

## **COST EMF-MED**

European network for innovative uses of EMFs  
in biomedical applications

at



## **Conference and 5<sup>th</sup> MCM**

**Program: 8-9 June 2016**

**Meeting Venue:**  
Cultural centre Het Pand  
Onderbergen 1  
9000 Gent  
BELGIUM

**Local organiser:**  
Prof. Luc Martens (Ghent University – iMinds, BELGIUM)  
[luc.martens@intec.ugent.be](mailto:luc.martens@intec.ugent.be)

## COST EMF-MED at BioEM 2016

COST EMF-MED is co-organizing BioEM2016, the premier international conference in the area of bioelectromagnetics to be held 5-10 June 2016 in Ghent, Belgium. BioEM conferences are organized as Annual Joint Meetings of Bioelectromagnetics Society (BEMS) and European BioElectromagnetics Association (EBEA).

Besides the whole conference being co-organized by COST EMF-MED (together with BEMS and EBEA), the most related sessions forming the formal COST EMF-MED two-day event are concentrated on 8 – 9 June 2016 (Wednesday – Thursday) with the program below, which is the integral part of the official BioEM2016 program.

Besides these sessions, COST EMF-MED related papers are also scattered in other sessions, including poster sessions on Monday and Tuesday. Note: COST EMF-MED participants attending only the COST event on Wednesday and Thursday will also have access to poster exhibition, as posters will be displayed in accessible area.

All info about the conference can be found on BioEM2016 web site: [www.bioem2016.org](http://www.bioem2016.org) , including the full program of the conference and all travel and local info.

### Wednesday, 8 June 2016

#### **09:00 - 10:00 Plenary session: Can we induce adaptive response with EM stimulation? The new frontier of immune system and EM field interaction (Chair: Myrtil Simko, Room: Rafter)**

09:00 - 09:30 **Immune system and EMF, state of the art and new routes to explore**

Claudio Pioli<sup>1</sup>

<sup>1</sup>Laboratory of Biomedical Technologies, ENEA, Rome, Italy)

09:30 - 10:00 **The challenge of immunoelectrochemotherapy**

Lluis M. Mir<sup>1</sup>

<sup>1</sup>Vectorology and Anticancer Therapies, UMR 8203, CNRS, Univ. Paris-Sud, Gustave Roussy, Université Paris-Saclay, Villejuif, France

#### **Coffee Break, Chiabrera Lecture**

#### **11:00 - 12:40 Computational models for medical applications (room: Zaal Rector Vermeylen)**

11:00 - 11:20 **Large-Scale Multi Neuronal Simulation within an Anatomical Head Model for Transcranial Alternative Current Stimulation (tACS) Investigations**

Antonino Mario Cassara<sup>1</sup>, Esra Neufeld<sup>1</sup>, Manuel Guidon<sup>2</sup>, Wolfgang Kainz<sup>3</sup> & Niels Kuster<sup>1,4</sup>

<sup>1</sup>IT'IS Foundation for Research on Information Technologies in Society, Zurich, Switzerland

<sup>2</sup>Zurich MedTech, Zurich, Switzerland

<sup>3</sup>U.S. FDA, CDRH, Office of Science and Engineering Laboratories, Division of Biomedical Physics, USA

<sup>4</sup>Swiss Federal Institute of Technology (ETHZ), Zurich, Switzerland

11:20 - 11:40 **Investigation of Electric and Magnetic Stimulation Time Constants Through Neuronal Dynamics Functionalized Anatomical Models**

Esra Neufeld<sup>1</sup>, Antonino Mario Cassara<sup>1</sup>, Hazael Montanaro<sup>1,2</sup>, Wolfgang Kainz<sup>3</sup> & Niels Kuster<sup>1,2</sup>

<sup>1</sup>IT'IS Foundation for Research on Information Technologies in Society, Zurich, Switzerland

<sup>2</sup>Swiss Federal Institute of Technology (ETHZ), Zurich, Switzerland

<sup>3</sup>U.S. FDA, CDRH, Office of Science and Engineering Laboratories, Division of Biomedical Physics, USA

11:40 - 12:00 **“Patient semi-specific” dosimetry for electromagnetic stimulation applied to regenerative treatments**  
Francesca Camera<sup>1</sup>, Fioravante Capone<sup>2</sup>, Stefania Setti<sup>3</sup>, Roberta Fusco<sup>3</sup>, Ruggero Cadossi<sup>3</sup>, Francesca Apollonio<sup>1</sup>, Vincenzo Di Lazzaro<sup>2</sup> & Micaela Liberti<sup>1</sup>  
<sup>1</sup>*Department of Information Engineering, Electronics and Telecommunications, "La Sapienza" University of Rome, Rome, Italy, 00184*  
<sup>2</sup>*Institute of Neurology, Campus Biomedico University, Rome, Italy*  
<sup>3</sup>*IGEA, Clinical Biophysics, Carpi, Italy*

12:00 - 12:20 **Assessment of the Electric field distribution induced by deep Transcranial Magnetic Stimulation for the treatment of depressive disorders**  
Serena Fiochi<sup>1</sup>, Ilaria Liorni<sup>1</sup>, Paolo Ravazzani<sup>1</sup> & Marta Parazzini<sup>1</sup>  
<sup>1</sup>*Istituto di Elettronica e di Ingegneria dell'Informazione e delle Telecomunicazioni IEIIT, CNR Consiglio Nazionale delle Ricerche-IEIIT, Milan, Italy*

12:20 - 12:40 **Stochastic Collocation Method Applied to Transcranial Magnetic Stimulation Analysis**  
Mario Cvetkovic<sup>1</sup>, Anna Šušnjara<sup>1</sup>, Dragan Poljak<sup>1</sup>, Sebastien Lallechere<sup>2</sup> & Khalil El Khamlichi Drissi<sup>2</sup>  
<sup>1</sup>*University of Split, Split, Croatia*  
<sup>2</sup>*Blaise Pascal University, Clermont-Ferrand, France*

### **Lunch**

**14:30 - 16:30 COST EMF-MED – 5<sup>th</sup> Management Committee Meeting (room: Rafter) – agenda TBA**

**After MCM: COST EMF-MED reception (social event for COST EMF-MED participants)**

<b>Thursday, 9 June 2016</b>
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**08:30 - 09:30 Tutorial: “The Erice-EBEA School framework” - Neuroprotective effects of EM fields: from preclinical to clinical studies (Chair: Ferdinando Bersani, Room: Rafter)**

08:30 - 08:45 **The Erice-EBEA School: an unique opportunity to learn Bioelectromagnetics**  
Ferdinando Bersani<sup>1</sup>  
<sup>1</sup>*University of Bologna, Bologna, Italy*

08:45 - 09:30 **Neuroprotective effects of EM fields: from preclinical to clinical studies**  
Ruggero Cadossi<sup>1</sup>  
<sup>1</sup>*IGEA, Carpi, Italy*

**09:30 - 10:30 Plenary session: Need of a breakthrough in clinical application of hyperthermia: shared knowledge, gaps and challenges (Room: Rafter)**

09:30 - 10:30 **Hyperthermic Radiation Oncology 2020: Evidence, Care, Cure, Visions**  
Stephan Bodis<sup>1</sup>  
<sup>1</sup>*Radiation Oncology Center, Kantonsspital Aarau-Baden, Baden, Switzerland*

### **Coffee Break**

**11:00 - 12:40 Pulsed electric fields: from cells to animals (room: Zaal Rector Vermeulen)**

11:00 - 11:20 **Optimizing Nano-Pulse Electro-Signaling parameters to activate immunogenic apoptosis and inhibit metastasis**  
Richard Nuccitelli<sup>1</sup>, Zachary Mallon<sup>1</sup>, Amanda McDaniel<sup>1</sup>, Myra Perez<sup>1</sup>, Mark Kreis<sup>1</sup>, Brian Athos<sup>1</sup>, Dave Danitz<sup>1</sup>, Darrin Uecker<sup>1</sup> & Pamela Nuccitelli<sup>1</sup>  
<sup>1</sup>*Research and Development, Pulse Biosciences Inc., Burlingame, CA, USA*

- 11:20 - 11:40 **Potential Differential Effects of Single High Intensity 6 ns Electric Pulses on Macroscopic Inward and Outward Ionic Currents Recorded in Whole-Cell Patch Clamped Bovine Chromaffin Cells**  
Lisha Yang<sup>1</sup>, Gale Craviso<sup>1</sup>, Robert Terhune<sup>2</sup>, P. Thomas Vernier<sup>3</sup>, Indira Chatterjee<sup>2</sup> & Normand Leblanc<sup>1</sup>  
<sup>1</sup>*Department of Pharmacology, University of Nevada School of Medicine, Reno, NV, USA*  
<sup>2</sup>*Department of Electrical and Biomedical Engineering, University of Nevada, Reno, NV, USA*  
<sup>3</sup>*Frank Reidy Research Center for Bioelectrics, Old Dominion University, Norfolk, VA, USA*
- 11:40 - 12:00 **Diverse susceptibility to nsPEF ablation across multiple cell types**  
Andrei Pakhomov<sup>1</sup>, Chantelle Labib<sup>1</sup>, Elena Gianulis<sup>1</sup>, Gintautas Saulis<sup>2</sup>, Vitalij Novickij<sup>3</sup> & Olga Pakhomova<sup>1</sup>  
<sup>1</sup>*Frank Reidy Research Center for Bioelectrics, Old Dominion University, Norfolk, VA, USA*  
<sup>2</sup>*Department of Biology, Vytautas Magnus University, Kaunas, Lithuania*  
<sup>3</sup>*Magnetic Field Institute, Vilnius Gediminas Technical University, Vilnius, Lithuania*
- 12:00 - 12:20 **Electrical manipulation of mesenchymal stem cells calcium oscillations with microsecond pulsed electric fields**  
Hanna Hanna<sup>1</sup>, Franck Andre<sup>1</sup> & Lluís M. Mir<sup>1</sup>  
<sup>1</sup>*Vectorology and Anticancer Therapies, UMR 8203, CNRS, Univ. Paris-Sud, Gustave Roussy, Université Paris-Saclay, Villejuif, France*
- 12:20 - 12:40 **Gene Electrotransfer for Effective Delivery of Plasmid DNA to the Skin In Vivo**  
Richard Heller<sup>1</sup>, Amy Donate<sup>1</sup>, Siqi Guo<sup>1</sup>, Chelsea Edelblute<sup>1</sup> & Anna Bulysheva<sup>1</sup>  
<sup>1</sup>*Center for Bioelectrics, Old Dominion University, Norfolk, Virginia, USA*

### **Lunch**

### **14:00 - 15:20 Innovative perspectives for medical applications (room: Zaal Rector Vermeylen)**

- 14:00 - 14:20 **Electrochemotherapy by pulsed electromagnetic field treatment in vivo**  
Damijan Miklavcic<sup>1</sup>, Simona Kranjc<sup>2</sup>, Matej Kranjc<sup>1</sup>, Janez Scancar<sup>3</sup>, Jure Jelenc<sup>4</sup> & Gregor Serša<sup>2</sup>  
<sup>1</sup>*Faculty of Electrical Engineering, University of Ljubljana, Ljubljana, Slovenia*  
<sup>2</sup>*Department of Experimental Oncology, Institute of Oncology Ljubljana, Ljubljana, Slovenia*  
<sup>3</sup>*Jozef Stefan Institute, Ljubljana, Slovenia*  
<sup>4</sup>*Iskra Medical LLC, Ljubljana, Slovenia*
- 14:20 - 14:40 **Image-Based Modeling of Superparamagnetic Iron-Oxide Nanoparticle Hyperthermia Therapy**  
Hazel Montanaro<sup>1,2</sup>, Esra Neufeld<sup>1</sup>, Myles Capstick<sup>1</sup> & Niels Kuster<sup>1,2</sup>  
<sup>1</sup>*IT'IS Foundation for Research on Information Technologies in Society, Zurich, Switzerland*  
<sup>2</sup>*Swiss Federal Institute of Technology (ETHZ), Zurich, Switzerland*
- 14:40 - 15:00 **A full-wave numerical study to investigate the possibility of using microwaves for image-monitored ablation treatments**  
Gennaro G. Bellizzi<sup>1,2</sup>, Marta Cavagnaro<sup>3</sup>, Lorenzo Crocco<sup>1</sup>, Vanni Lopresto<sup>4</sup> & Rosa Scapaticci<sup>1</sup>  
<sup>1</sup>*IREA, National Council of Research of Italy, Naples, Italy*  
<sup>2</sup>*DIIES, Mediterranean University of Reggio Calabria, Reggio Calabria, Italy*  
<sup>3</sup>*DIEET, Sapienza University of Rome, Rome, Italy*  
<sup>4</sup>*ENEA, Division of Health Protection Technologies, Rome, Italy*
- 15:00 - 15:20 **New focusing strategy for improved design of hyperthermia array applicators**  
Domenica Iero<sup>1</sup>, Maarten Paulides<sup>2</sup>, Lorenzo Crocco<sup>3</sup>, Tomas Drizdal<sup>2</sup>, Tommaso Isernia<sup>1,3</sup> & Gerard van Rhoon<sup>2</sup>  
<sup>1</sup>*DIIES Dipartimento di Ingegneria dell'Informazione, delle Infrastrutture e dell'Energia Sostenibile, Università Mediterranea di Reggio Calabria, Reggio Calabria, Italy*  
<sup>2</sup>*Department of Radiation Oncology, Hyperthermia Unit, Erasmus MC Cancer Institute, Rotterdam, Netherlands*  
<sup>3</sup>*IREA Istituto per il Rilevamento Elettromagnetico dell'Ambiente, CNR, Napoli, Italy*

## **Coffee Break**

**16:00 - 18:00 Workshop: Single cell electromagnetic exposure and analysis: experimental considerations, coupling of optical imaging techniques, and biological outcomes (Chairs: Caterina Merla & Rafael Davalos, Room: Rafter)**

16:00 - 16:10 **Disseminating the OPTIC BIOEM MSCA-IF Project: the SICEAN workshop at BioEM 2016 meeting**

Caterina Merla<sup>1</sup> & Lluís M. Mir<sup>1</sup>

<sup>1</sup>*Vectorology and Anticancer Therapies, UMR 8203, CNRS, Univ. Paris-Sud, Gustave Roussy, Université Paris-Saclay, Villejuif, France*

16:10 - 16:30 **Microchambers for cell exposure: from the design to applications**

Agnese Denzi<sup>1</sup>, Maura Casciola<sup>1,2</sup>, Paolo Marracino<sup>1</sup>, Caterina Merla<sup>3,4</sup>, James C. M. Hwang<sup>5</sup>, Xuanhong Cheng<sup>5</sup>, Francesca Apollonio<sup>1</sup> & Micaela Liberti<sup>1</sup>

<sup>1</sup>*Department of Information Engineering, Electronics and Telecommunication (DIET), Sapienza University of Rome, Rome, Italy*

<sup>2</sup>*Frank Reidy Research Center for Bioelectrics, Old Dominion University, Norfolk, USA*

<sup>3</sup>*Italian Inter-University Centre of Electromagnetic Fields and Bio-Systems, Italian National Agency for New Technologies, Energy, and Sustainable Economic Development, Rome, Italy*

<sup>4</sup>*Vectorology and Anticancer Therapies, UMR 8203, CNRS, Univ. Paris-Sud, Gustave Roussy, Université Paris-Saclay, Villejuif, France*

<sup>5</sup>*Lehigh University, Bethlehem, USA*

16:30 - 16:50 **Electroporation of adhered brain endothelial cells on chip toward controlled transcellular permeabilization of the blood-brain barrier**

Mohammad Bonakdar<sup>1</sup>, Elisa Wasson<sup>1</sup> & Rafael Davalos<sup>1,2,3</sup>

<sup>1</sup>*Department of Mechanical Engineering, Virginia Tech University, Blacksburg, Virginia, USA*

<sup>2</sup>*Department of Biomedical Engineering and Sciences, Virginia Tech University, Blacksburg, Virginia, USA*

<sup>3</sup>*Virginia Tech - Wake Forest University, Blacksburg, Virginia, USA*

16:50 - 17:10 **Non-invasive and Label-Free Optical Spectroscopy Techniques to Investigate the Interaction between Intense Pulsed Electric Fields and Biological Samples**

Antoine Azan<sup>1</sup>, Michaël Scherman<sup>2</sup>, Aude Silve<sup>3</sup>, Valérie Untereiner<sup>4,5</sup>, Caterina Merla<sup>1</sup>, Nelly Dorval<sup>2</sup>, Brigitte Attal-Trétout<sup>2</sup>, Olivier Piot<sup>4</sup> & Lluís M. Mir<sup>1</sup>

<sup>1</sup>*Vectorology and Anticancer Therapies, UMR8203, CNRS, Univ. Paris-Sud, Gustave Roussy, Université Paris-Saclay, Villejuif, France*

<sup>2</sup>*Département de Mesures Physiques, ONERA, Palaiseau, France*

<sup>3</sup>*Institute for Pulsed Power and Microwave Technology, Karlsruhe Institute of Technology, Karlsruhe, Germany*

<sup>4</sup>*MEDyC UMR7639, CNRS, Reims, France*

<sup>5</sup>*Plateforme d'Imagerie Cellulaire et Tissulaire, CNRS, Reims, France*

17:10 - 17:30 **Study of the transmembrane voltage induced by short electric pulses on cells membranes: overcome and remaining challenges**

Aude Silve<sup>1</sup>, Ralf Straessner<sup>1</sup>, Martin Sack<sup>1</sup>, Lars Wegner<sup>1</sup> & Wolfgang Frey<sup>1</sup>

<sup>1</sup>*Institute for Pulsed Power and Microwave Technology, Karlsruhe Institute of Technology, Eggenstein-Leopoldshafen, Germany*

17:30 - 17:50 **Thermal imaging with Rhodamine B in cells exposed to electromagnetic radiation**

David Moreau<sup>1</sup>, Claire Lefort<sup>1</sup>, Ryan Burke<sup>1</sup>, Philippe Leveque<sup>1</sup> & Rodney P. O'Connor<sup>1</sup>

<sup>1</sup>*XLIM Research Institute, Limoges, France*