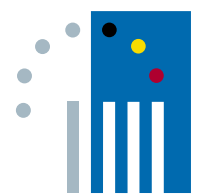
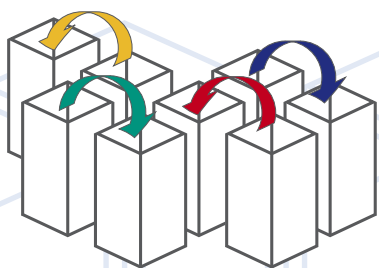


# Interuniversity Attraction Poles



## ABBREVIATIONS

<b>ARA-AGR</b>	Algemeen Rijksarchief – Archives Générales du Royaume
<b>C2RMF</b>	Centre de Recherche et de Restauration des Musées de France
<b>CEIT</b>	Centro de Estudios e Investigaciones Técnicas
<b>CSIC</b>	Consejo Superior de Investigaciones Científicas
<b>FUCAM</b>	Faculté Universitaire Catholique à Mons
<b>FUNDP</b>	Facultés Universitaires Notre-Dame de la Paix
<b>FUSL</b>	Facultés Universitaires Saint-Louis à Bruxelles
<b>GANIL</b>	Grand Accélérateur National d'Ions Lourds
<b>GSI</b>	Gesellschaft für Schwerionenforschung mbH
<b>GxABT</b>	Gembloux Agro-Bio Tech
<b>ITG-IMT</b>	Instituut Voor Tropische Geneeskunde Antwerpen – Institut de Médecine Tropicale d'Anvers
<b>KBR</b>	Koninklijke Bibliotheek van België – Bibliothèque Royale de Belgique
<b>KBIN-IRSNB</b>	Koninklijk Belgisch Instituut voor Natuurwetenschappen – Institut Royal des Sciences Naturelles de Belgique
<b>KMMA-MRAC</b>	Koninklijk Museum voor Midden-Afrika – Musée Royal de l'Afrique Centrale
<b>KMS-ERM</b>	Koninklijke Militaire School – Ecole Royale Militaire
<b>KMSKB-MRBAB</b>	Koninklijke Musea voor Schone Kunsten van België – Musées Royaux des Beaux-Arts de Belgique
<b>KULeuven</b>	Katholieke Universiteit Leuven
<b>LSE</b>	London School of Economics and Political Science
<b>LSHTM</b>	London School of Hygiene and Tropical Medicine
<b>NIKHEF</b>	Nationaal Instituut voor Subatomair Fysica
<b>RWTH</b>	Rheinisch-Westfälische Technische Hochschule
<b>SCK-CEN</b>	Studiecentrum voor Kernenergie – Centre d'Etude de l'Energie Nucléaire
<b>SISSA</b>	Scuola Internazionale Superiore di Studi Avanzati
<b>SOMA-CEGES</b>	Studie- en Documentatiecentrum Oorlog en Hedendaagse Maatschappij – Centre d'Etudes et de Documentation Guerre et Sociétés contemporaines
<b>UA</b>	Universiteit Antwerpen
<b>UCL</b>	Université Catholique de Louvain
<b>UGent</b>	Universiteit Gent
<b>UHasselt</b>	Universiteit Hasselt
<b>ULB</b>	Université Libre de Bruxelles
<b>ULg</b>	Université de Liège
<b>UMONS</b>	Université de Mons
<b>VUB</b>	Vrije Universiteit Brussel

As an external reviewer, I have been able to appreciate the extremely high quality of the research carried out under one of the IAP programmes. The programme brought together several laboratories from all Belgian regions and attracted several international partners, resulting in important results that would not have been achieved by any single partner.

**Philippe Bastin, Institut Pasteur (FR)**

The IAP program is very effective for international visibility of Belgian science. Excellence networking within Belgium is as important as European networking.

**Michael Boshart, University of Munich (DE)**

I have sincerely admired (and envied!) the IAP projects as excellent builders of high-level cooperative fundamental research in Belgium.

**Javier Gil Sevillano, Universidad de Navarra (ES)**

I was highly impressed by the quality, depth and broadness of the research that was carried out in this programme. The IAP's form a unique instrument to stimulate high-quality interregional collaborative research in Belgium.

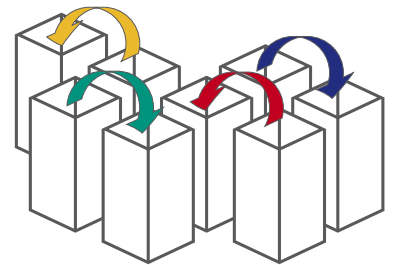
**Bauke W. Dijkstra,  
Rijksuniversiteit Groningen (NL)**

I was deeply impressed by both the structure of the funding arrangements, and the genuinely collaborative research that resulted from them. In my experience the programme produced world-class research.

**Simon Loseby, University of Sheffield (UK)**

# Interuniversity Attraction Poles

phase VI



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# Interuniversitij Attraction Poles – phase VI

## Introduction

For more than 20 years, Belgium has been supporting basic research systematically through the «Interuniversity Attraction Poles» (IAP) programme. This programme aims at reinforcing the high-level scientific potential of universities and at giving a temporary impetus to the formation of interuniversity networks of excellence in basic research.

The IAP are open to all scientific disciplines and cover a wide range of research fields among life sciences, exact and applied sciences and human sciences.

The impact of the IAP on basic research is considerable as shown by the number of “peer-reviewed” scientific publications in top journals. The IAP programme also represents a critical mass of several thousands of researchers working in the framework of the programme including some 500 researchers paid with IAP funds.

Another way to assess the impact of the IAP is to look at the international recognition gained by participating teams. Scientific collaboration, as implemented through the IAP, puts Belgian researchers into a favourable and comfortable position in international science networks and makes it possible to the best research teams of the country to be part of the avant-garde on the world level.

What makes the IAP one of the most significant incentives for basic research in Belgium is not only the size of the financial commitment but also the emphasis laid on interuniversity collaboration.

## Phase VI

- Budget: 143 million EUR
- Duration: 01/2007 – 12/2011
- Organisation: 44 networks of 4 to 15 teams
- Participants: universities, federal scientific institutions
- Open to participation of non-Belgian universities and public research institutions within the European Union

## Objectives

The programme’s objectives are multiple:

- to give teams that are already recognised within the international scientific community additional human and material resources for building a sufficient critical mass;
- to promote long-term, structured collaboration among university research teams of both Belgium’s linguistic Communities and teams belonging to the federal scientific institutions;
- to foster complementarity and interdisciplinarity among these teams;
- to enable young teams to benefit from the environment of excellence provided by a network and its international renown and influence;
- to facilitate the insertion of Belgian research teams into European and International networks.

## A little history

The IAP programme was first launched by the Belgian Federal Authority in 1987. It has developed over six 5-year periods.

The first phase (1987-1991) included 14 networks. The second phase (1990-1995) supported 23 additional networks and the third phase (1992-1996) made it possible to continue the first phase while extending it to 16 networks. The fourth phase (1997-2001) funded 35 networks and the fifth phase (2002-2006) 36 networks.

Today the IAP networks have become a hallmark of excellence on the Belgian science policy scene. This is why the Belgian Federal Authority has approved the implementation of a sixth phase of IAP, spanning the period 2007-2011. The new phase includes 44 networks and involves 324 teams (including 74 non-Belgian European teams).

The IAP represent a unique contact structure in which French- and Dutch-speaking scientists from Belgium’s different Communities have the opportunity to work together. This is why the initiator of these networks is the Federal Government, whereas all other components of basic research funding in our country are entrusted to the Communities.

## Budget

For the first five phases of the IAP programme, the Belgian Federal Science Policy Office invested some 370 million euros in basic research over the period 1987–2006.

Funding of the sixth phase of the IAP programme will total about 143 million euros for the period 2007–2011.

## Network structure

An IAP network consists of:

- at least four teams belonging to different institutions (universities or federal scientific institutions);
- at least one team belonging to each of the country's two main linguistic Communities;
- the promoter of one of the teams ensures overall coordination of the network's organisation and of its scientific and administrative management.

The Belgian Federal Science Policy Office is in charge of the operational and daily administrative and financial management of the networks.

## Implementation

A call for proposals is issued at the start of each new phase of the programme. Network proposals submitted by the institutions to the administration undergo remote evaluation by international experts. This evaluation concerns both the cohesion of a proposed network and the scientific quality of its project.

At the end of each phase of the programme, the networks are evaluated by international experts as to the research quality and the team synergy.

The modalities of IAP network implementation and follow-up are laid down in a cooperation agreement concluded between the Federal State and the Communities.

## The IAP and the European Research Area

3% of the budget has been set aside for the participation of teams belonging to non-Belgian universities or public research institutions within the European Union. This participation takes the form of co-funding amounting to 50%. The IAP phase VI has made it possible to fund the participation of 74 foreign teams in 39 of the 44 IAP networks.

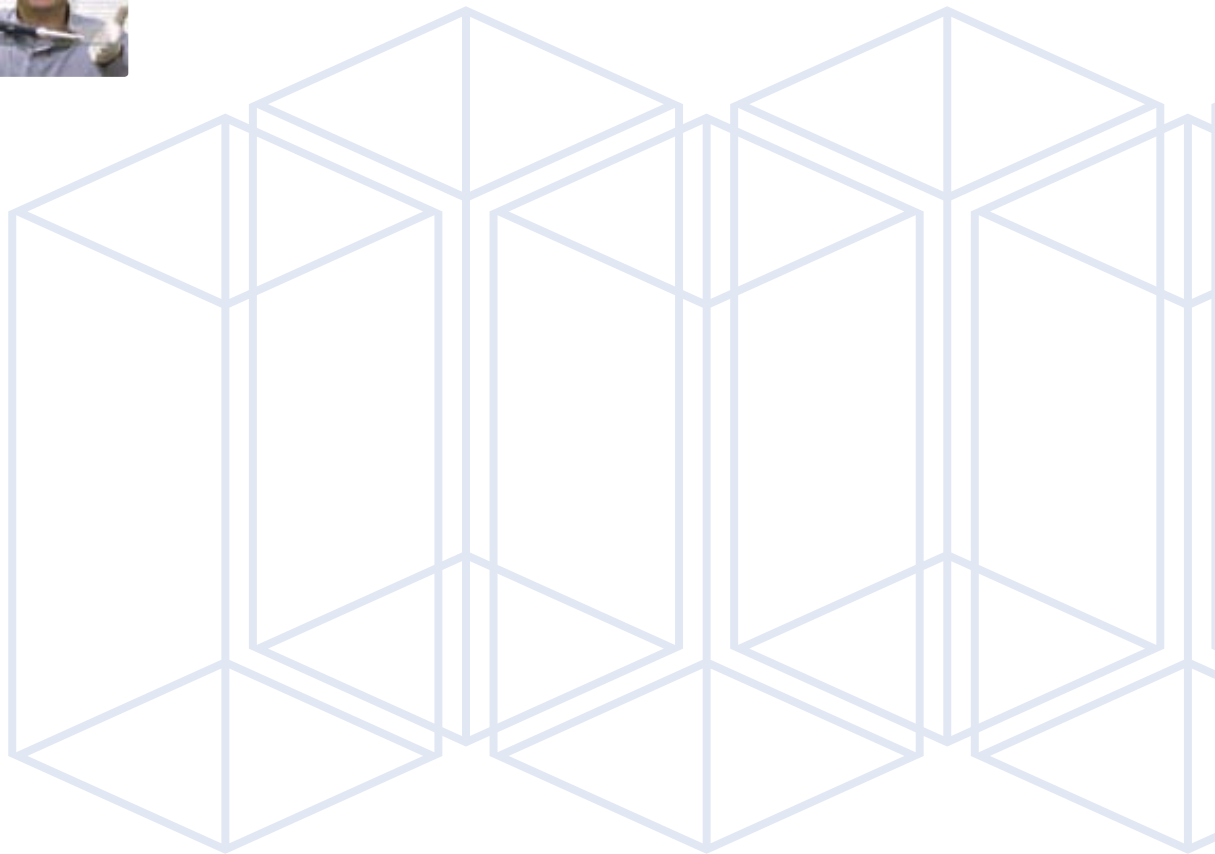
This opening of the IAP programme to institutions in other European countries constitutes a big step towards integration of the Belgian scientific potential into the European Research Area.

## Programme evaluation and monitoring

The IAP have undergone repeated evaluations by international experts. From these assessments it emerged that the IAP programme has amply met expectations as regards progress towards its objectives and that it constitutes an important science policy instrument. The programme is often regarded as an example.

The IAP programme is monitored by a Steering Committee offering opinions and advice on the programme's evolution. In addition to representatives of the Federal Authority and both the French and the Flemish Community, this Committee includes representatives of the Council of Rectors of the French-speaking Community (CREF), representatives of the Flemish Interuniversity Council (VLIR) and a foreign expert.

<http://www.belspo.be/iap>





# Life Science



## P6/05

# From genes to functional defects in hereditary and malignant diseases

- VAN SCHAFTINGEN Emile, UCL
- MARYNEN Peter, KULeuven
- GEORGES Michel, ULg
- SPELEMAN Franki, UGent
- DEVUYST Olivier, UCL
- MECUCCI Cristina, Università degli Studi di Perugia (IT)
- ODERO Maria, Universidad de Navarra (ES)



An increasing proportion of diseases is recognized as resulting from inherited mutations, or from mutations or epigenetic changes (e.g. DNA methylation) that occur during life. The goal of the network is to identify the genes undergoing such changes in a number of important diseases, including malignancies (solid tumours of neurogenic origin; haematological malignancies), malformations and complex disorders (cardio/vascular anomalies; glycosylation defects; mucoviscidosis; renal disorders). Its

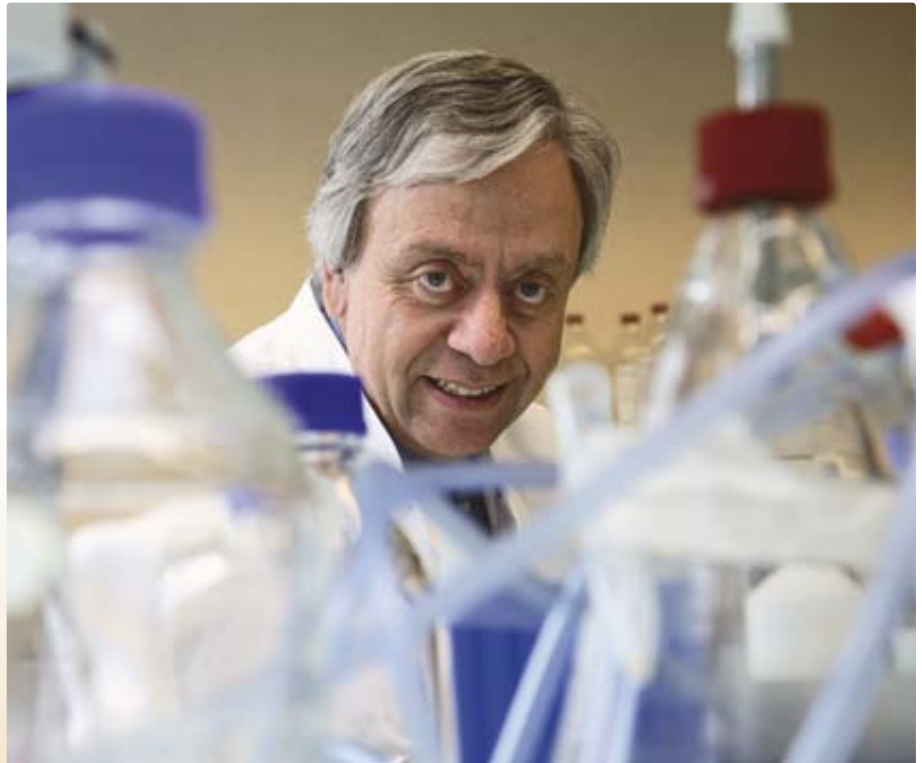
goal is also to identify the function of the products of these genes and how the (epi)mutations affect their function. These studies involve the combination of the expertise of investigators involved in gene hunting, complex trait analysis, epigenetics, enzymological and biochemical studies, morphologists and specialists of organ physiopathology.

[http://www.icp.ucl.ac.be/IAP605\\_A/](http://www.icp.ucl.ac.be/IAP605_A/)

## P6/12

# Cell-mediated immune responses in health and disease: from basic science to clinical investigation

- GOLDMAN Michel, ULB
- BUREAU Fabrice, ULg
- COULIE Pierre, UCL
- MOSER Muriel, ULB
- PLUM Jean, UGent
- THIELEMANS Kris, VUB



The most important function of the immune system is to protect organisms against infectious diseases while avoiding self destruction. Since no single effector response can effectively deal with all forms of pathogenic aggressions, the diversity of effector mechanisms is absolutely essential for host survival. However, excessive responses to pathogens, self-constituents or even non-self benign antigens may cause tissue damage; therefore, a system regulating the immune system is needed. The global working theme of

this network is that T cells orchestrate the outcome of immune responses. The network investigates T cells as effector cells of the immune system and the regulatory circuits controlling their function. It is looking at: (1) ways of enhancing the cancer-killing activity of T cells, like exploiting Toll-like receptor signaling of dendritic cells; (2) mechanisms of immune regulation, like regulatory T cells; (3) biased T cell responses in neonates and adults, with emphasis on T cells that provide help to B cells. Its goal is to deliver

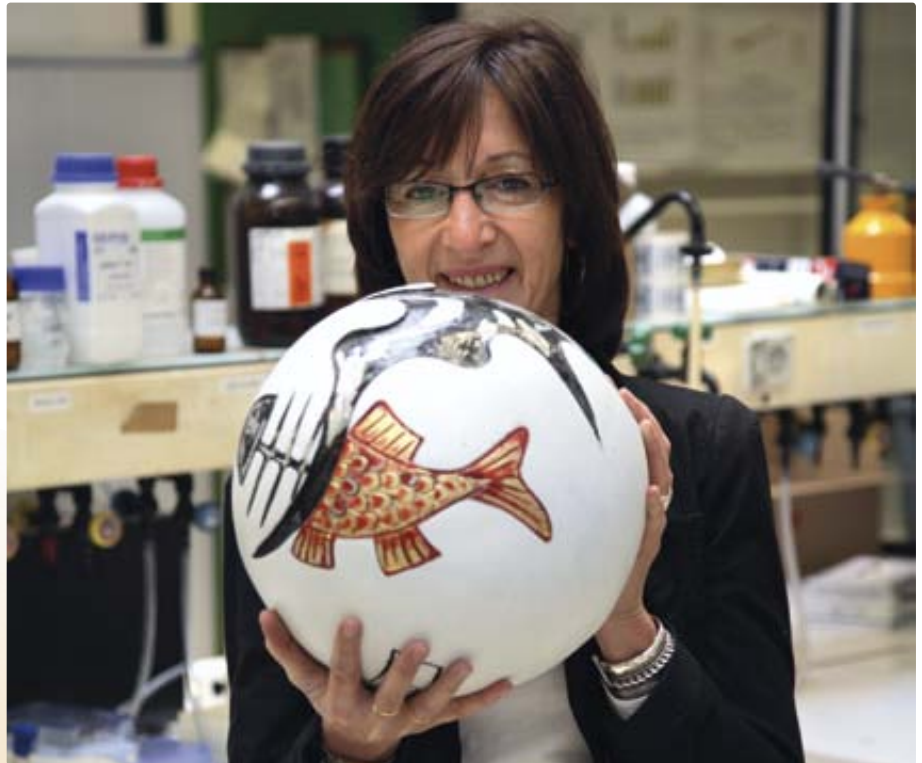
thereby novel concepts for therapeutic or prophylactic immune intervention in clinical medicine.

<http://www.pai-fedimmune.be/cgi-bin/WebObjects/Fedimmune.woa>

## P6/13

# Tracing and integrated modelling of natural and anthropogenic effects on hydrosystems case study: the Scheldt river basin and the adjacent coastal North Sea

- LANCELOT Christiane, ULB
- BAEYENS Willy, VUB
- DELEERSNIJDER Eric, UCL
- DELHEZ Eric, ULg
- ANDRE Luc, KMMA-MRAC
- BILLEN Gilles, Université Pierre et Marie Curie (FR)



This network focuses on the modification of aquatic system functions in response to global change. It aims to develop, validate and apply tools for evaluating the past, current and future changes in quality of surface, ground and marine waters and to relate them to human activities in the basin of the Scheldt. The methodology combines observations, process studies, modelling and economic analysis to implement and validate coupled physical-biogeochemical models describing the sources and fate of key nutrients

and pollutants (metals, xenobiotics, pathogens) along the aquatic continuum in response to anthropogenic and natural changes. Once validated the tool will be used to assess the ecological and economic effectiveness of mitigation policies suggested by the EU Water Framework Directive for 2015 and the Millennium Ecosystem Assessment for 2030 and 2050. With the case study of the Scheldt and the adjacent North Sea, the studied time scale covers one century, 1950-2050.

<http://www.climate.be/TIMOTHY/>

# P6/14

## G protein-coupled receptors: from structure to diseases

- PARMENTIER Marc, ULB
- VANDEN BROECK Jozef, KULeuven
- THEVELEIN Johan, KULeuven
- VAN DAMME Jozef, KULeuven
- DESMECHT Daniel, ULg
- PARDO Leonardo, Universitat Autònoma de Barcelona (ES)



The theme of the network is the family of G protein-coupled receptors (GPCRs), the largest family of membrane receptors, which constitute the targets for about half the active compounds presently used as therapeutic agents. The network studies a set of receptors and receptor subfamilies from human and animal models (mouse, insects, yeast), in order to approach the field of GPCRs as a whole. The project focuses on receptors involved in inflammatory responses, central nervous system functions and the control of endocrine organs. It covers a

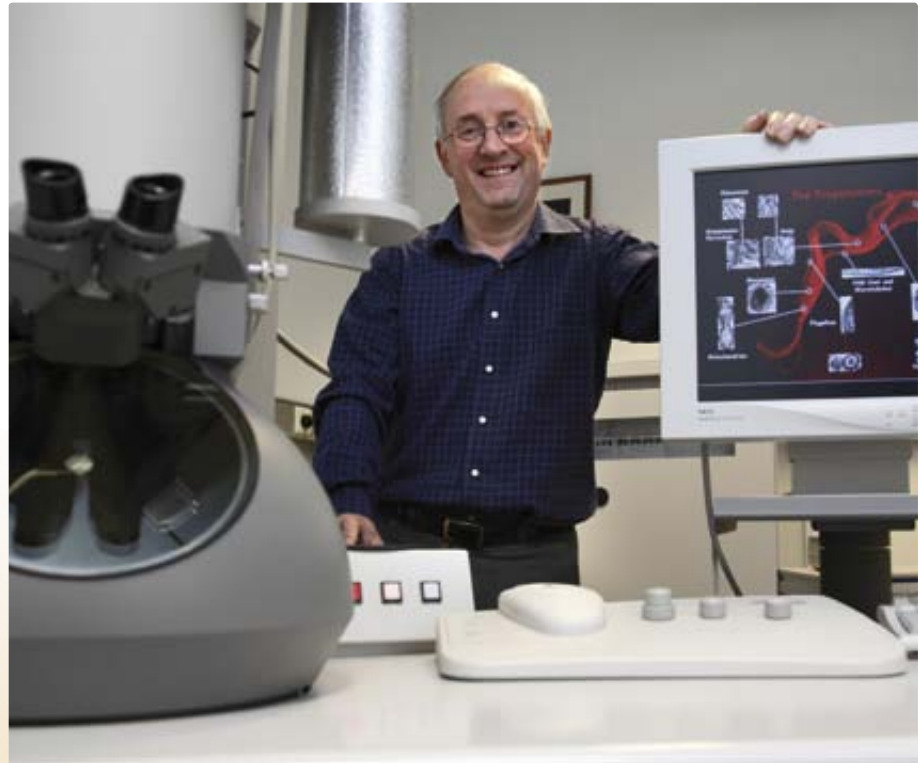
range of aspects, including the structural organization of the receptors in the cell membrane, the intracellular signaling resulting from their activation, and their role in physiology and human diseases. The main application of the project is the validation of specific receptors as targets for the future development of innovative drugs.

<http://www.ulb.ac.be/medecine/pai-iri/>

## P6/15

# Molecular dialogue between parasite and hosts: the trypanosome model

- PAYS Etienne, ULB
- DE BAETSELIER Patrick, VUB
- MICHELS Paul, UCL
- COOSEMANS Marc, ITG-IMT
- NOLAN Derek, Trinity College Dublin (IE)
- BOSHART Michael, Ludwig-Maximilians-Universität München (DE)



The main themes of the network, all focused on the model parasite *Trypanosoma brucei*, are the molecular mechanisms used by parasites to undergo developmental transformations and adapt to their hosts. The research objectives include the characterization of surface receptors and endocytic components, the studies on the genetic and metabolic changes occurring during cellular differentiation from proliferative to resting forms, the characterization of the interactions taking place between the trypanosomes and macrophages of

the host, and finally the characterization of interactions between the parasite and the tsetse fly. The partnership provides a comprehensive complementary expertise, with molecular biologists, immunologists, biochemists and parasitologists. Areas of application of the fundamental research performed in this network are within the domain of biomedicine i.e. diagnosis and treatment of neglected diseases such as human sleeping sickness and cattle nagana.

<http://www.icp.be/pai6-15/>

P6/18

## Signal transduction in inflammation: from gene to organism

- PIETTE Jacques, ULg
- BOURS Vincent, ULg
- HAEGEMAN Guy, UGent
- VANDENABEELE Peter, UGent
- VANDENHEEDE Jackie, KULeuven
- BAUD Véronique, Institut Cochin (FR)
- STAELS Bart, Institut Pasteur de Lille (FR)
- FULDA Simone, Universität Ulm (DE)



The theme of the network is the study of inflammation to understand the origin of many deregulations observed in inflammatory diseases. The first objective of this network is the understanding of the signal transduction intermediates involved in the control of the inflammatory reaction. Inflammatory mediators lead not only to gene regulation but in some cases also to cell death. The second objective is the

understanding of cell death mechanisms in inflammation. Starting from complex and multi-factorial inflammatory diseases, the molecular processes involved in the onset and progression of inflammation are also studied in animal models by a dual approach: an in-depth analysis of regulatory checkpoints in specific models together with their transposition to the molecular level to identify the underlying signalling

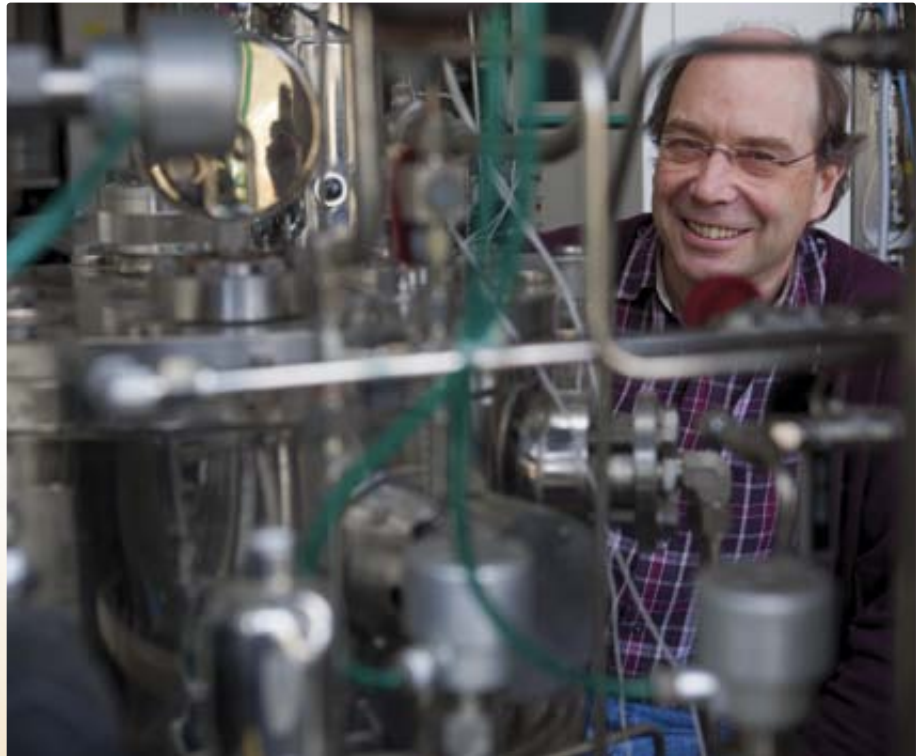
pathways, and select a group of genes or molecules to be validated in animal models for their causal function. This network will certainly be instrumental for a better understanding of the control of inflammation and characterization of new drugable targets in inflammatory diseases.

<http://www.virofond.ulg.ac.be/IAP/>

## P6/19

# Proteins: interactions involved in folding, function and supramolecular assemblages

- JORIS Bernard, ULg
- DEVREESE Bart, UGent
- SOUMILLION Patrice, UCL
- BRASSEUR Robert, GxABT
- HERDEWIJN Piet, KULeuven
- WYNS Lode, VUB
- VAN DER EYCKEN Johan, UGent
- ENGELBORGHS Yves, KULeuven
- GOORMAGHTIGH Erik, ULB
- DOBSON Christopher, University of Cambridge (UK)



Proteins are the most important macromolecules for the functioning of the living cells. The tridimensional structures of proteins and their dynamic properties depend mainly on intramolecular interactions while their associations with all kind of ligands (substrates, inhibitors, effectors, nucleic acids, lipid bilayers or other proteins) rest on intermolecular interactions. Unwanted alterations of intermolecular protein interactions can transform a normal protein into an aberrant one, resulting in many types of pathologies

such as Alzheimer and Parkinson diseases. This network contributes to better understand the molecular basis of these disorders. Perturbation of the protein interactions with its natural ligand constitutes the main mechanism of action of all the therapeutic drugs. In particular, the network studies the interaction of bacterial protein targets with antibiotics to combat bacterial resistance and to find new compounds to kill bacteria. It associates innovative and relevant technologies in molecular and structural biology, bacteriology,

biophysics, bioinformatics, protein and membrane chemistry, enzymology, organic synthesis and theoretical chemistry.

<http://www.iap-profusa.be/>



P6/20

## Paracrine and transcriptional control of embryogenesis

- MARTIAL Joseph, ULg
- HUYLEBROECK Danny, KULeuven
- DAVID Guido, KULeuven
- DEWERCHIN Mieke, KULeuven
- LEMAIGRE Frédéric, UCL
- GOFFINET André, UCL
- VANDERHAEGHEN Pierre, ULB
- MUMMERY Christine, Hubrecht Instituut (NL)



The objective of the network is to understand the cellular and molecular mechanisms that pattern an embryo and establish its organ systems. The complexity and multidisciplinary nature of developmental biology led to create an IAP network that brings together several teams which share their complementary expertise and technology. The network investigates the expression and the function of genes implicated in early and late stages of embryo development such as the formation of germ layers, the development of various organs like

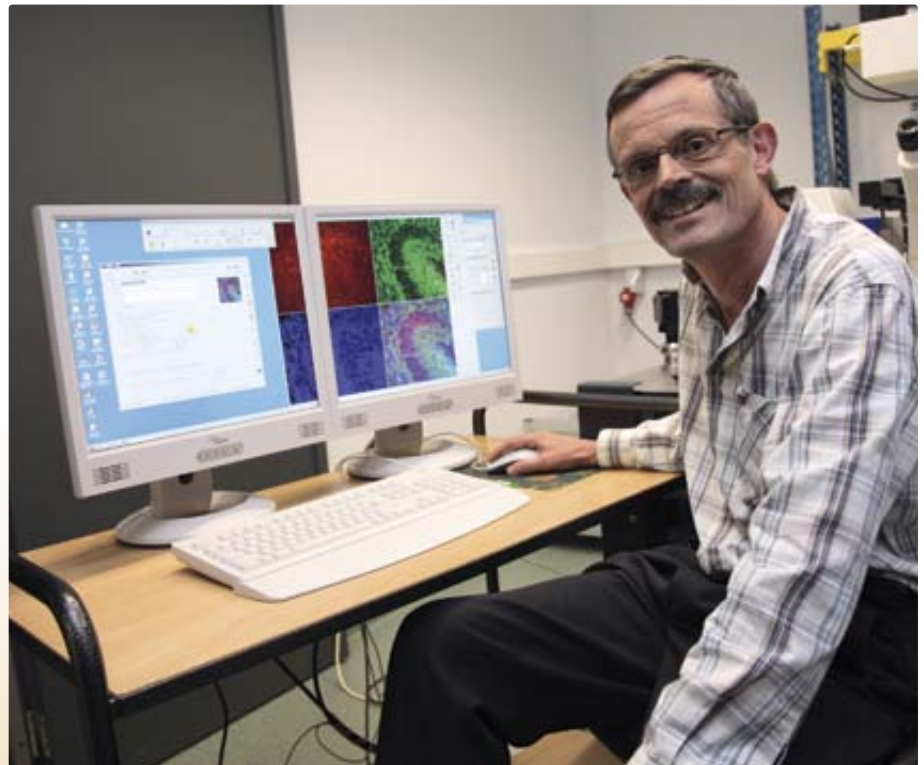
the liver, pancreas and kidney and the formation of the nervous and vascular systems. This basic information is instrumental for advancing modern medicine with notably the potential of developing effective new therapies, particularly those based on tissue regeneration and production of specific human cell types for transplantation from stem cells.

[http://www.lbmegg.ulg.ac.be/index.php?option=com\\_content&view=article&id=14&Itemid=24](http://www.lbmegg.ulg.ac.be/index.php?option=com_content&view=article&id=14&Itemid=24)

## P6/28

# Signal integration mechanisms in health and disease

- WUYTACK Frank, KULeuven
- WAELKENS Etienne, KULeuven
- VANDEKERCKHOVE Joël, UGent
- RIDER Mark, UCL
- DEQUIEDT Franck, GxABT
- FUKS François, ULB
- TAVERNIER Jan, UGent
- DILWORTH Steve, Imperial College London (UK)



This network studies various aspects of cellular signaling mechanisms and their mutual integration into a comprehensive cellular network. This project is organized in seven work packages dealing with: (1) the mechanisms of nuclear epigenetic reprogramming, (2) the role of  $Ca^{2+}$  as a cellular messenger and its intricate link with cellular lipid metabolism, (3) the novel field of TRP channel-based cell signaling, (4) the role of protein phosphorylation in pathogen–host interactions, and in particular of (5) AMP-activated kinase

and protein phosphatase 2A, (6) a study of a novel approach demonstrating signaling-elicited conformational protein alterations, (7) the exploration of the protein phosphatase 2A interactome and its relation to cancer. The network is confident that only such an integrative approach, monitoring changes in the concentration or properties of various cellular components can lead to a full understanding of signal integration. It is therefore clear that, although in essence fundamentally oriented, several links to the pathology are addressed.

[http://med.kuleuven.be/iap/p6\\_28/](http://med.kuleuven.be/iap/p6_28/)

## P6/29

# Perceptual and cognitive processing in the human and non-human primate brain

- ORBAN Guy, KULeuven
- VANDENBERGHE Rik, KULeuven
- SWINNEN Stephan, KULeuven
- SALMON Eric, ULg
- DE SCHUTTER Erik, UA
- FIAS Wim, UGent
- MULLER Robert, UMONS
- RIZZOLATTI Giacomo, Università degli studi di Parma (IT)



The main theme of the network is the study of the visual system and its relationships with motor, memory and executive brain centers in human and non-human primates. The project covers a wide range of topics, all centered on the working of the primate visual system. In particular it studies higher order visual functions and the control of actions, the functional role of attention, sleep, learning and memory, executive functions, as well as quantitative and sequence processing. To this end, the network relies on and

optimize and improve behavioral and electrophysiological methods and functional and anatomical imaging techniques in concert with state-of-the-art analysis and modeling approaches. In this network, the emphasis lies on supporting cognitive neuroscience by means of collaborative experiments, sharing technological developments within the network, setting up imaging facilities as resources accessible to other groups.

<http://neuroserv.med.kuleuven.be/iuap.php>

## P6/30

# Vessel formation and vessel wall biology in disease and medicine

- CARMELIET Peter, KULeuven
- HOLVOET Paul, KULeuven
- BALLIGAND Jean-Luc, UCL
- FOIDART Jean-Michel, ULg
- RAES Martine, FUNDP
- VAN DE VOORDE Johan, UGent
- HEIMBERG Harry, VUB
- NINIO Ewa, Université Pierre et Marie Curie (FR)



A correctly developed vascular system is an absolute prerequisite for the correct functioning of the organism. Imbalances in its formation contribute to the pathogenesis of numerous malignant, inflammatory, ischemic, infectious and immune disorders. In addition, angiogenesis is a driving force in tissue regeneration, in repair of beta cell mass and in graft functioning following islet transplantation in diabetes. Various components – angiogenic growth factor pathways, proteolytic systems, inflammatory

and endothelial cells, oxidative stress, hypoxia – play essential roles in the formation of vessels and their organization into a highly ordered and correctly patterned functional network. However, also maintenance of the endothelial cell (EC) layer of the vessel wall is essential for proper functioning of the vessel and prevention of vascular disorders (such as atherosclerosis, cancer, etc.). The main themes of this network are to explore in an integrated manner the genetic, molecular, and cellular mechanisms underlying (1)

pathological vessel formation (lymph/angiogenesis in disease), (2) vessel wall pathology, endothelial, endocrine and cardiovascular dysfunction related to metabolic syndrome, and (3) interactions between vessel formation and metabolic syndrome and its consequences, and their potential mutually modulating effects.

<http://med.kuleuven.be/IUAP/p6-30/>

## P6/31

# Molecular and cellular mechanisms of electrical excitability

- SIPIDO Karin, KULeuven
- TYTGAT Jan, KULeuven
- SEUTIN Vincent, ULg
- SNYDERS Dirk, UA
- LEYBAERT Luc, UGent
- RIGO Jean-Michel, UHasselt
- VOS Marc, Universitair Medisch Centrum Utrecht (NL)
- MARRION Neil, University of Bristol (UK)



Electrical excitability is essential to the normal function of the brain and the heart and is the result of a highly coordinated activity of ion channels and transporters. The electrical signals convey information over long distances and initiate complex events such as pain, memory, and the normal heartbeat. Dysfunction of ion channels is responsible for several major congenital and acquired diseases, such as sudden cardiac death and several neurologic diseases. The network investigates the molecular properties and regulation of ion channels and transporters proteins

in heterologous expression systems, native cells and tissues. Identification of highly specific toxins supports structure-function studies and pharmacologic dissection of channel function in situ. Using different models the network studies cell-to-cell communication in the CNS, and ion channel remodeling and plasticity in common diseases such as atrial fibrillation and ischemic heart disease. The insights gained from basic properties and mechanisms of dysfunction provide a rational basis for therapeutic development.

<http://med.kuleuven.be/cardio/IUAP/>

## P6/33

# Growth and development of higher plants

- INZÉ Dirk, UGent
- PÉRILLEUX Claire, ULg
- VERBRUGGEN Nathalie, ULB
- BOUTRY Marc, UCL
- VERBELEN Jean-Pierre, UA
- BENNETT Malcolm, University of Nottingham (UK)



In an era characterized by the rapid growth of the world population and dramatic shrinking of fossil energy sources, plants, representing natural power stations, become more and more indispensable to support and maintain the well-being of mankind. Present understanding of how plants develop and grow is still very limited and this shortage becomes exemplary when the subterranean part of the plant is considered. Roots however serve a multitude of functions that are essential for normal growth and development

of the plant. This network combines efforts to tackle major aspects of root growth and development in a well-focused strategy by concentrating on one species, *Arabidopsis thaliana*. Each partner has its unique research approach and background ranging from plant physiology, biochemistry to genetics and molecular biology. It is the interplay of the different disciplines and techniques within the work packages that constitutes the basis for a successful network. The anticipated new insights will certainly become essential for all

future approaches to enhance growth of plants as alternative energy sources.

<http://www.iuap-barn.be/>

## P6/35

# Importance and interaction of allergy, infections and respiratory environmental exposures in chronic lower & upper airway diseases (the AIReWAY study consortium)

- JOOS Guy, UGent
- BACHERT Claus, UGent
- NEMERY Benoit, KULeuven
- LOUIS Renaud, ULg
- FOKKENS Wytske, Universiteit van Amsterdam (NL)



The project aims at unravelling cellular and molecular mechanisms underlying the upper (rhinitis, sinusitis, nasal polyposis) and lower airway diseases (asthma and chronic obstructive pulmonary disease (COPD)). The network proposes that environmental factors such as allergen exposure, pollution and infection and their interactions are causally involved in the pathogenesis. Therefore, the individual and combined effects of allergens, infections and air pollution on the main cellular and molecular mediators are

investigated at different phases typing the natural history of each disease, using experimental animal models. In addition, to assure clinical relevance, the network aims at validating observations by analyses on serum, sputum, nasal and bronchial lavage and tissue samples from healthy controls and several defined patient groups.

<http://www.aireway.ugent.be/>

## P6/36

# The hepatic progenitor cell niche under experimental conditions and in human liver disease

- ROGIERS Vera, VUB
- LEROUX-ROELS Geert, UGent
- LECLERCQ Isabelle, UCL
- ROSKAMS Tania, KULeuven
- ALISON Malcolm, University of London (UK)
- TRAUTWEIN Christian, RWTH Aachen (DE)



This project focuses on the structure and functions of progenitor/stem cell niches in normal and diseased liver. Progenitor cells have partially retained their embryonic plasticity. The niches are specialized environments that inhibit these cells to proliferate and differentiate. When liver cells are damaged as a result of disease, local progenitor cells are stimulated to proliferate and differentiate in order to repopulate the liver with functional liver cells. The project also studies the repopulation of diseased liver by transplantation

of progenitor cells in different mouse models. Recruitment of progenitor cells to the liver from distant locations is another option to replenish the liver with healthy cells. Where will these progenitor cells engraft into the liver? To which cell types will they give rise to? Better insight into the biology of the hepatic progenitor cell niche will improve the knowledge on the pathogenesis of liver diseases. New possibilities for liver cell transplantation, and novel strategies for the treatment of chronic liver diseases by stimulation

of the local progenitor cell niches, may result from this research.



## P6/38

# Non invasive quantitative molecular imaging with applications for studying cellular processes in oncology and neurology

- BOSSUYT Axel, VUB
- VAN DER LINDEN Annemie, UA
- MORTELMANS Luc, KULeuven
- PHILIPS Wilfried, UGent
- GALLEZ Bernard, UCL



Today, molecular imaging has become an essential tool in biomedical research. It builds on technical advances in both clinical and small animal imaging techniques and exploits specific molecular and cellular targets as the source of image contrast. With these new tools come new challenges with respect to quantification and robust extraction of information from such data. The objective of this network is to contribute to the refinement of existing molecular imaging procedures and the exploration of novel technologies with emphasis on methods to produce valid quantitative

results. These methodologies include bioluminescence imaging, microPET, microSPECT, microCT, high resolution MRI and EPR imaging. The work is distributed in five work packages, that encompass both life sciences research and fundamental research in core technologies. In vivo imaging strategies, involving advances in image acquisition, radiolabeled tracers and contrast agents, reporter gene strategies and image analysis are investigated in the context of two life science research themes: cancer research and neurodegeneration.

<http://nimi.ugent.be/>

## P6/40

# Molecular and cellular basis for beta cell therapy in diabetes

- PIPELEERS Daniel, VUB
- SCHUIT Frans, KULeuven
- HENQUIN Jean-Claude, UCL
- EIZIRIK Decio, ULB
- MATHIEU Chantal, KULeuven



Diabetes is defined as a state of chronically elevated glucose levels in the blood. It is caused by failure of the pancreatic beta cells to produce the amounts of insulin needed to control blood glucose levels. The project searches for intervention targets through which survival and function of beta cells can be preserved. The working hypothesis is that the phenotype of the cells determines their life span and their ability to respond to metabolic demands. The network has shown that this phenotype varies among cells and

can undergo changes under influence of environmental conditions. It is therefore considered as a potential target for interventions. The research aims to define the various beta cell phenotypes and their regulation, and to identify crucial sites in the pathways that lead to apoptosis or an impaired insulin release. According to this rationale, the project addresses five major issues in the outlined long-term objective: (1) identification and regulation of beta cell phenotypes, (2) food intake-dependent plasticity of functional beta

cell mass, (3) regulation of fuel-induced insulin secretion, (4) mechanisms in apoptosis and targets for intervention, (5) modulation of immune cells for beta cell protection.

<http://www.bbc-net.be/>

P6/41

## Inhibition of human immunodeficiency virus (HIV) replication

- BERNEMAN Zwi, UA
- VANHAM Guido, ITG-IMT
- VERHASSELT Bruno, UGent
- MOUTSCHEN M. Michel, ULg
- VANDAMME Anne-Mieke, KULeuven
- BERKHOUT Ben, Universiteit van Amsterdam (NL)



Therapy success has reduced AIDS-related morbidity and mortality significantly during the last years, but resistance to existing drugs is a growing problem. Novel strategies are needed, which should target HIV from various angles in order to prevent treatment escape. This network investigates the possibility of inhibiting HIV replication using the following work packages: (1) Development of advanced bio-informatics tools to predict and counter viral escape under drug and immune pressure. (2) Finding new drug targets

that do not suffer from cross resistance with current drugs. (3) Refining the RNA interference (RNAi) technology to prevent escape. (4) Exploring the possibilities of “autologous” immunotherapy, based on transfection of dendritic cells and other antigen-presenting cells with HIV-derived messenger RNA. (5) Development of a suitable small animal model to test these new approaches *in vivo*. In conclusion, this project targets viral escape and resistance under immune and drug pressure with the ultimate goal of inhibiting HIV replication more effectively.

[www.ua.ac.be/hivstop/](http://www.ua.ac.be/hivstop/)

## P6/43

# An integrated approach towards understanding the pathogenesis of CNS and PNS neurodegenerative disorders

- VAN BROECKHOVEN Christine, UA
- DE DEYN Peter Paul, UA
- TIMMERMAN Vincent, UA
- DE STROOPER Bart, KULeuven
- ROBBERECHT Wim, KULeuven
- ROUSSEAU Frederic, VUB
- BRION Jean-Pierre, ULB
- OCTAVE Jean-Noël, UCL
- VAN DUJN Cornelia, Erasmus Universiteit Rotterdam (NL)
- SAFTIG Paul, Christian-Albrechts-Universität (DE)
- WEIS Joachim, RWTH Aachen (DE)



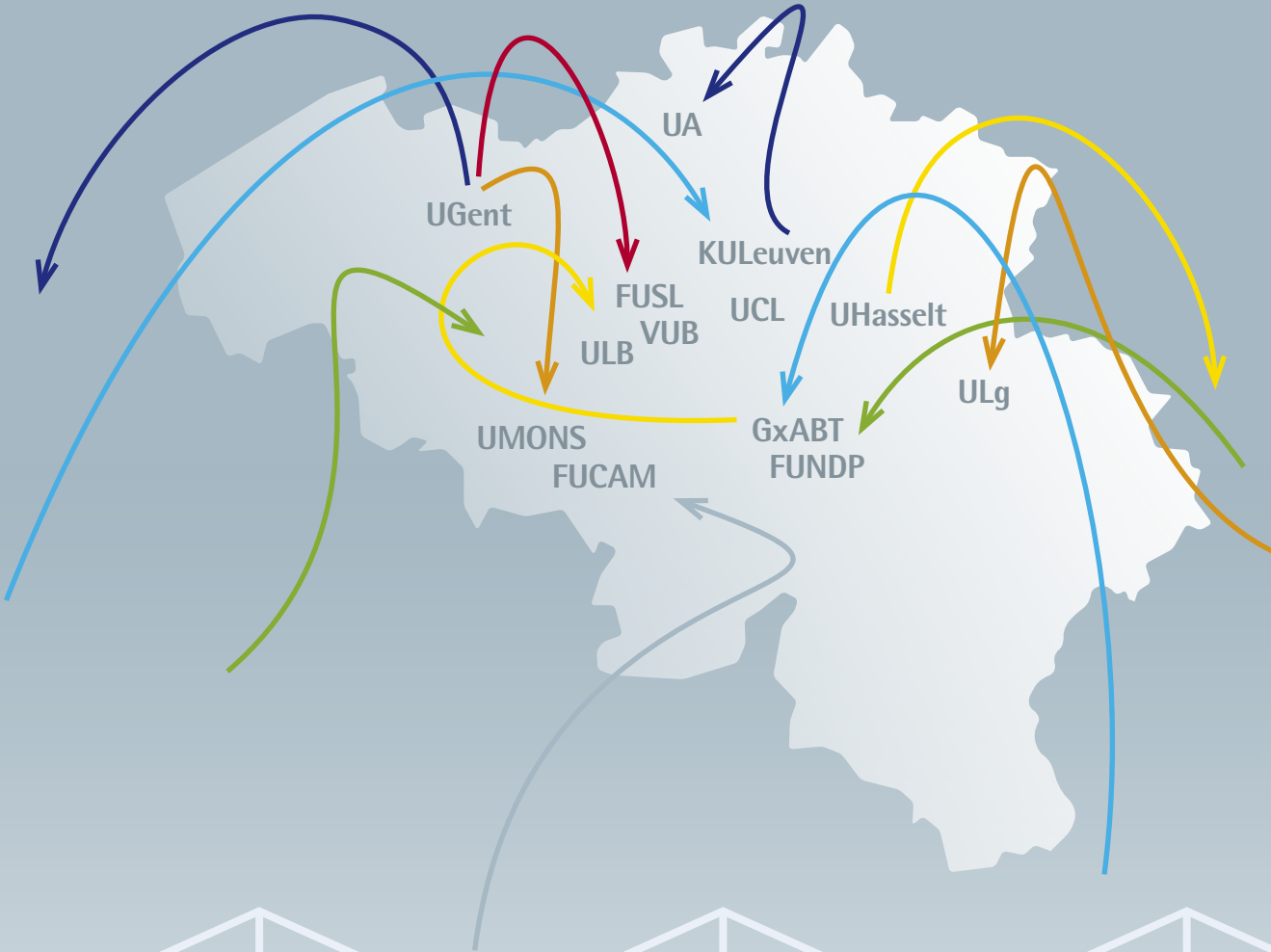
The main aim of the project is gaining a better understanding of the process of neurodegeneration in central and peripheral nervous systems that lead to diseases such as Alzheimer dementia, Parkinson's disease, motorneuropathies and amyotrophic lateral sclerosis. Those age-related diseases have a major impact on quality of life of elderly and major socio-economical consequences for the aging Western society. The network brings together researchers specialized in clinical neurology, neuropathology,

genetics and genomics, cell biology, mouse and small model organisms, and protein modelling. The partners aim at clarifying the biological pathways that are linked to neurodegeneration, by identifying novel genes and genetic risk factors, by identifying modifiers of genetic function by genetic screens, by analyzing the functional networks in which the proteins encoded by these genes are operating, and ultimately, by providing novel avenues for early diagnosis, prognosis, prevention and treatment.

<http://www.molgen.ua.ac.be/iap6/>

# Interuniversity Attraction Poles

- 44 research networks
- 324 research groups





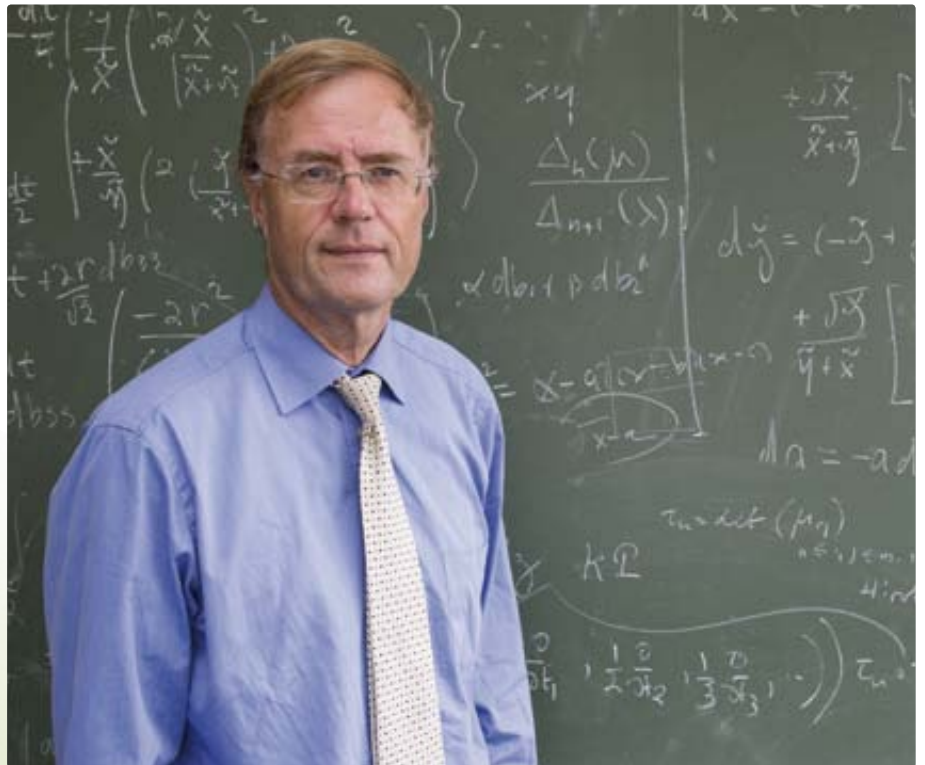
# Exact and Applied Science



## P6/02

# Nonlinear systems, stochastic processes and statistical mechanics

- VAN MOERBEKE Pierre, UCL
- GASPARD Pierre, ULB
- KUIJLAARS Arno, KULeuven
- VAN DER JEUGT Joris, UGent
- KRIECHERBAUER Thomas, Ruhr-Universität Bochum (DE)
- KUPIAINEN Antti, University of Helsinki (FI)
- DUBROVIN Boris, SISSA (IT)



This project is centered on the study of nonlinear systems and the appearance of complex behavior. Systems composed of many microscopic particles present collective and nonlinear phenomena such as phase transitions, or transport properties under nonequilibrium conditions. In order to make progress in this field, this network develops a wide range of methods, from the theory of chaotic and integrable systems to the theory of stochastic processes and statistical mechanics. It also studies matrix models and random matrices,

a field that connects several areas of theoretical physics, mathematics and statistics and has strikingly deep connections with a variety of problems, e.g., with combinatorics, combinatorial probability related to statistical mechanics, number theory, random growth and random tilings, and questions of communication technology.

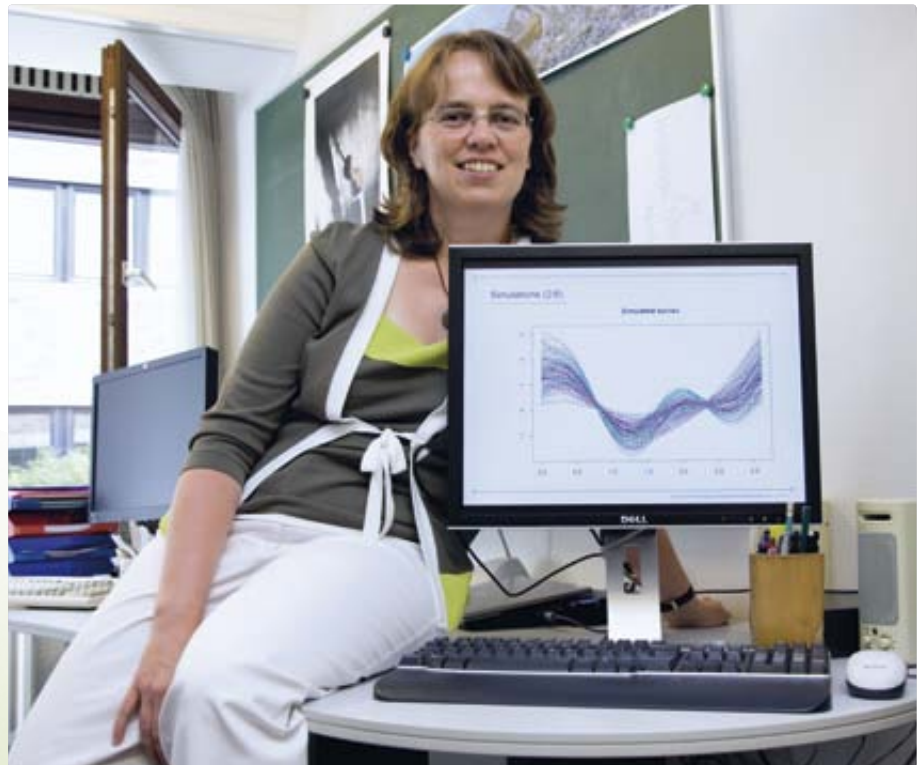
<http://sites.uclouvain.be/sc-nosy/>



## P6/03

# Statistical analysis of association and dependence in complex data

- VAN KEILEGOM Ingrid, UCL
- VAN MECHELEN Iven, KULeuven
- VERBEKE Geert, KULeuven
- DUCHATEAU Luc, UGent
- VERAVERBEKE Noël, UHasselt
- ANTONIADIS Anestis, Université Joseph Fourier (FR)
- EILERS Paul, Leids Universitair Medisch Centrum (NL)
- MANTEIGA Wenceslao González, Universidade de Santiago de Compostela (ES)
- KENWARD Michael, LSHTM (UK)



One key aim of statistics is to analyse in an appropriate way the dependence and association present in a dataset. The data that are collected nowadays to analyse these dependence structures, are often of a complex nature and also the research questions are of an ever increasing complexity. This requires the construction of new models. The development of new methods and intensive interaction between experts is also required to cope with these complex data. The global objective of the network is to develop new models and

methodological tools to do inference and to analyse these complex data structures. To achieve this goal, the network is structured in five workpackages, devoted to different types of complex data structures: multivariate data with qualitative constraints, temporally and spatially related data, incomplete data, data with latent heterogeneity, and highdimensional and compound data. The domains of application of the project include, among others, medicine, economy, insurance, psychology, ...

<http://www.stat.ucl.ac.be/IAP/PhaseVI/index.html>

## P6/04

# Dynamical systems, control and optimization

- GEVERS Michel, UCL
- VANDEWALLE Joos, KULeuven
- AEYELS Dirk, UGent
- PINTELON Rik, VUB
- ROOSE Dirk, KULeuven
- SEPULCHRE Rodophe, ULg
- KINNAERT Michel, ULB
- VANDE WOUWER Alain, UMONS



The aim of this network is to develop new methods and algorithms for the modelling, control and optimization of dynamical systems and networks. Dynamical system theory is a generic discipline that is present in just about all applications of engineering and life sciences. Central to control systems is the notion of feedback, where the dynamics of the system are changed by application of a feedback control that is a function of a measured observation. This allows one to change the dynamics and to optimize the performance of

the dynamical system. Optimization methods play a central role in this discipline. Besides the theoretical work, the network is also involved in applications for which the theoretical tools developed here are essential: these include environmental systems, communication systems, networks and graphs, biological and biochemical systems, biomedical engineering, neural control of movements, mechanical systems and robotics.

<http://sites.uclouvain.be/dysco/>

P6/08

## Physical chemistry of plasma – surface interactions

- DELPLANCKE Marie-Paule, ULB
- DEGREGZ Gérard, ULB
- HECQ Michel, UMONS
- HOUSSIAU Laurent, FUNDP
- LEYS Christophe, UGent
- SCHNEIDER Jochen, RWTH Aachen (DE)
- VAN DER MULLEN Joost, Technische Universiteit Eindhoven (NL)



Plasmas, usually referred to as the fourth state of matter, have many applications in surface treatments and material processing. The mechanisms taking place in the plasma bulk as well as at interfaces are not fully understood. This project, combining experimental and theoretical activities, aims at federating groups involved in research on reactive plasma to improve the understanding of these systems. The integrated approach involves investigating the chemistry, magneto-hydrodynamics, electrical properties of ionized gas

phases and their impact on exposed surfaces. The investigated plasmas cover a wide range of conditions: high/low pressure, equilibrium/non equilibrium. The researchers of the network expect to develop coupled models based on experimental identification of key parameters for each type of source-pressure-regime combination. This should lead to a better understanding of the relationship between functional properties of coatings and modified surfaces and plasma treatment conditions.

<http://mecapp45.ulb.ac.be/IAPPSI>

## P6/10

# Photonics@be: micro-, nano- and quantum-photonics

- EMLIT Philippe, ULB
- MEGRET Patrice, UMONS
- VAN CAMPENHOUT Jan, UGent
- HENS Zeger, UGent
- THIENPONT Hugo, VUB
- BAETS Roel, UGent
- BENTE Erwin, Technische Universiteit Eindhoven (NL)
- TAKI Abdelmajid, Université des Sciences et Technologies de Lille (FR)



The project of this network is about harnessing light. It is about photons and fields in interaction with matter. Its research objectives go from the theoretical study and experimental validation of newly discovered physical phenomena to the introduction of new concepts for photonic devices and systems. This project is organized in five workpackages encompassing nanostructures and meta-materials for photonics, advanced fiber and semiconductor lasers, all optical signal handling, quantum optics and quantum

information, bio-photonics. Photonics has acquired an ubiquitous role not only in information and communication technology, but also in many aspects of our everyday life. The growing impact of photonics can be compared to the onset of electronic technologies some 50 years ago. In this network, the emphasis lies on fundamental research that may lead to applications in optical tele- and datacommunication, sensing, printing, imaging, data storage and computing.

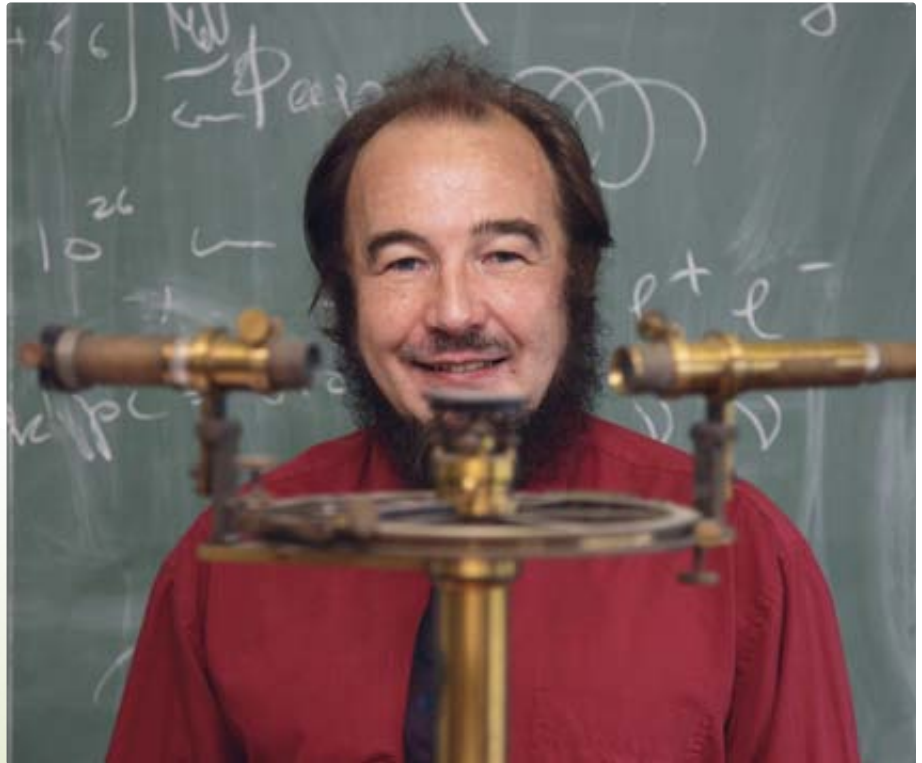
<http://opera.ulb.ac.be/Photonics@be/>



# P6/11

## Fundamental interactions: at the boundary of theory, phenomenology and experiment

- FRERE Jean-Marie, ULB
- FAVART Denis, UCL
- BERTRAND Daniel, ULB
- GERARD Jean-Marc, UCL
- HENNEAUX Marc, ULB
- SEVRIN Alexandre, VUB
- DE CLERCQ Catherine, VUB
- DE WOLF Eddi, UA
- TROOST Walter, KULeuven
- RYCKBOSCH Dirk, UGent
- CUGNON Joseph, ULg
- ABEL Steven Adam, Durham University (UK)
- AUGÉ Etienne, Université Paris-Sud (FR)
- DE GROOT Nicolo, NIKHEF (NL)
- TENCHINI Roberto, Istituto Nazionale di Fisica Nucleare (IT)



Understanding deeply the fundamental interactions of Nature calls for a close collaboration between experimentalists and theorists. This network focuses its action on outstanding fundamental problems like: neutrino properties and their implications for the evolution of the Universe; search for the symmetry breaking mechanism which differentiates weak, strong and electromagnetic interactions, and the associated Brout-Englert-Higgs particle; quantization of gravity and its unification with other forces through string theory. The

approach is both top-down (from theory to phenomenological implications) and bottom-up, relating experimental and astrophysical observations to generate or improve theoretical schemes. The network conducts experiments at large facilities, like the CERN Large Hadron Collider, the underground Gran Sasso observatory, or the large neutrino telescope IceCube imbedded in the South Pole glacier. It also exploits the data from other direct and indirect dark matter searches, and cosmological observations. The need for fast

information sharing and processing in the field was at the origin of the invention of the World-Wide Web, and more recently of a distributed computing network (GRID).

<http://www.f-i.be/>

## P6/16

# Non-destructive analysis of cultural heritage objects

- STRIVAY David, ULg
- JANSSENS Koen, UA
- MOENS Luc, UGent
- VINCZE Laszlo, UGent
- WALTER Philippe, C2RMF (FR)



Conservation and preservation of cultural heritage has become a topic of major concern within Europe. There is an increasing need for non-destructive investigation of cultural heritage materials, as sampling is often restricted because of the value or the uniqueness of the artefact. Even when sampling is allowed, non-destructive testing offers the possibility of obtaining more information from a sample, as complementary techniques may be applied on the same sample. The main objectives of this project are: virtual

sectioning and 3D imaging by micro-tomography; development of elemental and molecular analytical techniques; development of mobile analytical tools; identification and characterization of the support and of paint layers; transformation and degradation of paint layers; improving access to state-of-the-art analytical tools for cultural heritage researchers.

<http://www.nacho.ulg.ac.be>

## P6/17

# Advanced complex inorganic materials by a novel bottom-up (nano)chemistry approach: processing and shaping

- CLOOTS Rudi, ULg
- HOSTE Serge, UGent
- DEVILLERS Michel, UCL
- SU Bao-Lian, FUNDP
- FRANSAER Jan, KULeuven
- POELMAN Dirk, UGent
- MORENO Rodrigo, CSIC (ES)
- SANCHEZ Clément, Université Pierre et Marie Curie (FR)



This research project focuses on new synthetic routes for near-net shape forming of advanced inorganic materials for fabricating components with high reliability at acceptable costs, and with minimal energy expenditure. Synthesis must involve the spontaneous and sometimes reversible organization of small building blocks for the purpose of synthesizing a larger conglomerate structure. The materials are designed first on the nanometer scale by the use of well identified multi-metallic molecular

precursors following a bottom-up approach starting at the molecular level, in presence or not of ordered nanoscale opened systems offering many opportunities for the design of complex functional systems via self-assembling or templating. Organization of the building blocks across several length scales is a key challenge in the design of advanced materials. From molecular level to macrostructure, synthetic pathways went up different routes from solution to powder processing and

shaping. In meeting this challenge the network also proposes to learn much from bio-inspired processes in current use in nature.

<http://www.inanomat.ulg.ac.be/>

## P6/21

# Inverse problems and optimization in low frequency electromagnetism

- BELMANS Ronnie, KULeuven
- MELKEBEEK Jan, UGent
- VAN KEER Roger, UGent
- DULAR Patrick, ULg
- PIRIOU Francis, Université des Sciences et Technologies de Lille (FR)



In this project electromagnetic systems and their applications are investigated, modeled and optimized. The process is done by efficient numerical modelling of electromagnetic forward problems and is approached as a constraint for inverse problems and extended to optimization schemes. New numerical tools, optimization algorithms, regularization techniques and experimental procedures are developed, paying special attention to the questions of uniqueness and stability of the solution. Already existing methods in the field of inverse

problems and optimization are adapted to low frequency electromagnetic systems. Finally, the developed methods are validated by means of real-life applications. Among these applications, considered for validation, are non-destructive testing, optimal electromagnetic microsystems, design of active and passive shielding of electromagnetic systems taking into account the safety levels, optimal induction heaters, power electronics and non-linear power distribution systems, high-efficiency motors, non-

classical machines, design of magnetic and piezoelectric actuators, control, generators for renewable energy (wind generators, biogas turbines), etc.

<http://www.esat.kuleuven.be/electa/iuap/>



P6/23

## Advanced research on exotic nuclei for nuclear physics and nuclear astrophysics

- VAN DUPPEN Piet, KULeuven
- DESCOUVEMONT Pierre, ULB
- WAGEMANS Cyrillus, UGent
- AIT ABDERRAHIM Hamid, SCK-CEN
- CHOMAZ Philippe, GANIL (FR)
- SCHEIDENBERGER Christoph, GSI (DE)
- JOLIE Jan, Universität zu Köln (DE)
- CHARDIN Gabriel, Université Paris-Sud (FR)



At the heart of all atoms that make up the universe lies the atomic nucleus: a minute system with a well-defined number of protons and neutrons. Although of negligible dimension in terms of size, the atomic nucleus accounts for over 99% of the mass of the atom. Understanding its properties and the way these influence the formation of the elements in the stars, is central in this network. Experimental and theoretical studies are undertaken especially to study atoms with a very unusual proton to neutron ratio. These

extraordinary atoms are not available on earth and are produced artificially using the specific capabilities of different European accelerator facilities, amongst them ISOLDE at CERN (Switzerland). As these atoms often live less than a second, challenging detection systems are developed to register the radiation emitted during radioactive decay or nuclear reactions. The obtained experimental information is confronted with state-of-the-art theoretical models. As a result the prediction of the properties of radioactive isotopes,

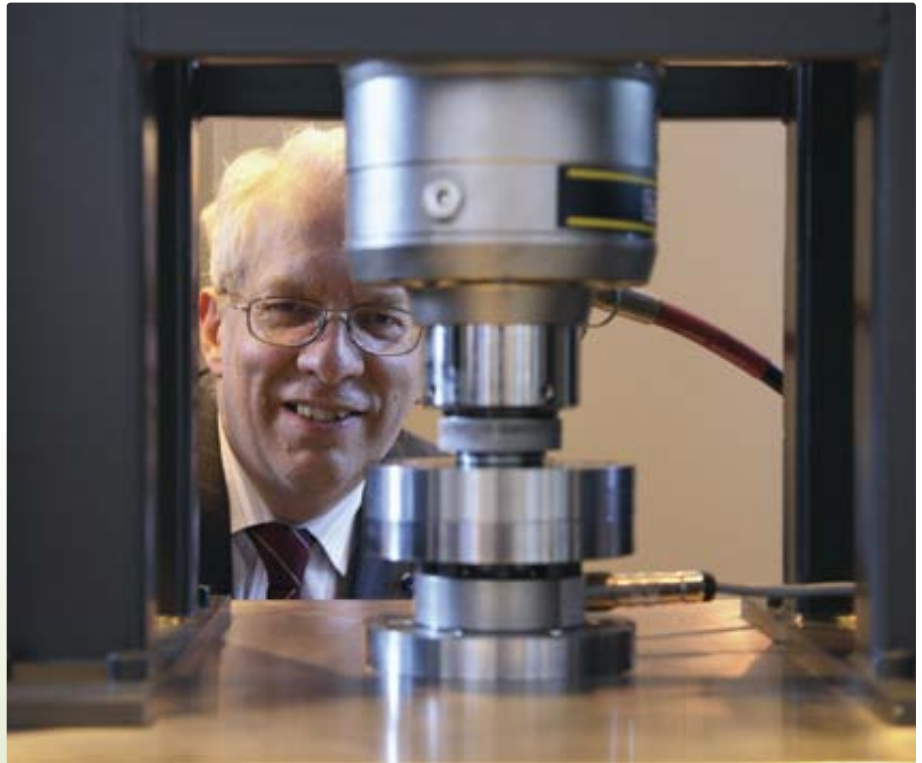
that are e.g. produced in exploding stars, becomes much more reliable and the mysteries of the atomic nucleus are unravelled.

[http://iks32.fys.kuleuven.be/wiki/brix/index.php/Main\\_Page](http://iks32.fys.kuleuven.be/wiki/brix/index.php/Main_Page)

## P6/24

# Physics based multilevel mechanics of metals

- VAN HOUTTE Paul, KULeuven
- SCHRYVERS Dominique, UA
- PARDOEN Thomas, UCL
- HABRAKEN Anne-Marie, ULg
- RABET Luc, KMS-ERM
- DEGRIECK Joris, UGent
- VAN DER GIESSEN Erik,  
Rijksuniversiteit Groningen (NL)
- GASPERINI Monique, Université Paris-  
Nord (FR)
- GIL SEVILLANO Javier, CEIT (ES)



One of the challenges faced by the society is weight reduction of systems used in the transportation and energy sector. This includes the development of higher performance materials as well as the improvement of the design and integrity assessment methods for the structures they constitute. Substantial progress in these fields requires a thorough understanding of the underlying physics of the deformation mechanisms. To do just that for metals is the main objective of this project. A multi-scale approach (experimental,

theoretical and numerical) is used to study phenomena at five length scales varying from the nano-scale, at which dislocations and mechanical twins are studied, until the engineering scale. In this, a sound understanding of the transitions between these length scales is essential. The knowledge generated will also be used in methods for optimising metal forming as well as in the research on emerging structures such as MeMS and multifunctional active panels.

<http://sirius.mtm.kuleuven.be/m3phys/>

## P6/25

# Bioinformatics and modeling: from genomes to networks

- DE MOOR Bart, KULeuven
- VAN DE PEER Yves, UGent
- GOLDBETER Albert, ULB
- WEHENKEL Louis, ULg
- D'ALCHE-BUC Florence, Université d'Evry-Val-d'Essonne (FR)
- THIEFFRY Denis, Université de la Méditerranée (FR)



Due to technological breakthroughs, biological and biomedical sciences today are confronted with a tsunami of numerical data. Nowadays, the complete genome sequence of an organism (genomics), the levels of all the genes as they are expressed in one sample of tissue at one specific moment in time (transcriptomics) or the concentration of proteins in a certain sample (proteomics) can be obtained. This network aims at bringing together expertise on dynamic modeling, numerical algorithms, software engineering, statistics, genetics and biology in order to understand

and unravel the inherent complexity of biological processes and networks, at several orders of magnitude in space and in time. The network unifies the most important bioinformatics research groups in Belgium and will serve as an enabler for systems biology. The main research challenges concentrate on annotation and comparative genomics, high-throughput data analysis, data integration, dynamical modeling and simulation of biological networks and bridging the gap between bioinformatics and biological modeling.

<http://www.kuleuven.be/biomagnet/>

## P6/26

# Belgian fundamental research network on cryptology and information security

- PRENEEL Bart, KULeuven
- QUISQUATER Jean-Jacques, UCL
- STORME Leo, UGent
- DE DECKER Bart, KULeuven
- MACQ Benoit, UCL
- POSCH Reinhard, Technische Universität Graz (AT)
- GOLLMANN Dieter, Technische Universität Hamburg-Harburg (DE)



This project performs fundamental research into a number of selected disciplines that address the information security challenges the society is facing. Cryptology and watermarking techniques can be found at the core of computer and network security, of digital identification and digital signatures, digital rights management systems, content retrieval, tamper detection, etc... The following five research challenges have been defined: discrete mathematics, cryptographic algorithms and protocols, watermarking, secure software and

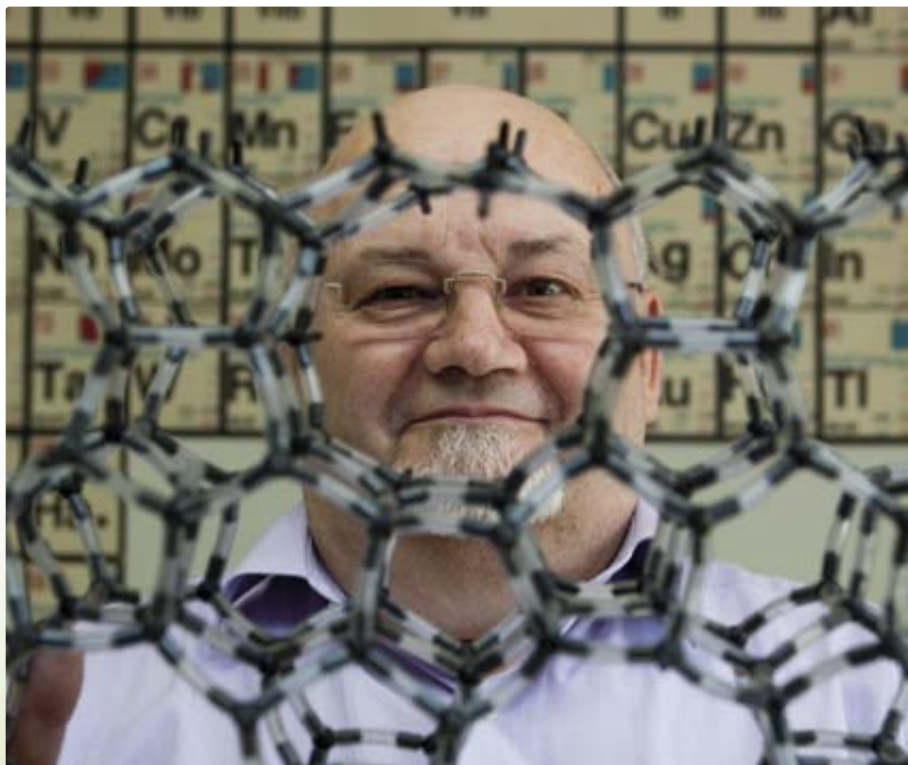
secure hardware. In order to focus the research and to integrate the work of the network, three application areas have been selected: secure documents, ultra low power crypto for sensor networks, ambient intelligence and RFID and eventually mobile terminals, DRM and trusted computing. The goal of these areas is not to perform applied research on these topics, but rather to identify long-term challenges to guide the fundamental research in the project.

<https://www.cosic.esat.kuleuven.be/bcrypt/>

P6/27

## Functional supramolecular systems (FS2)

- JACOBS Pierre, KULeuven
- VAN DER AUWERAER Mark, KULeuven
- JÉROME Christine, ULg
- LAZZARONI Roberto, UMONS
- MARIN Guy, UGent
- JONAS Alain, UCL
- DU PREZ Filip, UGent
- BARON Gino, VUB
- DE MESMAEKER Andrée, ULB
- WOUTERS Johan, FUNDP
- VANDERZANDE Dirk, UHasselt
- VANDERLEYDEN Jos, KULeuven
- WAROQUIER Michel, UGent
- MUELLEN Klaus, Max-Planck-Institut für Polymerforschung (DE)
- FEIJEN Jan, Universiteit Twente (NL)



Functional Supramolecular Systems (FS2) concern chemical species beyond the molecule level held together by non-covalent intermolecular interactions. The project aims at developing novel FS2, understanding driving forces for multidimensional organization, developing tools to investigate, address, and manipulate. FS2 studied are nanostructured and self-assembling systems, hierarchically structured nanoporous materials, (hybrid) biomaterials, organic, inorganic and hybrid thin films. In specific work

packages partners with complementary expertise and instrumental capabilities interact at different platforms, *viz.* theory and modeling, synthesis and fabrication, structure and functionality, devices and responsive systems. Basic knowledge is provided paving the way for development of advanced applications, *viz.* organic nanotransistors and solar cells, smart surfaces and materials, diagnostic tools for clinical and regenerative medicine, drug delivery systems, and new sustainable chemistry.

<http://www.biw.kuleuven.be/COK/IAP/>

## P6/39

# Fundamental issues in software engineering: modelling, verification and evolution of software

- D'HONDT Theo, VUB
- DEMEYER Serge, UA
- MENS Kim, UCL
- MASSART Thierry, ULB
- SCHOBENS Pierre-Yves, FUNDP
- BOIGELOT Bernard, ULg
- DUCHIEN Laurence, Université des Sciences et Technologies de Lille (FR)
- UCHITEL Sebastian, Imperial College London (UK)
- VAN DEURSEN Arie, Technische Universiteit Delft (NL)



Software-intensive systems are among the most complex artifacts ever built. In the development of such systems, the use of rigorous models and analysis methods is essential to make sure that the software satisfies its requirements and exhibits the desired properties (e.g., safety, security, reliability, consistency). At the same time, in order to adapt to the constantly changing requirements and technology, these systems must be able to evolve over time, without breaking their essential properties.

This project combines the strength of research teams in model-driven engineering, software evolution, formal modelling, formal verification, and aspect-oriented software development. The project aims to advance the state of the art in each of these domains, to strengthen existing collaborations, to forge new partnerships, and to leverage and disseminate this research at a European level. To achieve these objectives the network supports seven work packages that cluster

special interest groups in the area of programming and modelling languages, model analysis, and model evolution.

<http://moves.vub.ac.be/>

P6/42

## Quantum effects in clusters and nanowires

- PEETERS François, UA
- VAN HAESENDONCK Chris, KULeuven
- PIRAUX Luc, UCL
- BOGAERTS Annemie, UA
- GHOSEZ Philippe, ULg
- WAGNER Patrick, UHasselt
- PILENI Marie-Paule, Université Pierre et Marie Curie (FR)



The project is aimed at the study of structural, optical, magnetic, electrical and reactive properties of clusters and nanowires, which is an important subfield of nanoscience with the nanosize control realized at least in two dimensions, – through nano-engineering of their size, shape, structure, and composition. Clusters and nanowires consisting of metal, semiconductor, carbon and combinations of these materials are studied using different approaches, e.g., laser vaporization, ion implantation, electrochemical and vapor

deposition, self-assembly, electron beam lithography, etc. On experimental side, high-resolution electron microscopy, nuclear techniques with atomic probes, different types of local probe microscopy, SQUID based magnetometry, laser spectroscopy, X-ray reflectometry, etc. are used. Computational studies include a wide range of techniques ranging from Monte Carlo and molecular dynamics simulations, finite element and finite difference techniques to *ab initio* approaches. The study is contributing to the design of new nanomaterials

with desired properties important for, e.g. photovoltaics, nano-electronics and nano-sensors.

<http://www.cmt.ua.ac.be/iap6/>





# Human Science



## P6/01

# Justice and society: sociopolitical history of justice administration in Belgium (1795-2005)

- ROUSSEAUX Xavier, UCL
- HEIRBAUT Dirk, UGent
- NANDRIN Jean-Pierre, FUSL
- VELLE Karel, ARA-AGR
- LUYTEN Dirk, SOMA-CEGES
- LEUWERS Hervé, Université Charles-de-Gaulle (FR)
- FABER Sjoerd, Vrije Universiteit Amsterdam (NL)



The project aims to deepen the knowledge of the socio-political processes, actors and mentalities that have shaped the historical development of the Belgian justice system, its relation to society and its present-day features. The research is organised along the following topics: criminal and civil law policies and their impact; collective practices and profiles of judicial actors (magistrates, lawyers, prison personnel, police...); justice in times of reform and crisis. It combines long term study (1830-2005) of four

domains: civil justice, criminal justice, the judicial world and sources, with transversal views on key periods: the origins of Belgian justice (Revolutions 1795-1830) and the World Wars (1914-1945). The network is developing an internet repository JUST-HIS for textual, statistical, biographical and other resources for Belgian justice history. It aims at a cross-fertilization of disciplines in the 'justice' domain and a renewal of traditional research by integrating legal history, historical criminology, socio-political history and archival sciences.

<http://www.just-his.be>

## P6/06

# Democratic governance and reflexive theory of collective action

- LENOBLE Jacques, UCL
- SWINNEN Johan, KULeuven
- DE VOS Paul, UGent
- PICHAULT François, ULg
- DEAKIN Simon, University of Cambridge (UK)



This multidisciplinary project seeks to advance the current research in theory of governance of collective action, and to draw the institutional implications of the resulting understanding of the requirements of a “reflexive theory” of democratic governance. At a theoretical level, it deepens the pragmatist reading of theory of collective action proposed by the “experimentalist and pragmatist” approach to governance by highlighting the “reflexive nature” of the learning operation at the core of every collective action, focusing on the conditions enabling actors to choose the best

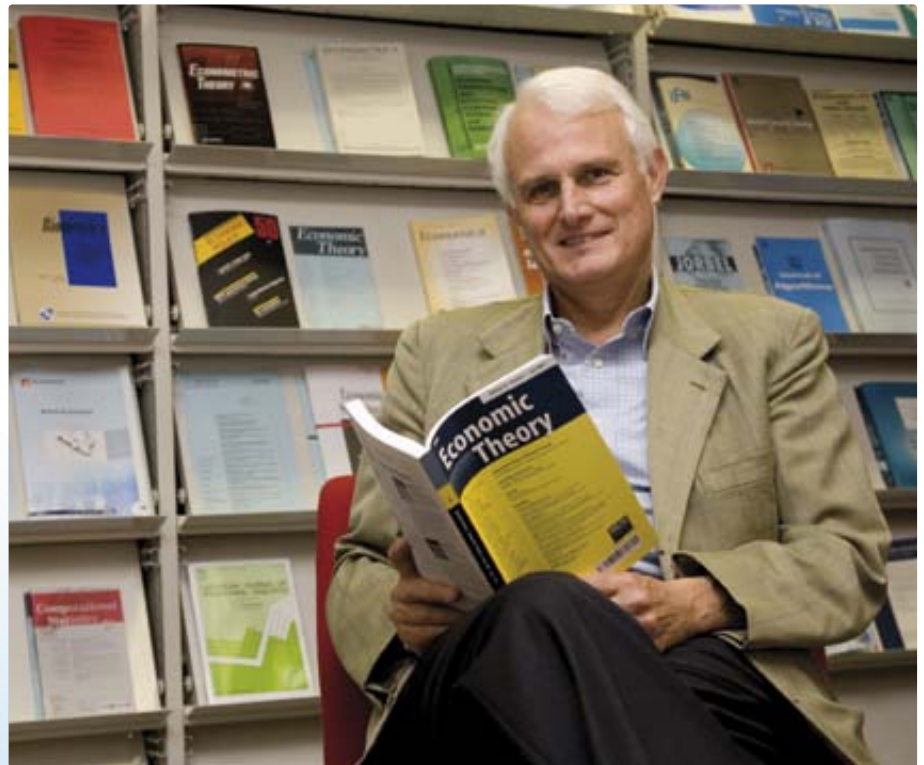
course of action to meet their normative expectations. It also explores the possible institutional expressions of the resulting requirements for a reflexive governance of collective action in three thematic fields: the balance between foreign direct investment and human development, information sharing and collective learning via information technology and appropriate institutional design in governance of microbiological commons, and reflexive regulatory schemes better meeting the requirements of ‘multi-stakeholder’ corporate governance.

<http://iap6.cpd.ucl.ac.be/>

## P6/07

# Economic policy and finance in the global economy: equilibrium analysis and social evaluation

- D'ASPREMONT Claude, UCL
- SCHOKKAERT Erik, KULeuven
- LAURENT Sébastien, FUNDP
- VAN DE GAER Dirk, UGent
- DE LA CROIX David, UCL
- WEIL Philippe, ULB
- ZIMMERMANN Jean-Benoît, Université de la Méditerranée (FR)
- COWELL Frank, LSE (UK)
- CREMER Helmut, Université de Toulouse (FR)
- PALM Franz, Universiteit Maastricht (NL)



The purpose of the project is to develop economic, social-choice, finance and game-theoretical concepts to address the challenges of globalization for developed and developing countries and to normatively evaluate proposed policies. Workpackage 1 is devoted to the design of markets and social mechanisms, involving networks and coalitions, bargaining procedures and conflict resolution. Workpackage 2 is concerned with normative issues and with political feasibility considerations. It analyzes successively normative

criteria, the challenges for social protection in Europe and the political feasibility of reforms. Workpackage 3 deals with international economics and finance. It concerns trade policy, competition policy in the EU and the spatial redistribution of economic activities. Central bank interventions and their relation with market volatility, exchange rate policy, credit market frictions and the labor market are also on the agenda. Finally, financial econometrics are to be used to analyze investment decisions under interest rate

and inflation risk and to understand the differences of stock market microstructures across competing markets.

<http://www.uclouvain.be/en-core-pai.html>

## P6/09

# Higher education and research: organization, market interaction and overall impact in the knowledge-based era

- DEWATRIPONT Mathias, ULB
- VEUGELERS Reinhilde, KULeuven
- BOUCKAERT Jan, UA
- GERARD Marcel, FUCAM
- WAUTHY Xavier, FUSL
- FINET Alain, UMONS
- FRIEBEL Guido, Université de  
Toulouse (FR)
- SOETE Luc, Universiteit Maastricht (NL)



The project aims at improving our understanding of the higher education and research (HER) system, a segment of the economy and of society which is ever more crucial today, in our “knowledge-based society”. Understanding the link between the organization of HER and the overall economy is consequently more crucial than ever, at a time when globalization intensifies the competition for talent. Moreover, in an era of growing scarcity of public-sector funds, the question of access to higher education also

represents a key challenge in terms of overall “equality of opportunities”. To do this, the project focuses on five main themes: (1) the link between higher education funding, student choices and participation, and overall performance; (2) the role of globalization on the evolution of the governance and strategies of HER institutions; (3) the evolution of quality assessment methods of HER (evaluation, rankings, career paths, optimization methods, ...); (4) the link between the organization of basic and applied research and the ability

to innovate; and (5) the role of HER in fostering economic growth and its impact on trade and migratory flows.

<http://www.ecares.org/iap-p6-09.html>

## P6/22

# The transition from republic to empire: the impact of romanization on cities and countryside in Italy and the provinces (2<sup>nd</sup>/1<sup>st</sup> century BC - 2<sup>nd</sup>/3<sup>rd</sup> century AD)

- WAEKENS Marc, KULeuven
- BRULET Raymond, UCL
- VERMEULEN Frank, UGent
- VAN NEER Willem, KBIN-IRSNB
- VERSTRAETEN Gert, KULeuven
- BINTLIFF John, Universiteit Leiden (NL)
- SLAPSAK Bozidar, University of Ljubljana (SI)



The project studies acculturation in four regions of the Roman Empire (Gallia Belgica, C Italy, C Greece and SW Anatolia) conquered at various dates in various stages of development. Post-colonialists reject 'Romanization' as a deliberate act to introduce peace and civilisation or to conquer and assimilate by supporting local elites, explaining it as a 'varnish' coating local cultures or an act of self-promotion by local elites adopting 'Roman lifestyles' later emulated by lower classes. Modern scholars replace the notion of

'Romanization' as a political concept not automatically implying cultural transfers by that of 'Imperial culture' continuously renewing itself through multi-directional cultural transfers between capital and provinces. The aim of this network is the interdisciplinary study of how four regions were affected by their incorporation into the Empire focusing on urban/demographic developments, infrastructure and social mobility; urban economy, incl. subsistence, crafts and exchange patterns; the relation city-countryside, incl. history/diversity of

rural settlements, land use, internal connections and dependency between city and hinterland.

<http://www.iuap.be/>

## P6/32

# City and society in the Low Countries 1200-1800: space, knowledge, social capital

- BOONE Marc, UGent
- WEISS Monique, ULB
- BLONDÉ Bruno, UA
- LEFÈVRE Patrick, KBR
- DRAGUET Michel, KMSKB-MRBAB
- PRAK Maarten, Universiteit Utrecht (NL)



The project aims at deepening the historical study of urban society in the Low Countries in both a chronological sense, compared to the traditional boundaries of historiography, and a geographical sense. Research covers the most urbanised core regions of the Low Countries (Flanders, Brabant, Holland and Hainault) during the glory-days of urban culture in the medieval and early modern Low Countries (1200-1800). Available know-how on urban history in Belgium (and in the Netherlands through collaboration with a Dutch

team) is brought together in order to explore topics which reflect current trends in historical research and to evaluate methodological innovation. Three main themes are studied in this project: (1) urban space, (2) knowledge and culture, (3) social networks and social capital. Given the importance of the phenomenon of the city in the Low Countries' past, the proposed research topics will elucidate the exceptional and particular development of the Low Countries in a European context.

<http://www.cityandsociety.be/>

## P6/34

# Greater Mesopotamia: reconstruction of its environment and history

- TANRET Michel, UGent
- BAETEMAN Cecile, KBIN-IRSNB
- VAN LERBERGHE Karel, KULeuven
- TUNCA Önhan, ULg



This project aims at a new interpretation of the complex historical evolution of Greater Mesopotamia, being the alluvial plain of Tigris and Euphrates, South West Iran (Khuzestan) and Syria from the point of view of the interaction of the ancient environment with the population and the development of their social, political and economic institutions over time. It is a cross-discipline research, a synthesis between alpha and beta sciences. Digital maps form the basis, produced on the basis of ancient maps, surveys, aerial photographs and satellite imagery. This

is completed by environmental geo-archaeological investigations. Another aspect is documented by wide textual studies of cuneiform, classical and Arab sources and European traveller's narratives. This has resulted in radical new insights in the historical geography. The archaeological investigations in the core areas provide case studies of the different landscapes: the Syrian coastal area (Tell Tweini), the Khabur Basin (Chagar Bazar) and the Upper Euphrates region (Tell Ahmar), complemented with the results of previous excavations in the

alluvial plain (Tell ed-Der). Out of this comes the ongoing development of new historical insights.

[http://www.sumer\\_akkad.ugent.be/](http://www.sumer_akkad.ugent.be/)



## P6/37

# Changing patterns of participation and representation in contemporary democracies – a comparative research on the relation between citizens and state

- DESCHOUWER Kris, VUB
- HOOGHE Marc, KULeuven
- DELWIT Pascal, ULB
- WALGRAVE Stefaan, UA
- ANDEWEG Rudy, Universiteit Leiden (NL)



Democratic political representation and political participation have been going through major changes during the last few decades. Both the institutional environment – the way in which political decision making is organized – and the societal norms and values in which political actors have to make their choices has been evolving. European integration and processes of regionalization have increased the number of relevant levels of decision making. The erosion of the traditional societal cleavages and conflicts have

made the democratic dialogue more complex and fragmented. The network analyzes how both citizens and politicians deal with these changes. The project gathers new data through an international survey among members of parliament in 63 national and regional parliaments in 15 countries and through a three wave panel survey of the voters at the 2009 regional elections in Belgium. Several aspects of political representation and participation are thus being analyzed, including representational roles, voting behavior

and motivation, trust and legitimacy, conceptions of democracy, protest movements, party members and party strategies.

<http://www.partirep.eu>

## P6/44

# Grammaticalization and (inter)subjectification

- VAN DER AUWERA Johan, UA
- VANDENBERGEN Anne-Marie, UGent
- CUYCKENS Hubert, KULeuven
- DEGAND Liesbeth, UCL
- MANIACKY Jacky, KMMA-MRAC
- DIEWALD Gabriele, Leibniz Universität Hannover (DE)



The project aims to understand how languages or rather their speakers 'make' grammar and how objective meanings become subjective and even intersubjective. The first process is called 'grammaticalization' and the second one '(inter)subjectification'. The focus is on three issues: (1) what is the nature of the semantic changes in subjectification and in intersubjectification what is the relationship with the structural developments in grammaticalization? (2) what is the teleology of these processes, more particularly, are

grammaticalization and (inter) subjectification unidirectional or not? and (3) what is the scope or range of these processes, more particularly, how do grammaticalization and (inter)subjectification relate to other mechanisms of language change, notably, to analogy? These issues are studied with respect to six areas of grammar, viz. modality, evidentiality, mood, discourse particles, complementation and nominal modification. The project also addresses the wider import of the findings for linguistic theory.

<http://webh01.ua.ac.be/gramis/>

I observed that this Belgian research programme has a very positive impact on the structuration of fundamental research in networks, which is a very rational way to promote basic research.

Jean-François Briat, Centre National de la Recherche Scientifique (FR)

I have had the opportunity to recognize the strong and positive influence of the IAP programme in the research development of Belgian academic institutions.

Emilio Munoz, Spanish National Research Council (ES)

The IAP programme has been enormously beneficial to fundamental research in Belgium.

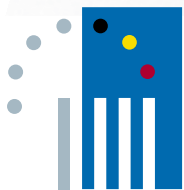
Wouter Moolenaar, Nederlands Kanker Instituut (NL)

I found that the IAP was excellent, and considerably enhanced the effectiveness of the Belgian contribution to particle physics on the international stage. I believe that this is due, in large measure, to the synergies that the broad coalition from the different communities enables. The IAP programme is something that Belgium should be proud of.

Ken Peach, John Adams Institute for Accelerator Science (UK)

The Belgian IAP programme has been a tremendous successful investment in fundamental research in Belgium. I have seen the boost that this programme has given to the considered research community, with a great increase in international positioning of the Belgian community.

Paul Van den Hof, Dutch Institute of Systems and Control (NL)



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