technology
Eidgenössische TH Zürich
École Polytechnique Fédérale de Lausanne
National Academy of Sciences of Ukraine

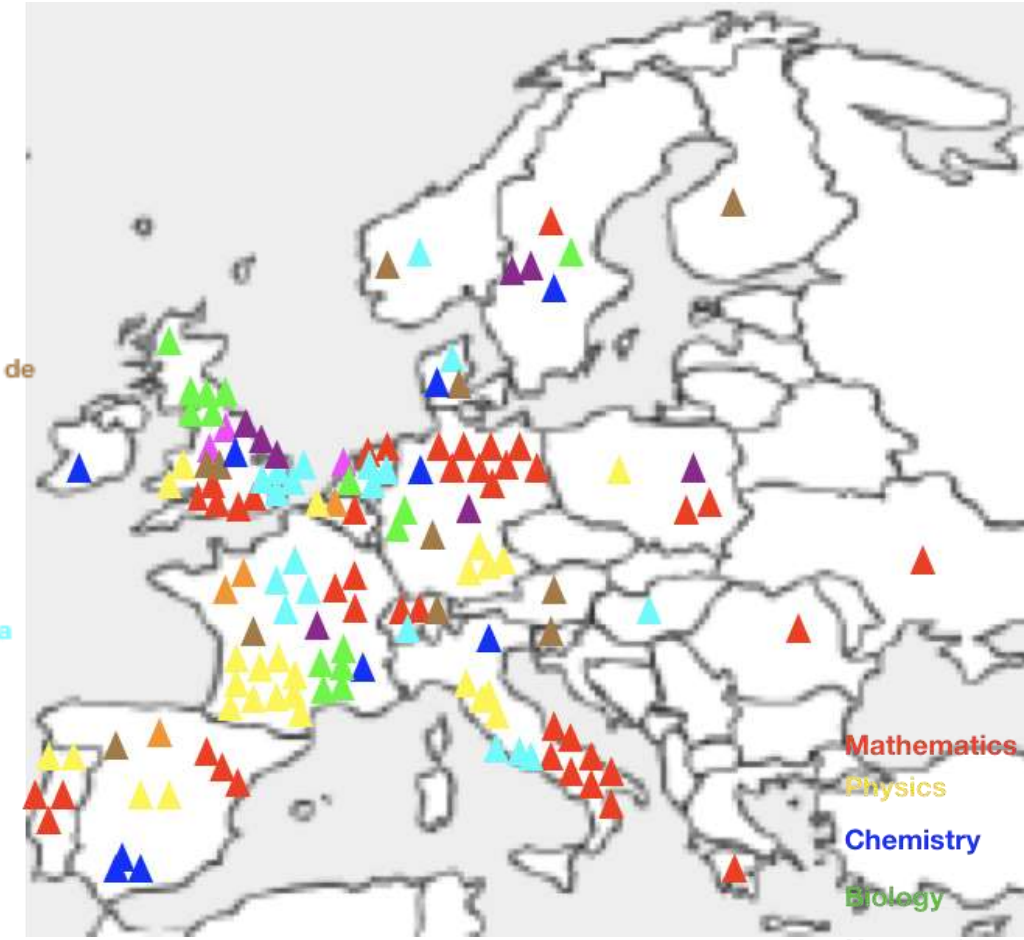
IPAG, Grenoble
Friedrich-Alexander-Universitat,
Nanotech Institute of Technology
Universite de Reims
Politecnico de Milano, Milan
European Synchrotron Radiation Facility
Institute for Theoretical Physics
Universite Paris-Sud
Max-Planck Institute
Krajowe Centrum Informatyk Kwantowej
Institut de Planetologie et d'Astrophysique
Politecnico di Torino
University of Durham
Instituto di Nanotecnologia
Ecole Supereure de Physique
Southampton University
Institut d'Astrophysique
Universidad Politecnica de Cataluna
University Paris VI
CNRS Orleans
Technische Universitat Berlin
Universidade de Coimbra
University Paris XI
Universitat Paderborn
Institut Catala de Nanociencias
Laboratorio Ibérico Internacional

University des Saarlandes
Dublin City University
Stockholm University
Universidad de Alicante
Universidad de Valência
University de Renes
Aarhus University
University of Cádiz
Royal Institute of Technology in Stockholm
Universitá degli Studi di Pavia
University of Warwick
University of Strasbourg
Goethe Universität Frankfurt
Université Paris-Sud
Innstituto Karolinska
Université de Rennes
INSERM
Universite Paris-Saclay
University of Edinbrug
King's College London
Georg August Universität Göttingen
École Polytechinique Fédérale de Lausanne
University of Portsmouth
University of Glasgow
Catholic University of Leuven
Cambridge University
Ludwig-Maximilians-
Universität München
University Provence
Stockholm University
Karolinska Institute
Queen Mary University of
London
Universidade de East Anglia
Nencki Institute

University of London
University of Southampton
Leiden University Medical
Center

Novartis Animal Health
University of Veterinary Medicine
Jena Institution
University of Edinburgh
Université Paris-Est
Laboratory Twinning Project Universidad de
Córdoba
University of Cambridge
Danish Techinical University
The Pirbright Institute

Technische Universiteit Eindhoven
University of Warwick
Paris Tech
Università degli Studi di Roma Tor Vergata
Université Toulouse
University of Paris-Saclay
Laboratorire des Signaus et Systèmes
Consiglio Nazionale delle Ricerche
Gran Sasso Science Institute
ETH Zurich
University of Groningen
CWI and VU University
Leiden University
University of Debrecen
University of Leicester
Lancaster University
University of Nottingham
Norwegian University of Science and Technology
University of Wolverhampton



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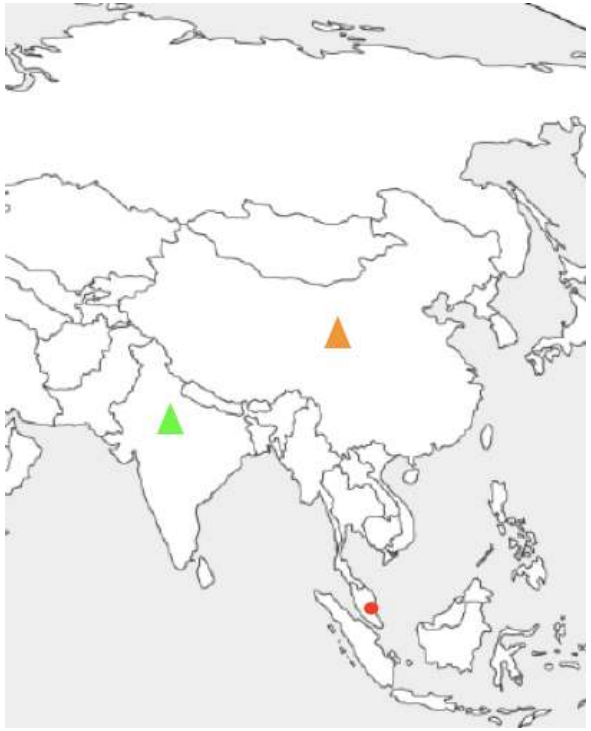
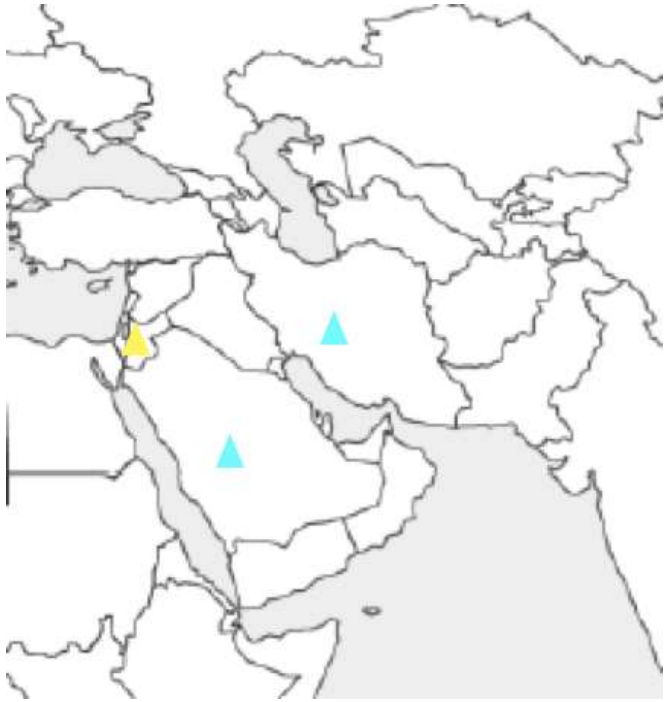
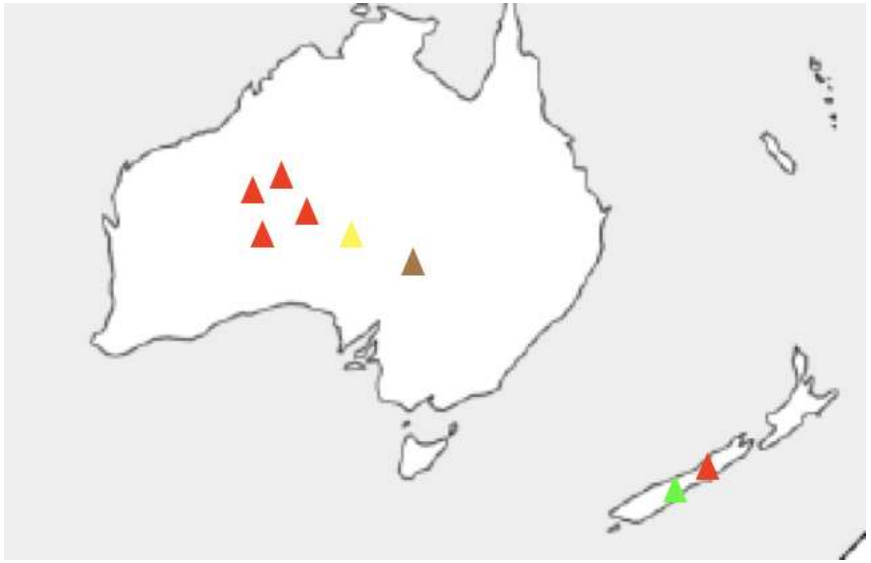


National University of Singapore
National Institute of Technology Rourkela
Guangdong Provincial Strategic Alliance of Medical Devices Innovation



University of Tel Aviv
King Abdullah University of Science and Technology
Isfahan University of Technology



Perth Australian National University
Massey University Palmerston North
University of Canterbury
University of Auckland
University of Western Australia
Swinburne University
University of Otago
Monash University

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Our existing competencies and expertise
Research issues and questions

Mathematics

Representation Theory
Algebras with polynomial identities
Group theory
Associative and Lie algebras
Differential equations
partial differential equations
dynamical systems
Combinatorics and graph theory

Probability
algebraic geometry
Differential geometry
Complex analysis
Number theory
Applied mathematics
Mathematical physics
Computational mathematics
Mathematical biology
Hyperbolic geometry

Our existing competencies and expertise
Research issues and questions

Physics

Atomic and Molecular Physics
Biotechnological Applications of Nanomaterials
Classical and Quantum Physics: Mechanics and Fields
Condensed Matter Physics
Electronic Structure of Solids, Surfaces and Nanostructures
Extragalactic Astrophysics
General Theory of Particles and Fields
Interstellar Medium
Magnetic Materials and Magnetic Properties
Non-linear Optics and Ultrafast Phenomena
Physics of Biological Systems
Quantum Information
Quantum Optics
Semiconductor Physics
Solar Astrophysics
Statistical Physics and Thermodynamics
Stellar Astrophysics
Structure of Liquids and Solids: Crystalography
Surface Physics

Chemistry

Our existing competencies and expertise
Research issues and questions

- New Materials and Methods for Energy Production and Storage
- Green Chemistry and Biotechnologies: Renewable Energies, Biotransformation and Bioremediation,

  Biomass Processing, Sequestration and Utilization of CO_2, Synthetic Green Methods,

  Valorization of industrial rejects and biomass residues and Biorefinery processes.
- Natural Products and Biodiversity.
- Nanostructured Materials for Energy, Photonics, Electronics, Catalysis, Biomedical and environmental applications.
- Design, Synthesis and Biological Evaluation of New Compounds with Biological and Pharmaceutical Activities.
- Synthesis of Functionalized and Intelligent polymers
- Homogeneous and Heterogeneous Catalysis and Development of Synthetic Methods.
- Development and Applications of Analytical Methods and Forensic Chemistry
- (Bio)Inorganic and structural Chemistry
- Chemistry for Industrial Innovation
- Theoretical and Computational Modeling of solids, surfaces and Molecular systems.

Biology

Our existing competencies and expertise
Research issues and questions

Cell biology

- Mechanisms of axonal degeneration and regeneration
- Identification, production and biochemical evaluation of chemokines
- Understanding the biology of the macrophage during the inflammation
- Cholinergic system and the maturation of motoneurons and muscle synapses
- Axon guidance and skeletal muscle cells during embryonic development
- Cellular reprograming

Physiology and Pharmacology

- Cardiovascular Physiology
- Inflammation, Pain and Immune System
- Cellular and Genomic Physiology
- Neurophysiology
- Neuropharmacology
- Neuroendocrinology

Biochemistry and Immunology

- Mechanisms of DNA repair and recombination
- Neutrophils and Inflammation
- Parasite genome studies
- Immunity and host resistance to protozoan infections

Our existing competencies and expertise
Research issues and questions

Statistics

Actuarial Science

Applied Probability and Statistics

Bayesian Statistics

Inference in Stochastic Processes

Item response theory

Machine Learning

Probability and Stochastic Processes

Regression models and categorical data analysis

Spatial Statistics

Surival Analysis and Reliability

Time Series

Our existing competencies and expertise
Research issues and questions

Nuclear Sciences and Techniques

Radiation dosimetry and Nano-dosimetry – Experimental and Modeling

Radiological Protection

Medical images quality: Digital images in radiology

3D Medical images quality: Computed Tomography images and protocols & Digital Breast tomosynthesis

Human phantoms for radiology

Radiotherapy and Brachytherapy

Our existing competencies and expertise
Research issues and questions

Bioinformatics

Genome analysis and variation

Transcriptomics and Proteome analysis

Image analysis

Automated electrophoretic data analysis

Telepresence in biological systems

Pharmacogenomics

Differential gene expression research

Three dimensional structure analysis

Molecular modeling and Protein engineering

Algorithms for molecular model visualization

Automated detection of structural features

Our existing competencies and expertise
Research issues and questions

Neuroscience

Our research projects are focus on studying how the brain works in physiological and pathological conditions. We employ molecular, cellular, physiological, pharmacological, behavioral and computational tools to understand from basic functions to the most complex emergent properties of the brain, such as memory and decision making, in animals and humans.

Clinical and Toxicological Analyses

Biomarkers in Clinical and Toxicological Analyzes

Our existing competencies and expertise
Research issues and questions

Animal Sciences

Veterinary anesthesiology, diagnosis and control of pain and stress.

Clinical and laboratory evaluation of veterinary physiology and pathology.

Diagnostic imaging and video-surgeries.

Clinical-surgical study and therapeutic and diagnostic methods.

Pathophysiology and endocrinology of animal reproduction.

Toxicology and toxic plants.

Quality control of products of animal origin

Diagnosis, epidemiology and quality inspection of products of animal origin

Concluding remarks for the project on Basic Sciences and their applications

- We have solid and successful experience in collaborating with foreign Institutions to produce high quality science;
- Most of our international collaborations were ignited by individual initiatives;
- We are expecting to expand our collaborations through Print, as part of the Institutional commitment to optimize UFMG internationalization;

Cristina from Glasgow

- She made a presentation of University of Glasgow and the city
- College of Science and Engineering is the supporting partner of UG.
- Examples of interdisciplinary research at UG: (1) glacial isostatic adjustment Antarctica, (2) topography of Africa, climate change and human evolution, (3) Scientific applications of the Helium isotopes, (4) The role of lithology in determining the morphology of the landscape.

Carmen from Seville

- She made a presentation of Universidad de Seville and the city
- She is on administrative and presented a broader picture of the university
- There is an Institute of biomedicine (from biological area)
- Strategies to find partners to collaborate: good partners; research-based; long-term
- They have a lot of cotutelle agreements
- Examples of joint degrees with distinct Institutions, some of them with UFMG (physics)
- 1- Nuclear Physics (Erasmus Mundus)
- 2- International Double Master Degree Program in Physics
- 3- International Double Master Degree Program in Biology
- 4- International Double Master Degree Program in Mathematical
- 5- International Double Master Degree Program in Chemistry (Bachelor + Master)
- 6- International Double Master Degree Program in Engineering