

## **Behnaam Aazhang**

Rice University, USA

Professor and Chair, Department of Electrical and Computer Engineering; Director, Centre for Multimedia Communications (CMC), Rice University, Houston, Texas, USA. Behnaam Aazhang received his B.S. M.S., and Ph.D. degrees in Electrical and Computer Engineering from University of Illinois at Urbana-Champaign in 1981, 1983, and 1986, respectively. From 1981 to 1985, Behnaam Aazhang was a Research Assistant in the Coordinated Science Laboratory, University of Illinois. In 1985, he joined the faculty of Rice University, Houston, Texas, where he is now the J.S. Abercrombie Professor, Chair of the Department of Electrical and Computer Engineering, and also the Director of Center for Multimedia Communications. He has been a Visiting Professor at IBM Federal Systems Company, Houston, Texas, the Laboratory for Communication Technology at Swiss Federal Institute of Technology (ETH), Zurich, Switzerland, the Telecommunications Laboratory at University of Oulu, Oulu, Finland, the U.S. Air Force Phillips Laboratory, Albuquerque, New Mexico, and at Nokia Mobile Phones in Irving, Texas. Professor Aazhang holds 9 patents.

Project: "Flexible Wireless Communication Systems 2007-2011". Development of future wireless communication systems requires multidisciplinary fundamental research covering all the relevant layers of the Open System Interface (OSI) model as well as related technologies, like radio channels, transceiver techniques, transmission techniques, medium access control, radio resource management and internet protocol (IP) over wireless systems. The goal of the research is to develop technology in the areas of decentralized and self-organizing network topologies and operatorless radio access network concepts. An important enabling technology is based on opportunistic communications. It utilizes the frequency spectrum efficiently and flexibly using reconfigurable software defined radio (SDR) platforms. The main focus of the research is on cognitive radio technologies. The applications of the technologies include broadband wireless access solutions, like mobile phones and laptop computers, as well as short range communication devices down to the body area networks with, e.g., medical applications. Finnish host organisation: The Centre for Wireless Communications (CWC) of University of Oulu is the leading academic wireless communications research centre in Finland and renowned by the world-wide research community. CWC's mission is to carry out research in an academic environment with the objective of supporting users and developers of wireless communication technology in the surrounding community in their R&D and application projects. CWC employs about 90 persons, one fourth of which come from abroad.

Finnish project leader: Professor Matti Latva-aho, tel. +358 40 588 9655 matti.latva-aho@ee.oulu.fi

## **Dimitris S. Argyropoulos**

North Carolina State University, USA

Professor of Chemistry, North Carolina State University, Raleigh, USA. His internationally recognized expertise covers an extremely broad spectrum of wood and natural product chemistry, ranging from structural studies of lignin to isolation and novel chemical reactions of various wood components. The work of his group focuses on the organic chemistry of wood components and the development of new chemistry for transforming the carbon present in our trees toward producing valuable chemicals, materials and energy.

Project: "Green Chemistry of Wood and Wood Components 2007-2010". One of the main obstacles that has seriously hampered the development of the science and technology of wood has been its insolubility. If one could selectively solubilize wood and its components, then a totally whole new way of approaching its utility will emerge. This is because the complete or selective solubilization of wood offers tremendous new opportunities to fractionation of its components, its reactive chemical & biochemical modification, as well as its processing. The large variety of research opportunities, challenges and application areas created by this discovery, inherently imply that a focused research program needs to be created with excellent collaborative links.

Finnish host organisation: University of Helsinki, Department of Chemistry. The department is a community of 300 teachers and researchers. The department of chemistry hosts several graduate schools, and participates in several national and international centers of excellence.

Finnish project leaders: Professor Markku Räsänen, [markku.rasanen@helsinki.fi](mailto:markku.rasanen@helsinki.fi), tel. +358 9 1915 0281 and Professor Ilkka Kilpeläinen, [ilkka.kilpelainen@helsinki.fi](mailto:ilkka.kilpelainen@helsinki.fi), tel. +358 9 1915 0359

## **Erik Aurell**

KTH Royal Institute of Technology, Sweden

Prof. Aurell's research interests concern the relationship between physical, computational and biological systems, especially systems biology and distributed communication systems.

Research project: The advanced concepts and techniques developed in the field of statistical physics have in recent years been turned into powerful tools for the modelling and analysis of large, distributed systems also outside of the traditional domains of physics, for example in the study of information and communication networks and the models of systems biology. The research project brings together top researchers and research units to advance this fertile and highly active area spanning computer science, physics and computational aspects of biology.

Finnish contact person and host organisation: Professor Pekka Orponen, Helsinki University of Technology

## **Amir Averbuch**

School of Computer Science, Tel Aviv University, Israel

Research project: The MIPCOM project will establish a research team led by Professor Averbuch at the Department of Mathematical Information Technology at the University of Jyväskylä. The aim is to develop and apply for industrial-use stable methods for data mining, processing of multiple data and results visualisation. The project will span five years.

Finnish host: University of Jyväskylä, Tapani Ristaniemi

## **Jan Blommaert**

University of London (UK)

Professor Jan Blommaert is an internationally recognised scholar of sociolinguistics, discourse analysis, linguistic anthropology and ethnography, focusing particularly on multilingualism. His research has introduced new perspectives to understanding multilingualism in ways that exude both theoretic innovativeness and social relevance.

Research project: The project will address language diversity and multilingualism in Finnish society on both the micro and macro level of social practices and processes. The study of the micro level involves, for instance, an analysis of the ways in which language users employ multilingual resources (including new technologies) in their ever-day lives and social functions. On the macro level, the research focuses on the functioning of multilingualism in society and language ideologies, and considers its implications for language, education and immigration policies. Finnish project leader and organisation: Professor Sirpa Leppänen, University of Jyväskylä, tel. +358 14 260 1210, sleppane@cc.jyu.fi.

## Venkatachalam Chandrasekaran

Colorado State University, USA

Prof. V. Chandrasekar is a Professor at Colorado State University where he has been conducting research on remote sensing for over 28 years. He serves as the Deputy Director and director for research of the US National Science Foundation - Engineering Research Center, Center for Collaborative Adaptive Sensing of the Atmosphere, which is a multi-university industry and government consortium. He has received numerous awards for his pioneering contributions in the area of "Polarimetric Radar Observations of the Atmosphere";

**Research project:** Development of novel ground and space based environmental remote sensing systems and technologies

The project is focusing on development of new ground and space based environmental monitoring methods and technologies. One of the main objectives of the appointment is to establish a world-class radar technology and application group in Finland. The appointment of Prof. Chandrasekar strengthens capabilities of University of Helsinki, Finnish Meteorological Institute and Aalto University in radar technology and weather radar related applications. It will reinforce collaboration between the institutes, universities and industry, and advance international recognition of Finnish research and industry partners. The project is closely linked to energy and environment strategic centre for science, technology and innovation CLEEN Ltd's program area. Prof. V. Chandrasekar will conduct research at Finnish Meteorological Institute and University of Helsinki, Department of Physics. The project will be carried out in a close collaboration with Aalto University School of Science and Technology, Department of Radio Science and Engineering,

**Contact person and host organisation:** Finnish Meteorological Institute, Professor Jarkko Koskinen, Tel. +358-9-19294174, email. jarkko.koskinen(at)fmi.fi

## **Hsiu-Hsi Chen**

National Taiwan University (Taiwan)

Professor Tony Hsiu-Hsi Chen has significantly contributed to the development of novel methodological approaches for evaluation of cancer screening and is an internationally esteemed scholar in his field.

Research project: The research project is concerned to develop the evaluation of cancer screenings. The research aims to combine world-class screening data with cutting-edge methodological expertise to create a unique research environment for research excellence. Finland is a leading country in cancer screening. Nationwide mass screening programmes for cervical and breast cancer have been running for decades and produced unique data. Finnish project leader and organisation: Professor Anssi Auvinen, University of Tampere, tel. +358 3 3551 6883, [anssi.auvinen@uta.fi](mailto:anssi.auvinen@uta.fi).

## **Elizabeth Couper-Kuhlen**

University of Potsdam, Germany

Prof. Couper-Kuhlen is an internationally highly accomplished researcher and a leading figure in interactional linguistics and the study of prosody, whose work is foundational to the study of clause combining in interaction.

Research project: The FiDiPro research project combines the research traditions of interactional linguistics, functional-typological linguistics and cognitive linguistics. The project focuses on the syntax and pragmatics of clause combining in written and spoken language. The goal is to better understand the linkages between the form of the clause and the actions that it performs in the situation of language use in both conversation and written text.

Finnish contact person and host organisation: Professor Ritva Laury, University of Helsinki

## **Anthony DeArdo**

University of Pittsburgh, USA

Professor Anthony J DeArdo is the head of the Basic Metal Processing Research Institute (BAMBRI) of the Department of Mechanical Engineering and Materials Science of the University of Pittsburgh. Professor DeArdo has more than 30 years of experience in the development of steels. His FiDiPro professorship will add considerably to the expertise of the new Centre for Advanced Steel Research of the University of Oulu.

Research project: The steel research programme aims to strengthen and coordinated research, teaching and post-graduate studies in steels. Another aim is to develop stronger, tailored steels. Studying and understanding the connections between steel microstructures and qualities and the controlled production of microstructures using process technologies will promote the steel industry's competitiveness and success into the future.

Finnish host: University of Oulu, Centre for Advanced Steels Research, Professor Pentti Karjalainen, pentti.karjalainen(at)oulu.fi

## **Kalyanmoy Deb**

Indian Institute of Technology, Kanpur (India)

Professor Kalyanmoy Deb is an internationally renowned and recognised scholar in the field of evolutionary computing. He has actively collaborated with a number of Indian and foreign companies on research projects on modelling and optimisation of practical problems. He has authored two popular textbooks on optimisation and written more than 175 international journal and conference papers.

Research project: In the age of globalisation and competitiveness, problems in business as well as in engineering must be solved keeping in mind one or more goals or objectives. In most such scenarios, the underlying problem can be formulated as a multi-criterion optimisation and decision-making problem. The research project shall systematically develop hybrid evolutionary-cum-classical optimisation and decision-making tools so that the overall task is performed reliably and in a most satisfactory manner.

Finnish project leader and organisation: Professor Jyrki Wallenius, Aalto University School of Economics

## **Edward Delp**

Purdue University (USA)

Professor Edward Delp is internationally considered a forefront scholar in multimedia signal processing research. His extensive research field covers, for instance, image and video compression, image processing and multimedia security.

Research project: The goal of the project is gain significant advances in image and video/audio indexing and retrieval, scalable image and video compression and multimedia security. Particular focus is also on next generation mobile applications.

Finnish project leader and organisation: Professor Jaakko Astola, Tampere University of Technology, tel. +358 3 3115 2923, jaakko.astola@tut.fi.

## **Jacek Dobaczewski**

Institute of Theoretical Physics, University of Warsaw (Poland)

Professor Jacek Dobaczewski is characterised as a world-leading nuclear structure theorist.

Research project: The main goal of the project is to search for a universal description of nuclear properties in nuclei far from stability, focusing on systematic features of ground and low-lying excited states that differentiate between well- and weakly-bound nuclear systems. Finnish project leader and organisation: Professor Juha Äystö, University of Jyväskylä, tel. +358 14 260 2424, juha.aysto@phys.jyu.fi.

## **Bogdan Dumitrescu**

Politehnica University of Bucharest, Romania

Dr. Bogdan Dumitrescu has a broad knowledge of convex optimization techniques, with application to signal processing problems like filter, filter bank and wavelet design.

FiDiPro project: Convex optimization in audio and image processing. Convex optimization theory is now a mature field, but only in the last decade it has enjoyed the development of reliable computation methods, especially for classes of problems like semidefinite programming. Signal processing tends to become one of the main beneficiaries of these methods and researchers try to identify convexity in existing or new optimization problems. The current project aims to adapt convex optimization tools for obtaining efficient and nearly optimal solutions to problems belonging to the following topics: oversampled filter banks, sparse representations, multidimensional systems analysis and synthesis. It is desired to obtain theoretical advances leading to publication of articles in top research journals and algorithmic advances, improving on current solutions in terms of quality and computing performance. The main applicative goals are: Algorithms for the flexible design of filter banks for audio processing that ensure high quality of subband processing tasks like noise suppression and audio enhancement; Design of sparse representation algorithms and associated overcomplete dictionaries, for audio and image coding; Methods for designing 2-D filter banks and wavelets, for image processing operations like denoising.

Finnish host organisation: Tampere University of Technology, Center for Signal Processing, professori Jaakko Astola

## **Atef Z. Elsherbeni**

University of Mississippi, United States

FiDiPro project: "Applied Electromagnetic Systems for Advances Future Wireless Electronics". In the future, wireless features is expected in many products such as intelligent packages, house hold guidance and in several medical applications. However, the wireless part of the product is not allowed to be big and dominating thus further miniaturization is required. At the same time the requirements of low cost and high volume is strong. Practically this can be satisfied only with new methods of manufacturing such as printable electronics. The final goal of the FiDiPro project is to have tools and applicable results of electromagnetic behaviour of new production materials for miniaturized low power high efficiency wireless sensors and systems. Finally the results of research work will be demonstrated in real products.

Finnish host: Tampere University of Technology, Department of Electronics, Ph.D., Professor Lauri Sydänheimo

## **Ari T. Friberg**

Royal Institute of Technology (Sweden)

Professor Ari T. Friberg is reviewed as being among the one per cent of top scientists in the world in the fields of optics and photonics. He is an internationally highly recognised scholar with an extensive and varied list of publications.

Research project: The project's main research field is optical physics. Advancements in optics and photonics are key drivers for technological innovations of the 21st century. In particular optical phenomena, components and devices in micro- and nano-scale dimensions will play an ever more important role. One of the goals is to make Finland stand as one of the leading centres of micro- and nano-optics research in Northern Europe. The research project is run jointly by the University of Joensuu and Helsinki University of Technology.

Finnish project leader and organisation: Academy Professor Jari Turunen, University of Joensuu, tel. +358 13 251 3209, jari.turunen@joensuu.fi and Professor Matti Kaivola, Helsinki University of technology, tel. +358 9 451 3151, matti.kaivola@hut.fi.

## **Stephan Fritzsche**

Gesellschaft für Schwerionenforschung (GSI), Germany

Prof. Fritzsche is an internationally leading expert in the field of atomic and molecular structure theory, and especially, for modelling inner-shell phenomena.

Research project: The FiDiPro project belongs to an international, rapidly developing field of synchrotron radiation and free-electron laser excited atomic, molecular and cluster physics. The research is concerned to develop, for instance, new theoretical tools for describing and analysing resonant electron emission. The research is closely linked to the development of new spectroscopic instruments and technologies.

Finnish contact person and host organisation: Professor Helena Aksela, University of Oulu

## **Robert Fullér**

Eötvös Lorand University, Hungary

Acclaimed Hungarian mathematician Robert Fullér will be working in the Soft Computing Research team at the Institute of Advanced Management Systems Research (IAMSR) of Åbo Akademi University. Professor Fullér comes from Eötvös Lorand University, Budapest.

Research project: The project headed by Professor Fullér seeks to strengthen research into fuzzy optimisation and fuzzy ontology. Fuzzy optimisation and ontology can be used to solve complex industrial problems related to activities such as logistics and exploration for market information or other relevant information to support decision-making.

Finnish host: Åbo Akademi University, Institute for Advanced Management Systems Research, Professor Christer Carlsson, phone: +358 2 215 4196, [christer.carlsson@abo.fi](mailto:christer.carlsson@abo.fi)

## **Robert Benny Gerber**

University of California, Irvine, USA

Professor Robert Gerber (b. 1944) is one of the pioneers in the field of quantum dynamics simulations of molecular processes. His expertise is in the field of time-dependent quantum mechanical simulations of chemical reactions and molecular processes.

**Research project:** The main research objectives of the project are water complexes of atmospheric interest, new directions in noble-gas chemistry, ices and chemical reactions on ice surfaces and in ice media, and conformational transition dynamics of biological molecules. Computational chemistry combined with spectroscopic studies is an excellent tool to investigate energetics and reactivity of water complexes. The project will study the stability of novel noble-gas compounds experimentally and theoretically, with emphasis on the temperature effects on their lifetimes.

**Finnish host and university:** Professor Lauri Halonen, Finnish Centre of Excellence in Computational Molecular Science, University of Helsinki, tel. +358 9 1915 0280, lauri.halonen(at)helsinki.fi

## **Scott F. Gilbert**

Swarthmore College, USA

Prof. Gilbert was one of the first scientists to point out how the advances in developmental genetics enable the linking of evolution and development, an emerging field that is now known as evolutionary developmental biology. He is now one of the leading authorities in bioethics and practices related to the use of experimental animals, stem cells and cloning.

Research project: The current research of Prof. Gilbert focuses on the development and evolution of turtles, and his research is helping to make turtles one of the new key models in evolutionary developmental biology. The FiDiPro research project will explore the extent to which turtle shells share developmental genetic programmes associated with other vertebrate structures and test whether the diversity of the turtle shell may stem from similar developmental mechanisms as the diversity of organs such as hairs, scales and teeth. Concomitantly, the research should help to uncover why specific molecular pathways appear to be involved in diseases and regeneration related to bones and epithelial organs.

Finnish contact person and host organisation: Professor Mart Saarma, Institute of Biotechnology/Biomedicum Helsinki, University of Helsinki

## Gregorz Glinka

University of Waterloo, Canada

**Project:** A universal fatigue crack growth model for high strength steel

Analytical and numerical studies necessary for the determination of required data influencing the fatigue crack growth under a variety of combinations of the maximum stress intensity factor,  $K_{max}$ , and the stress intensity range,  $\Delta K$ . The two parameter crack growth model will be used for predicting the fatigue crack growth rate induced by variable amplitude cyclic loading and welding residual stresses. The intention is to account for both the effective stress intensity range and the effective maximum stress intensity factor. Such an approach will require of elasto-plastic analysis of stresses and strains near the crack tip and calculation of stress intensity factors including the effect of highly non-linear internal stresses. The development of theoretical basis and validation of the proposed methodology will be the main theme of the project.

**Contact person and host organisation:** Aalto University School of Science and Technology, Department of Applied Mechanics, Professor Gary Marquis, website: <http://appmech.tkk.fi/en/>

## **Jussi Hanhimäki**

Graduate Institute of International Studies, Geneva (Switzerland)

Professor Jussi Hanhimäki is very well known and esteemed in the international scientific community as a scholar of history and international relations. He is particularly merited in research into the cold war and its transatlantic dimension.

Research project: The project explores the constant fluctuation between cooperation and conflict characterising transatlantic relations for decades before 9/11. The overall objective is to contribute to our understanding of the past, present and future of transatlantic relations.

Finnish project leader and organisation: Academy Professor Marjatta Hietala, University of Tampere, tel. +358 3 3551 6539 or +358 50 562 0839, marjatta.hietala@uta.fi.

## **Adriaan van Heiningen**

University of Maine, USA

Dr. Adriaan van Heiningen is Professor of Chemical Engineering at University of Maine. He got his B.Sc. and M.Sc. degrees in chemistry and chemical engineering from State University of Groningen in Netherlands. He worked several years as a Group Leader in the Dutch Norit Research before moving to Canada where he got his Ph.D. degree in chemical engineering from McGill University in Montreal in 1982. Dr. van Heiningen worked many years as a scientist in The Pulp and Paper Research Institute of Canada (Paprican) and as a teacher in McGill University. In 1991 he was nominated as the Professor in Chemical Engineering at Canadian University of New Brunswick. Since 1999 he has held his current position at University of Maine. Through his long career Professor van Heiningen has created an exceptionally broad, internationally acknowledged expertise in the areas of chemical engineering, pulp and paper technology and energy production.

Project: "Innovative Forest Products Biorefinery 2007-2011". Research targets are at conversion of existing kraft pulp mills into integrated forest products biorefineries that produce, in addition to tailored cellulose pulps and energy, liquid transportation fuels and monomers for green polymer industry. The new products will raise the profitability of pulp mills. Tailoring of cellulose pulps will make it possible to produce lighter paper and board products which will increase the competitiveness of paper industry. The research will be carried out in collaboration between Helsinki University of Technology and University of Maine.

Finnish host organisation: Helsinki University of Technology. Professor van Heiningen's research at Helsinki University of Technology (TKK) will include collaboration between the Departments of Chemical Technology, Forest Products Technology and Mechanical Engineering. In addition he will collaborate with VTT and other institutes in Finland. Helsinki University of Technology, Finnish Pulp and Paper Research Institute (KCL) and VTT Technical Research Centre of Finland form together world's most comprehensive education and research centre in forest products technology. This centre has played a key role in the global success story of Finnish forest cluster industries.

Finnish project leader: Professor Tapani Vuorinen, Head of Department, Helsinki University of Technology (TKK), [tapani.vuorinen@tkk.fi](mailto:tapani.vuorinen@tkk.fi), phone +358 9 451 4236

## **Thomas Heinze**

Friedrich Schiller University of Jena (JU), Germany

Professor Heinze has extensive knowledge about polysaccharides, specially in the area of cellulose and its derivatives.

FiDiPro project: Polysaccharide-Based Biomaterials. This project will produce new advanced knowledge overcoming the challenges of creation of tailored biopolymers to design a broad collection of high-added value biomaterials. Project is expected to have significant results in creation of new concepts for high-added value materials based on biomass, allowing development of new innovative products suitable for various value chains. The main challenge is to connect the functionalisation strategy of the biopolymers with the tailored assembly of materials at the nanoscale and also with the creation of stimuli-responsive properties, such as specific response to light and chemicals. Project will advance education of scientists with a new expertise combining tailoring of biomass based materials at the molecular level to achieve macroscopic multi-functional properties.

Finnish host organisation: Åbo Akademi, Laboratory of Fibre and Cellulose Technology, professor Pedro Fardim

## **Rikard Holmdahl**

Medical Inflammation Research Lab, Lund (Sweden)

Professor Rikard Holmdahl's research has advanced understanding of complex diseases, such as rheumatoid arthritis and multiple sclerosis. In his research, Holmdahl has applied a groundbreaking combination of animal models and genetics.

Research project: Chronic inflammatory and autoimmune diseases such as rheumatoid arthritis, multiple sclerosis and systemic lupus erythematosus are diseases for which the scientific community has limited information concerning their pathogenesis. We also lack treatment that can prevent or revert the disease course. Mechanisms leading to destructive inflammation are to a large extent shared between these diseases. The project will use well-characterised animal models for inflammatory disease and powerful genetic tools to identify polymorphic genes selected by nature to control these pathways. The project will also involve in-depth studies on immune recognition and stability of target tissue and the fundamental mechanisms of interactions between inflammatory cells and the target tissue.

Finnish project leader and organisation: Professor Sirpa Jalkanen, University of Turku, tel. +358 2 333 7007, [sirjal@utu.fi](mailto:sirjal@utu.fi).

## **Seppo Honkanen**

University of Arizona, USA

Education: PhD (Helsinki Univ. of Technology, 1988). Since 1995 Honkanen has been with the world-renowned College of Optical Sciences in Tucson, Arizona. He has also served as a Vice President at NP Photonics, an Arizona based fiber optics Company which he co-founded in 1998. Before moving to Arizona, Honkanen led the development of photonic devices at Nokia Research Center.

Project: "Photonic Integrated Circuits by Heterogeneous Integration for Telecommunication and Sensor Applications 2007-2011". The main goal of this project is to build a world-class research program on Photonic Integrated Circuits at Micronova. In particular, novel schemes will be developed to integrate photonic components based on different material systems. An additional key goal of this project is to form strong partnerships with Finnish companies and foreign universities and research institutes. It is expected that this project will result in a new class of integrated photonic "chips", in which the advantages of different material systems will complement each other. These devices will have potential for greatly improved performance and reduced cost. They have a wide variety of applications, for example in the field of biosensors and in optical communications. Honkanen will also train several graduate students who will write their PhD dissertations based on their new results achieved in this project.

Finnish host organisation: Helsinki University of Technology, Micro and nanosciences, Micronova. Micronova is the leading research centre for micro and nanotechnology in Finland. Micronova is jointly run by VTT Technical Research Centre in Finland and Helsinki University of Technology, TKK. Over 300 researchers from VTT, TKK and several companies work there.

Finnish project leader: Professor Harri Lipsanen, harri.lipsanen@tkk.fi, tel. +358 9 451 3123

## **Dan Hultmark**

Umeå Centre for Molecular Pathogenesis, Sweden

Prof. Hultmark is a world leader in the field of *Drosophila* immunity and a top expert in fly genetics. Recently, Hultmark has in his studies focused on the cell-based immune response and described signalling pathways that activate hemocytes.

Research project: Infectious diseases are still the leading cause of death among young children worldwide, and the malfunctioning immune system can cause severe damage to the target tissue. Therefore it is necessary to develop new innovative ways to study immune response. The specific aim of the FiDiPro research project is to identify new genes involved in innate immune signalling. The fruit fly *Drosophila melanogaster* is used as an efficient system to identify novel genes involved in immune response.

Finnish contact person and host organisation: Professor Olli Silvennoinen, Institute of Medical Technology, University of Tampere

## **Tadeusz Iwaniec**

Syracuse University, USA

Prof. Tadeusz Iwaniec is a world-class mathematician and a driving force behind major recent developments in geometric analysis and non-linear elliptic partial differential equations with their many applications.

Research project: The research project focuses on mathematical analysis and its applications in mathematical physics and biology. Prof. Iwaniec's work can be applied in mathematical models in material science, impedance tomography and mathematical theory of statistical physics, for instance. All these will also be topics of the FiDiPro research project.

Finnish contact person and host organisation: Academy Professor Kari Astala, Finnish Centre of Excellence in Analysis and Dynamics Research, University of Helsinki

## **Ghassan Jabbour**

Arizona State University (USA)

Professor Ghassan Jabbour is one of the most visible and most frequently cited scholars in his field and regarded as a highly innovative scientist.

Research project: The research project is concerned to develop low-cost organic and hybrid devices for a wide range of applications. The devices can be used to produce flexible nanothick electronics, optoelectronics and sensors. Finnish project leader and organisation: Professor Risto Myllylä, University of Oulu, tel. +358 8 553 2671, risto.myllyla@ee.oulu.fi.

## **Antti-Pekka Jauho**

Technical University of Denmark (Denmark)

Professor Antti-Pekka Jauho is characterised as a scholar who tackles a broad range of issues, able to work in a number of topical and complementary fields of research. His particular approach is considered original and creative, and he is also very productive.

Research project: The project, which belongs to the field of computational nanotechnology, is concerned to study nanometre-scale processing and synthesis that open new possibilities for electronics components and devices. New, functional materials can be applied not only as more efficient and versatile processing and memory circuits but also as various kinds of sensors and actuators. Finnish project leader and organisation: Academy Professor Risto Nieminen, Helsinki University of Technology, tel. +358 50 3500 900, risto.nieminen@hut.fi.

## **Sirkka Järvenpää**

University of Texas at Austin, USA

The Corinna project headed by Professor Järvenpää will intensify the competence in the SimLab business networks and the exploitation of related information technology.

Research project: The project will develop the Virtual Value Space (VVS) concept to promote expertise in joint innovations made between companies. Furthermore, the project will empirically study immaterial rights in joint innovation processes. As a result it will generate new scientific data for the organisation and management of joint innovations. Professor Järvenpää is an expert in global virtual teams and group functioning.

Finnish host: Helsinki University of Technology, Riitta Smeds, riitta.smeds@tkk.fi

## **Professori Laurie S Kaguni**

Michigan State University, USA

Professor Laurie S. Kaguni is internationally recognised for her expertise in the structural and mechanistic biochemistry of mitochondrial DNA replication. She is particularly interested in investigating the molecular mechanisms that relate to the replication and expression of mitochondrial DNA genome and their regulation. The research combines biochemical and molecular genetics methods.

**Research project:** The project will analyse how the genes carried in mitochondrial DNA affect the disease-like characteristics of fruit fly mutants that are so-called models for human mitochondrial diseases. Such diseases include diverse and relatively rare neurological syndromes but also many cases of common conditions such as diabetes, Parkinson's disease, deafness and epilepsy. The project works to identify new genetic determinants and drug targets for understanding and treating mitochondrial diseases in humans.

**Finnish host and university:** Academy Professor Howard Jacobs, Finnish Centre of Excellence in Research on Mitochondrial Disease and Ageing, University of Tampere, tel. +358 3 3551 7731, [howard.t.jacobs@uta.fi](mailto:howard.t.jacobs@uta.fi)

## **Stuart Alan Kauffman**

University of Calgary, Canada

FiDiPro project: "Modelling and Reverse Engineering of Delayed Stochastic Models of Genetic Regulatory Networks" The subject of the FiDiPro research project is the development of delayed stochastic models of genetic regulatory networks. The project focuses on modelling the dynamics of genetic regulatory networks based on gene expression data at the single molecule level.

The expertise of Professor Kauffman in the fields of theoretical biology, complexity and systems biology and the competence of the research group led by Professor Olli Yli-Harja serve each other very well. The research results are expected to enhance our understanding of gene networks dynamics including in the case of diseases, namely cancer. The results can be utilised to better understand the appearance of cancer, its progression and predicting the effects of differentiation therapy on patients. The long term goal is the development of personalized medicine, where doctors can choose the best treatment for each patient.

Finnish host: Tampere University of Technology, Department of Signal Processing, Ph.D., Professor Olli Yli-Harja

## **János Kertész**

Budapest University of Technology and Economics, Hungary

Professor János Kertész is a worldwide renowned expert in complex systems. He has been active in many fields of statistical physics and its applications.

FiDiPro project: COSYR. The aim of the project is to carry out research on complex systems especially techno-social and ICT-based ones, as well as to strengthen the expertise and its training in this respect. Using data mining, data analysis, and modelling techniques and tools the plan is to explore the properties of these techno-social network systems for novel application development. The focus will be on problems like community formation and identification, relation between link weights, network structure and functionality, evolution of networks, and the role of time scales. Specifically the plan is to investigate networks of communication technology and social ICT-based nets and their collective behaviour. The research results are expected to contribute to the understanding of complex networks and lead to several practical applications related to the well-being of the society by optimising communication networks, introducing information spreading strategies, managing risk or other related aspects of community or civil design, and by developing computational analysis and modelling tools for the use of policy makers and technology developers to harness social ICT and collective behaviour in them. In this, training researchers and experts is an important part of the project.

Finnish host organisation: Helsinki University of Technology (Aalto University), Centre of Excellence in Computational Complex Systems Research - COSY, Department of Biomedical Engineering and Computational Science - BECS, Professor Kimmo Kaski

## **Peter Kivisto**

Augustana College, USA

Prof. Kivisto is a theorist and historical sociologist. A particular focus of his research has been on multiculturalism and, in recent years, also on dual citizenship. In his studies, he seeks to draft a theory of multicultural incorporation that is founded on a substantial empirical base derived from a comparative examination of a number of liberal democratic societies in a historical perspective.

Research project: The FiDiPro research project will call for further theoretical refinement, linking the significance of transnationalism and citizenship to multiculturalism. The project is primarily sociological, focusing on developments in advanced industrialised nations during the past 25 years. It is framed historically, compared and contrasted with the major migration waves of the later 19th and early 20th centuries.

Finnish contact person and host organisation: Professor Auvo Kostianen, University of Turku

## **Jonathan K.C. Knowles**

Head of Group Research, F. Hoffmann-La Roche Ltd., Basel, Switzerland

Professor Knowles is a pioneer of personalized medicine and has over 20 years of experience at the senior executive level in the global pharmaceutical and biotech industry.

FiDiPro project: Translational research and personalized medicine. Professor Knowles' project aims to facilitate the translation of biomedical research discoveries towards clinical and industrial applications as well as the adaptation of personalized medicine. Personalized medicine refers to the selection and optimization of therapies according to the patient's genotype and the molecular characteristics of disease. This project aims to demonstrate how new and emerging technologies could already be applied in helping treatment decisions in oncology. Eventually personalized medicine could improve the efficacy of health care processes as well as generate new business opportunities. The project also aims to leverage the expertise and networks of professor Jonathan Knowles. To this end a forum of translational researchers and industry will be established, bringing together representatives from universities, sector research institutes, industry, public health care providers and government authorities.

Finnish host organization: University of Helsinki, Institute for Molecular Medicine Finland FIMM, director, professor Olli Kallioniemi

## Vassilis Kostakos

University of Madeira, Portugal

Vassilis Kostakos is an Assistant Professor in the Madeira Interactive Technologies Institute at the University of Madeira, and holds an adjunct faculty appointment at Carnegie Mellon University. His Ubiquitous Computing research focuses on making interactive technology smarter, easier and safer to use, and developing novel sensing techniques for urban transport, and modelling of city-scale mobility.

**Project:** Urban Flows and Networks

The objective of this project is to utilize the data produced by Oulu's UPI (Urban Pervasive Infrastructure) and other sources for modeling and exploiting urban flows and networks. This data captures a rich subset of the everyday life and activities taking place in the City of Oulu. As interactive communication technologies play an increasing role in our everyday lives, the infrastructure that supports these activities can be an important source of understanding the type, frequency and characteristics of citizen's activities. Crucially, a characteristic of these technologies is mobility, and increasingly mobility has become an important aspect of technology usage and user needs. Hence, this project considers capturing and analysing various types of flows and networks of everyday life in the City of Oulu. By capturing and analysing these flows and networks, our project will develop services that better fulfill Oulu's stakeholders'.

**Contact person and host organisation:** University of Oulu, Media Team Oulu, Professor Timo Ojala, website: <http://www.mediateam oulu.fi/?lang=en>

## **Stefan Kurz**

Germany

Professor Stefan Kurz has made significant contributions in developing the classical electromagnetic theory to meet better the new needs of engineering.

FiDiPro project: Advanced Electromagnetic Modeling and Simulation for Engineering  
The 20th century mathematics yields a new interpretation into classical fields of physics, such as electromagnetism, and suggests new engineering practices that are not easily recognized by the traditional view. The project starts from this mathematics and builds a bridge into electrical engineering and electromagnetic design and vice versa in order to improve methods and approaches employed in electromagnetic design. Together with software vendors and industrial end users we focus on developing software systems for the upcoming needs.

Finnish host organisation: Tampere University of Technology, Electromagnetics, professor Lauri Kettunen

## Yong-Hwan Lee

Seoul National University, South Korea

Professor Yong-Hwan Lee (b. 1961) has developed a comparative fungal genomics platform in South Korea and also established extensive international networks. He combines systems biology and advanced bioinformatics methods in fungal genomics research in a unique way. Professor Lee is one of the world-leading scientists in his field.

**Research project:** Fungi associated with plants and forest trees play a fundamental role in the health of cultivated crops and boreal forests, affecting their vitality and productivity. Many of these fungi cause diseases to plants and forest trees, while others prevent diseases or enhance plant growth. Some fungi produce toxins dangerous to humans and domestic animals or spoil products in storage, while others (saprotrophs) cause problems by decaying construction wood and causing dry rot in buildings. However, fungi are also necessary as saprophytes for decaying organic matter and mineralisation of nutrients, and they play a key role in carbon cycling in nature. Comparisons at genomic and gene expression levels between three contrasting plant-fungus situations will help improve our understanding of key elements in the interactions and the evolution of these various forms. The project aims to develop a strong platform of theoretical expertise in fungal pathogenomics. The project combines two large areas of research: comparative fungal genomics and comparative pathobiology.

**Finnish host and university:** Professor Fred Asiegbu, Department of Forest Ecology, University of Helsinki, tel. +358 9 1915 8109, fred.asiegbu(at)helsinki.fi and Academy Professor Jari Valkonen, Department of Agricultural Sciences, University of Helsinki, tel. +358 9 1915 8387, jari.valkonen(at)helsinki.fi

## **Kalle Levon**

New York University, USA

Kalle Levon is Professor of Chemistry at New York University in the USA, specializing in electrochemical methods in diagnostics.

FiDiPro project: Health care diagnostics using chemical sensors. The purpose of the project is to develop a novel, easy-to-use and economical device for genetic diagnostics. The method is an immunoassay to detect single disease in point-of-care formats. The device is a microfluidic chip, and the method is based on potentiometric monitoring of DNA hybridization. Potentiometry is a technique that offers a unique economical and easy-to-use approach with simple instrumentation. One of the practical applications is directed towards the validation of PCR amplification step in the detection of genetic alterations.

Finnish host: Åbo Akademi University, Process Chemistry Centre, Laboratory of Analytical Chemistry, Professor Ari Ivaska

## **Fa-Hsuan Lin**

Institute of Biomedical Engineering, National Taiwan University, Taiwan ja Harvard Medical School, Boston, USA

Dr. Fa-Hsuan Lin has worked in the leading research institute in Boston, where he has developed MRI theories successfully.

FiDiPro project: The project will develop methods for ultra-low-field MRI (Magnetic Resonance Imaging ) in order to improve MR image resolution and shorten the measurement time to reach a level that will benefit brain research and allow new clinical applications. The device will allow one to measure the structure of the brain and cerebral activity virtually at the same time. The project will optimize existing methods for low-field applications such as massively parallel measurement and so-called compressed sensing and new methods, e.g., based on the use of a priori information will be developed. The project exploits and links to the ongoing major EU-funded project coordinated by the Department of Biomedical Engineering and Computational Science of the Helsinki University of Technology where a new kind of ultra-low-field MRI and a whole-head MEG-MRI device will be developed.

Finnish host organisation: Helsinki University of Technology, Department of Biomedical Engineering and Computational Science, professor Risto Ilmoniemi

## **Tadashi Matsumoto**

Japan Advanced Institute of Science and Technology, Japan

Professor Tadashi Matsumoto comes from the Japan Advanced Institute of Science and Technology. He has made a long career in Japan's leading telecommunications company NTT DoCoMo and holds more than 50 patents in wireless communications. Professor Matsumoto will work in the Centre for Wireless Communications at the University of Oulu.

Research project: The research project is on the development of distributed communications networks. The aim is to develop information flow models to utilise the transport capacities of telecommunications networks more efficiently. Professor Matsumoto is one of the leading researchers in wireless communications in the world and therefore an important expert in a field that is still lacking top Finnish expertise.

Finnish host: University of Oulu, Centre for Wireless Communications, Professor Pentti Leppänen, phone +358 400 586 489, pentti.leppanen(at)ee.oulu.fi

## **Professori Ralf Metzler**

Technical University of Munich, Germany

Professor Ralf Metzler's has a strong interdisciplinary approach in his research, combined with theoretical know-how. In his work, he combines the concepts and methods of physics in order to investigate key research questions of biological systems, such as the dynamics and functions of biomolecular systems in gene regulation.

**Research project:** The project will focus efforts to unravel questions related to the dynamics and functions of crowded cells. Particular attention is paid to gene regulations, translocation phenomena across cell membranes, and diffusion of biomolecular complexes as they are central to the functions of biological cells. The research will provide a better understanding of the underlying principles by which cellular dynamics takes place under crowded conditions. The scientific breakthroughs will pave way to biotechnological innovations in, for example, drug and gene delivery, design of new drugs and antibodies, and development of treatment for diseases related to perturbations in the genetic code.

**Finnish host and university:** Professor Ilpo Vattulainen, Department of Physics, Tampere University of Technology, tel. +358 400 510 592, [ilpo.vattulainen@tut.fi](mailto:ilpo.vattulainen@tut.fi)

## **Mark Nuttall**

University of Alberta (Canada)

Professor Mark Nuttall is regarded as an internationally leading scholar in the field of arctic social sciences and interdisciplinary research.

Research project: The focus of the project is on human-environment interactions, especially from the perspective of natural resource use and climate change. The project investigates how Northern communities cope or adapt to changes in the environment. A goal is to develop an innovative perspective to the assessment of human-environment interaction in the North.

Finnish project leader and organisation: Director, Docent Kari Laine, Thule Institute, University of Oulu, tel. +358 8 553 3550, kari.laine@oulu.fi.

## Juni Palmgren

Stockholm University & Karolinska Institutet, Sweden

Professor Juni Palmgren (b. 1949) has in-depth knowledge of statistical epidemiology and statistical genetics. She is an internationally recognised leading figure in promoting biostatistics at the intersection of mathematics, statistics and medicine. She has an extensive research profile that covers modelling and medical computing. Professor Palmgren is also chair of the Swedish Research Council eScience sub-committee and works actively for the promotion of Nordic research infrastructures.

**Research project:** For the first time in medical history, the technical prerequisites exist for merging cascades of molecular data from biological samples with clinical and epidemiological information on lifestyle, disease and health. Over the coming years, new insights will be gained into the complex multifactorial mechanisms underlying human health, with consequences for prevention, early detection, treatment and cure. The FiDiPro Professorship affiliation with the Institute for Molecular Medicine Finland will add expertise in epidemiology and biostatistics to the Institute's major research themes (human genomics, medical systems biology, and translational research).

**Finnish host and university:** Professor Jaakko Kaprio, Institute for Molecular Medicine Finland, University of Helsinki, tel. +358 9 191 27595, jaakko.kaprio(at)helsinki.fi

## Jacques Periaux

UPC/CIMNE, Barcelona, Spain

Professor Jacques Periaux received his PhD degree on numerical analysis at the University of Paris 6 in 1979. His main fields of interest are numerical solution of non-linear partial differential equations in computational fluid dynamics and electromagnetics, aerodynamic design of manned/unmanned aircraft vehicles, multidisciplinary design optimization, evolutionary algorithms, and game theory.

Project: "Advanced Methods in Multidisciplinary Industrial Simulation and Design 2007-2010". The aim of this project is a network that collects national and international know-how of multidisciplinary computational simulation and model-based optimization. The project offers to the industry a possibility to learn new methods and compare different approaches before constructing their own productive simulation models. The activity of the network will be supported by series of seminars analyzing modeling process multidisciplinary, database of test problems and methods with relating seminars and courses, theme days directed to the industry and long-lasting familiarization programme. The most concrete product of the project will be a network environment in which is collected test problems of multidisciplinary simulation, simulation software and optimization tools suitable for multi-objective design. The environment offers a test and marketing forum for developers of the methods and a schooling and comparison environment for utilizers. Together with educational meetings and seminars, the network environment supports networking of modeling experts in industry and raises the level of knowledge. Finnish host organisation: The Department of Mathematical Information Technology of the University of Jyväskylä and its predecessor, the group of scientific computing, has studied application-oriented research in numerical modeling and simulation since the beginning of 1980's. The core of strategy is connecting strong basic research to diversified collaboration with application fields targeting to projects with enterprises. International publication and conference activities and other networking are active. The results of the group are applied in industry on several strategic fields (paper industry, metal industry). The group has also produced spin off companies.

Finnish project leader: Professor Pekka Neittaanmäki, tel. +358 14 260 2733, pn@mit.jyu.fi

## **Matija B. Peterlin**

University of California, USA

Prof. Peterlin is an outstanding scientist and has wide experience in researching immunodeficiencies and autoimmune diseases, such as BLS and AIDS. Prof. Peterlin is recognised as a world leader in his field.

Research project: The FiDiPro project is concerned to research the function of the gene product called AIRE. The AIRE (autoimmune regulator) protein controls the expression of hundreds of genes, representing a substantial subset of tissue-specific antigens that are presented to developing T cells in the thymus. However, the molecular mechanisms by which AIRE mediates its functions are still largely obscure. A special focus of the research is on mutations in AIRE, found in APECED patients, which is a congenial immunodeficiency that is rather common in Finland.

Finnish contact person and host organisation: Professor Kalle Saksela, University of Helsinki

## **Josef Rauschecker**

Georgetown University Washington DC (USA)

Professor Josef Rauschecker is among the leading scientists in systems neuroscience in the world.

Research project: The project explores key questions in systems neuroscience, such as how sensory features of objects are processed in parallel and combined across the senses to allow fast and effortless perception, and how the human brain can selectively attend certain objects over others. The project will make it possible to unravel mechanisms of neural plasticity underlying goal-directed multi-sensory perception and perceptual learning.

Finnish project leader and organisation: Academy Professor Mikko Sams, Helsinki University of Technology, tel. +358 9 451 4848, mikko.sams@hut.fi.

## **Orlando J. Rojas**

North Carolina State University, USA

Orlando J. Rojas, from North Carolina State University in the USA, is specialized in the study of lignocellulosic materials.

FiDiPro project: Value-added materials and functional structures from lignocellulosics. The general goal of this project is to use abundant renewable forest resources and by-products (cellulose and lignin) as precursors for the production of high performance materials and structures (and their functionalized versions) and also as substrates for a biologically inspired synthesis of catalysts for clean energy. The future economic viability of the forest cluster companies could be greatly enhanced by extending plant-based materials for new, high-value, high-volume products that can be effectively recycled.

Finnish host: Helsinki University of Technology, Department of Forest Products Technology, Professor Janne Laine

## **Professor Robert Rollinger**

University of Innsbruck, Austria

Professor Robert Rollinger (b. 1964) is an internationally highly recognised and active scholar of the ancient and classical Near East. He is one of the few scholars in the field who has in-depth knowledge of both Ancient Greece and the Near East. In his studies, Professor Rollinger successfully combines both these fields of study in a creative way.

**Research project:** The project will investigate the cultural, linguistic and literary relations between the Near East and the West, specifically Ancient Greece, by applying the methods of several disciplines within the humanities. The project will elucidate the relations between East and West on the basis of Akkadian, Greek and Arabic sources, searching for the historical roots of dichotomies and controversies. A key part of the research concerns the analysis of the formation of cultural identities in a multicultural environment.

**Finnish host and university:** Professor Jaakko Hämeen-Anttila, Department of World Cultures, University of Helsinki, tel. +358 9 191 22092, jaakko.hameen-anttila(at)helsinki.fi

## **Yrjö Henrik Roos**

Faculty of Food Science and Technology, University College Cork, Cork, Ireland

Professor Yrjö Roos has profound expertise in food processing and food material science.

FiDiPro project: Hybrid technologies for food products with high fibre content and stability towards oxidation  
The objective of the project is to develop food processing technologies, where biotechnical matrix modification is combined with thermomechanical processing for manufacturing of cereal products with long storage stability and good sensory properties. The impact of processing parameters and material chemistry as well as macromolecular structure on physical features of the matrix will be investigated. Biopolymer functionalization is studied as a tool to create intrinsic protection and tailored diffusion properties for the food matrix. Interfacial engineering focuses specifically on exploitation of milk proteins in controlling mass transfer-induced instability.

Finnish host organization: VTT Technical Research Centre of Finland, Biotechnology, professor Anu Kaukovirta-Norja

## **George K.B. Sándor**

University of Toronto, Canada

George Sándor graduated from the Faculty of Dentistry, University of Toronto (Canada) with a DDS degree in 1978 and MD degree in 1986 and completed his Plastic Surgery Residency in Toronto in 1991. He has visited several European clinics including Arnhem (The Netherlands), Paris (France), Bern (Switzerland), and Oulu (Finland). Dr. Sándor is currently a Professor of Oral and Maxillofacial Surgery at the University of Toronto and the Clinical Director of the Graduate Program in Oral and Maxillofacial Surgery at University of Toronto and The Mount Sinai Hospital. He is also the Co-ordinator of Pediatric Oral and Maxillofacial Surgery at The Hospital for Sick Children and the Bloorview Kid's Rehab Center in Toronto. He has been the recipient of numerous research grants and teaching awards.

Project: "Harmonization of Hard Tissue Engineering: The Development of New Regenerative Products and Procedures 2007-2011". The goal is to harmonize the objectives in research between mesenchymal stem cell growth, scaffold preparation and the utilization of growth factors or bioactive substances to produce a new family of bone regeneration products and procedures in human and veterinarian clinical practice.

Finnish host organisation: Regea- Institute for Regenerative Medicine was founded in 2005 by Tampere University, Tampere University of Technology, Tampere University Hospital, Pirkanmaa polytechnic and Coxa &ndash; The Joint Replacement Hospital. The only clinical multi tissue bank of Finland and the only Tissue engineering Center in Finland are located in Regea.

Finnish project leader: Director of Regea Riitta Suuronen, Professor, riitta.suuronen@regea.fi, tel +358 3 3551 8497

## **Roger Säljö**

Göteborg University (Sweden)

Professor Roger Säljö is an internationally recognised and renowned scholar. His research focus is on the socio-cultural dimension of learning, and in particular on the impact of new technologies on learning.

Research project: The aim of the project is to deepen theoretical understanding of individual, social, and cultural formation of knowledge and skills. These approaches will be applied in analysing the challenges for new types of learning emerging in the global knowledge society. A further objective is to create a stronger theoretical and empirical basis for developing new learning environments that better meet the challenges of a changing society. Finnish project leader and organisation: Professor Erno Lehtinen, University of Turku, tel. +358 2 333 8824, [erno.lehtinen@utu.fi](mailto:erno.lehtinen@utu.fi).

## **Günter Steinmeyer**

Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, Germany

Research project: Professor Günter Steinmeyer is a top-class researcher with recognised expertise in extreme nonlinear optical phenomena and ultrafast laser sources. In particular, his work at MBI has led to the demonstration of the shortest pulses ever generated with chirped mirrors (3.8 femtosecond) and has given rise to several novel design concepts for these chirped mirrors. In the research project a new avenue for the generation of phase-stable and intense femtosecond pulses is proposed, consisting of a phase-stabilized 100 kHz laser system with subsequent compression stage. This source consists of a short-pulse oscillator that delivers 2.5-cycle pulses with nJ energies and an amplifier stage that allows to reach several microjoules of energy with similar pulse duration after compression. Both sources can be directly applied for experiments on nonlinear propagation in different types of fibers and photonic crystal structures. Finnish contact person and host organisation: Professor Markus Pessa, Tampere University of Technology, markus.pessa (at) tut.fi

## **Bo Stråth**

European University Institute (Italy)

Professor Bo Stråth Professor Stråth is one of the most prominent scholars in the field of theory of contemporary European history. He has, for example, published articles on the methodology of history research, underpinning the development of methods to research contemporary social, economic and political developments.

Research project: The research project focuses on Europe as a specific polity arena and on how such a European polity relates to a broader cultural understanding of Europe. Further questions include: In what sense does 'Europe' have a political capacity to shape modernity? In what sense can Europe be seen as a political economy with a social dimension and to what extent can it be legitimised through debates in a European public sphere?

Finnish project leader and organisation: Docent Henrik Stenius, University of Helsinki, tel. +358 9 1912 3188, henrik.stenius@helsinki.fi.

## Juan Antonio Tapia-Ladino

University of Concepción, Chile

**Project:** LUT GSEEE FiDiPro Fellowship in Permanent magnet machines

The goals of the project are to deepen the expertise of the Finnish industrial and academic sectors on electric drives and motors, especially permanent magnet machines and their new energy efficient applications (especially, windmills, other distributed generation and mobile drives). Research results provide essential knowledge for the electric industry for developing new products. Especially, the wind power is developing fast and there is a big need to improve the power density of permanent magnet generators. The most rugged solution is known as direct drive generator. As the power of the turbine increases the speed in rpm decreases and the torque of the electric machine must be extremely high. Such a demand leads to non-conventional solutions and totally new ideas are needed. The project is directly connected to the research area of CLEEN Ltd (Strategic centre for science, technology and innovation of the Finnish energy and environment cluster).**Contact person and host organisation:** Lappeenranta University of Technology, Department of Electrical Engineering, Professor Juha Pyrhönen. website: [http://www.lut.fi/en/technology/lutenergy/electrical\\_engineering/Pages/Default.aspx](http://www.lut.fi/en/technology/lutenergy/electrical_engineering/Pages/Default.aspx)

## **Joe Terwilliger**

Columbia University (USA)

Professor Joe Terwilliger is an internationally esteemed scholar of genetics, with a solid international network of cooperation worldwide. He has especially distinguished himself as a developer of statistical genetics methods.

Research project: The project involves development of statistical genetics methods to study multifactorial disease traits. Since national diseases, such as diabetes, migraine and obesity, are multifactorial diseases, computational modelling is very difficult. As genetic research methods have developed, it has become possible to use collected data to identify genes and understand their effects on the population.

Finnish project leader and organisation: Professor Aarno Palotie, University of Helsinki

## **David Thomas**

University of Wales-Bangor, UK

Prof. David Thomas is an internationally highly merited researcher in land-ocean interaction and has wide expertise in sea ice studies of key importance to Finland as well. His research activities focus on the ecology and biogeochemical processes of coastal waters, freshwater inputs and sea ice. Thomas has also led many biogeochemical studies in the Antarctic and Arctic.

Research project: The major aims of the project are to establish a biogeochemical study of the Baltic from catchments to the open sea to investigate how inorganic and organic matter is released from terrestrial systems, transformed as it passes through freshwaters before being released to coastal waters. The project is concerned to investigate the effects of this matter on biological activity, composition of the food web and biomass of the standing stocks in the sea.

Finnish contact person and host organisation: Leading Research Scientist Riitta Autio, Finnish Institute of Marine Research

## **Olli H. Tuovinen**

Ohio State University, USA

Dr. Olli H. Tuovinen is Professor of Microbiology at Ohio State University. He is also appointed as Professor in the Soil Science and Environmental Science programs at the university. Dr. Tuovinen's research concerns biodegradable waste materials and biological applications in energy production, mining and drinking water industry. Olli H. Tuovinen obtained his undergraduate degrees at University of Helsinki and completed his Ph.D. degree at University of London (England). He worked as a postdoctoral researcher at the Waite Institute, University of Adelaide, South Australia, and later at University of Helsinki, Finland before he moved to the United States. He has been a faculty member at Ohio State University since 1978. Dr. Tuovinen has been a visiting professor in Brazil and Japan and has taught training courses in India and Peru.

Project: Applied Microbiology and Sustainable Biotechnology 2007-2009. The project seeks to develop novel bioprocesses for mining and metallurgy, biological production of hydrogen and ethanol energy carriers from renewable and waste materials, high-quality potable water services as well as molecular diagnostic tools for optimization and control of bioprocess performance and control of microbial hazards. The overall objectives in this research programme are to increase the understanding of the fundamentals underlying bioprocesses under extreme conditions (low/high temperature, high pressure, low nutrient availability, toxic chemicals) and to develop novel technology based on extremophilic microorganisms or their biomolecules.

Finnish host organisation: The Institute of Environmental Engineering and Biotechnology of the Tampere University of Technology (TUT). The environmental biotechnology research focuses on sustainable biotechnologies, bioremediation of contaminated environments and microbial ecology of extreme environments. TUT has nominated environmental biotechnology as one of the areas of research excellence.

Finnish project leader: Professor Jaakko Puhakka, Head, Institute of Environmental Engineering and Biotechnology, Tampere University of Technology, jaakko.puhakka@tut.fi, tel +358 3 3115 2966

## **Willem M. de Vos**

Wageningen University, Netherlands

Professor Dr. Willem M. de Vos received a PhD degree with highest honors at State University of Groningen, the Netherlands, on work in the area of Molecular Genetics, which was partly done at the Max Planck Institute in Berlin, Germany. He received a post-doctoral fellowship of the EU Biomolecular Engineering Programme to stay in the United Kingdom and then became research manager at NIZO, the research institute of the Netherlands dairy industry. Here he established a research group on lactic acid bacteria and became first Professor of Bacterial Genetics and later Chair of Microbiology at Wageningen University, the Netherlands, where he initiated research groups on the biotechnology of extremophiles and archaea, as well as the microbial ecology of the intestinal tract. In this function, he first served as Director of the Department of Biomolecular Sciences and in 2000 became Programme Director Microbial Functionality and Safety at the Wageningen Centre for Food Sciences (WCFS), a public-private centre of excellence in the Netherlands. He received several international awards, including the Rhone Poulenc Dairy Science Award.

Project: "Microbial Interactions for Intestinal Health 2007-2011". Our intestinal tract is colonized since birth by a myriad of microbes that are involved in the processing of our diet, develop intimate interactions with our body, and have a major contribution to health and disease. One of the present day challenges is to understand and improve the intestinal processes based on the intestinal microbes and their expression products. This will be the focus of this research project that aims to establish an advanced competence platform for defining Intestinal Health by capitalizing the expertise of internationally networking Universities, including University of Helsinki, Turku University and Wageningen University, The Netherlands. The project will deliver microbe-based intestinal health biomarkers, address industrially relevant issues and interventions, and benchmark intestinal irregularities that are targets for food and pharma interventions. A large and balanced industry consortium including six large and medium-sized food and pharma companies has been established to guide and monitor the project. All partners are committed to participate in the project to drive further public-private interactions and innovations for intestinal health.

Finnish host organisation: Primarily Professor Willem M de Vos will work at the University of Helsinki in Professor Airi Palva's research team, which is focusing on molecular biology of intestinal microbiota, on host-microbe interactions, on development of mucosal vaccine vectors and probiotics for prevention of intestinal infections as well as on developing high-throughput molecular methods for microbial diagnostics. The other important research collaborators in the project will also include the Institute of Biotechnology, University of Helsinki and Functional Foods Forum of the University of Turku. Finnish project leader: Professor Airi Palva, [airi.palva@helsinki.fi](mailto:airi.palva@helsinki.fi), tel. + 358 9 1915 7058

## **Kaiyun Wang**

East China Normal University (Shanghai), China

Prof. Wang is a merited scientist in eco-physiology and well versed particularly in the analysis of the carbon balance of mire ecosystems.

Research project: The goal of the research project is to understand the response difference of C sink/source of the boreal forest and mire ecosystems to climate factors and managements strategies as well as to optimise the production of biofuels and timber in cost-efficient ways in order to provide effective management policies for the forest and mire ecosystems for multi-objective use, particularly in enhancing biofuel production and mitigating atmospheric CO<sub>2</sub>. Another goal is to identify environmental and socio-economic impacts of production of biofuels from forests and mires. The project is a joint effort of the Universities of Joensuu and Kuopio.

Finnish contact person and host organisation: Professor Seppo Kellomäki, University of Joensuu  
Professor Pertti Martikainen, University of Kuopio

## Xiaohong Wang

Tsinghua University, China

Project: Modern tissue engineering - cell culture studies on digitally designed and manufactured 3D scaffolds

The development of tissue engineering and organ manufacturing faces many challenges. Modern additive manufacturing (AM) enables 3-D biomimetic structures with specially designed patterns, material compositions, and mechanical properties. AM also offers unique opportunity to precisely control the construct architecture (pore size, shape, orientation, and interconnectivity). The goals of this project are to find optimal 3-D cell culture conditions for AM's tissue scaffolds, and to prepare scaffolds which may eventually be applied in tissue failure substitution as artificial bone, cartilage or other tissues. Multidisciplinary novel biomanufacturing research combines competences from microbiology, biochemistry, medical disciplines from eventual application areas, materials and additive manufacturing research, complex computational tasks and 3-D tissue modeling. Results benefit Finnish scientific community and medical device, mechanical engineering, SW- and biotech industries through new scientific knowledge in tissue engineering and its optimal conditions, and directly applicable knowledge for developing AM techniques, 3-D modeling of tissues and tissue substitute materials. Close cooperation with leading Finnish institutes, and with Tsinghua University enables effective dissemination of the scientific results and offers an attractive research arena for researchers. Collaboration with other Aalto University School of Science and Technology research units provides synergies. The expertise at Department of Biomedical Engineering and Computational Science (BECS) and the The Laboratory of Polymer Technology (POTE) complement the work done at BIT Research Centre; this collaboration may lead to innovations and fast application by Finnish industry.

Contact person and host organisation: Aalto University School of Science and Technology, BIT Research Centre, Professor Marja Toivonen, website: <http://www.bit.tkk.fi/Home/Home>

## Professori Robert L Whetten

Georgia Institute of Technology, USA

Professor Robert L. Whetten (b. 1959) is one of the most distinguished international experts in the synthesis and characterisation of molecular nanostructures and nanoparticles. He has contributed significantly to the synthesis, isolation and characterisation of soluble C<sub>60</sub> and related fullerenes as well as of superconducting alkali-fullerides. Professor Whetten was the first to realise and appreciate the distinct optical and electrochemical properties of gold nanoclusters, arising from the quantum confinement of valence electrons in the metal core.

**Research project:** The project will focus on investigating the synthesis, characterisation and application of chemically stabilised nanoparticles with precise molecular structures and functionalised properties. The aim is to functionalise the particles to be compatible with a wide variety of chemical environments. This provides a possibility to use these particles for applications in catalysis, non-sensing, photonics, bio-labelling, and molecular electronics.

**Finnish host and university:** Professor Hannu Häkkinen, Department of Chemistry, University of Jyväskylä, tel. +358 14 260 4719, hannu.hakkinen(at)phys.jyu.fi

## **Stefan Winter**

Technische Universität München, Germany

Professor Winter is a globally acknowledged researcher and developer of modern timber construction. His expertise will create a platform of general research information, on which wooden low-energy housing areas can be implemented and related products commercialized.

FiDiPro project: "Innovative Timber Structures Technology & energy efficient and sustainable use of wood in building construction and the building stock & from materials to constructions". Energy saving goals and environmental aspects have made low-energy building interesting for industry and the construction sector. However, in Finland there is a lack of research for developing wooden low-energy houses in the sectors of technical specification, business concept development and standardization. TKK is inviting Professor Stefan Winter from TU München to bring know how of wooden low-energy wooden construction that is common in Central Europe.

Finnish host: Helsinki University of Technology, Department of Forest Products Technology, D.Sc., Professor Matti Kairi

## **Douglas Worsnop**

Aerodyne Research Inc. (USA)

Dr Douglas R. Worsnop (b. 1952) is regarded as one of the leading scientists in research on aerosol particles. He is a world-leading scientist in analytical techniques and highly experienced in complex field studies. Dr Worsnop currently works as a FiDiPro Professor, and his present term expires at the end of 2010.

**Research project:** The main objective of the project is to investigate the importance of aerosol particles on climate change and on human health, with a particular focus on the growth of freshly nucleated nm-sized atmospheric aerosols by condensation of organic vapours and the effect of aerosol formation in aerosol dynamics. Modern engine technologies have dramatically reduced overall aerosol emission levels while enhancing the production of nanoparticles, which have significant, undetermined health effects, as they are emitted in urban areas with large human exposure. The project brings together physical and chemical measurement expertise to investigate the fundamental interaction of molecules, clusters and aerosols, from nanometer to micrometer scales.

**Finnish host and university:** Professor Markku Kulmala, Finnish Centre of Excellence in Physics, Chemistry, Biology and Meteorology of Atmospheric Composition and Climate Change, University of Helsinki, tel. +358 9 191 50756, markku.kulmala(at)helsinki.fi

## **Hisao Yamauchi**

Tokyo Institute of Technology, Japan

Japanese scientist Hisao Yamauchi is one of the world's top names in the design of novel oxide materials. He comes from the acclaimed Tokyo Institute of Technology to work in the Laboratory of Inorganic and Analytical Chemistry at the Helsinki University of Technology.

Research project: The project led by Professor Yamauchi will research novel multifunctional oxide materials that are at the heart of current research into inorganic materials. Novel materials are needed for applications such as high-temperature supra-conductors, fuel cell and battery electrodes, thermoelectric devices and the commercial utilisation of spintronics/magnetoelectronics. This research will help improve energy efficiency and achieve developments such as CO<sub>2</sub>-free production of electric energy from waste heat.

Finnish host: Helsinki University of Technology, Department of Chemical Technology, Professor Maarit Karppinen, phone: +358 9 451 2602, [maarit.karppinen@tkk.fi](mailto:maarit.karppinen@tkk.fi)

## **Kamya Yekeh Yazdandoost**

NICT, National Institute of Information and Communications Technology, Japan

Dr.Yazdandoost is an expert in an interdisciplinary field between medicine and information communications technology.

FiDiPro project: Wireless Body Area Networks for Health and Medical-care (WiBAN-HAM).The subject of this research work is the design and development of novel solutions targeting wireless body area networks for health and medical-care applications to be used in the healthcare facility and home. The research focuses on realizing a number of areas including a channel model for tissue implanted device and onbody sensors for wireless body area networks. A central component of wireless body area networks is an antenna and there are several issues to consider when designing an antenna for WBAN's applications, including power consumption, size, frequency, biocompatibility and the unique RF transmission challenges posed by the human body.

Prior to any in-body or on-body data communications, the effect of the human body on the RF signal must be understood. Unlike the standard communication all the way through constant air, the various tissues and organs within the body have their own unique conductivity, dielectric constant, and characteristic impedance. Understanding the human body's effect on RF wave propagation is complicated by the fact that the body consists of components that each offer different degrees, and in some cases, different types of RF interaction. Therefore wireless body area networks should be treated as a special case of wireless communications with its unique channel model. In our vision of future healthcare we anticipate ubiquitous use of WBANs in health- and medical care.

Finnish host organisation: University of Oulu, Centre for Wireless Communications, director Ari Pouttu

## **Professori Luca Q. Zamboni**

Université de Lyon 1, CNRS, France

Professor Luca Q. Zamboni (b. 1962) is an internationally recognised and leading scientist in the area of combinatorics on words and related areas. He is known as a researcher who is able to solve highly challenging research problems in the field and formulate new innovative research questions. Zamboni is regarded as a leading authority in the research of combinatorics on words. He has also made significant contributions to the research of algebra and dynamical systems.

**Research project:** The objective of the project is to establish an internationally significant research centre working on combinatorics on words. This is an extensive interdisciplinary project that will be working on a number of phenomena and research problems in the field. The project combines mathematics, computer science and physics.

**Finnish host and university:** Professor Juhani Karhumäki, Department of Mathematics, University of Turku, tel. +358 2 333 5613, karhumak(at)utu.fi

## **Wei Zhang**

The University of Texas M. D. Anderson Cancer Center, TX, USA

Professor Wei Zhang works as a professor in pathology and cancer biology in The University of Texas M. D. Anderson Cancer Center and as the head of the Cancer Genomics Core Laboratory.

FiDiPro project: Systems Biology of Cancer: Mapping, Methods and Modeling for the Cancer Genome. The project is focused on applying systems biology tools to modern cancer research. We integrate multiple types of high-throughput measurement data and, by data mining medical archives for clinical data, associate clinical parameters with particular genetic events. Mathematical modeling and reverse engineering are applied to uncover the mechanisms of initiation and progression of the disease. The goal is to develop computational methods to process genomic data and to find new genomic markers. Also, in collaboration with Research Tissue Bank Finland, FinTiB, we aim to create a framework towards utilizing biobank resources in large scale. We expect to use the developed methods to study those cancers that are unusually common among the Finnish population. This project will advance the fields of computational cancer genomics, cancer research, and personalized medicine.

Finnish host organization: Tampere University of Technology, Department of Signal Processing, Professor Olli Yli-Harja