

## Commission K

Session	Number of slots
K01	4
Specialized mechanism of interactions of EMF with biological systems	
Conveners: Guglielmo D'inzeo, René De Seze	
Convener Emails: <a href="mailto:guglielmo.dinzeo@uniroma1.it">guglielmo.dinzeo@uniroma1.it</a> , <a href="mailto:Rene.DE-SEZE@ineris.fr">Rene.DE-SEZE@ineris.fr</a>	
<p>The experimental and theoretical assessment of possible health hazards resulting from non-ionising electromagnetic fields is central from a health and safety perspective. In spite of the long history of this research, there are still uncertainties concerning the thresholds for acute neurophysiological effects, as well as for possible biological effects due to low level exposures. New approaches for breakthrough have been conducted to obtain scientific evidences for or against those possible effects. Studies have been in general in focusing on frequencies and waveforms used for electric power transmission and for wireless communications. New technologies using different frequencies and waveforms aiming for translational applications have also emerged. Moreover, the possible beneficial use of electromagnetic field effects has become of more interest for the development of novel applications in biotechnology and medicine. This session calls for papers on recent developments of theoretical and experimental studies on biological effects of electromagnetic fields using various and innovative scientific approaches.</p>	

Session	Number of slots
K02	4
Protein response to EM fields as pathway of biological effects relevant for clinics	
Conveners: Paolo Marracino, Jack Tuszyinsky	
Convener Emails: <a href="mailto:paolo.marracino@risetechnology.com">paolo.marracino@risetechnology.com</a>	
<p>The potential for using EMF for medical purposes has been of interest since many decades. This session will focus on protein response to EM fields as pathway of biological effects relevant for clinics. In particular it will be shown that the mechanisms of interaction of EM fields acting on membrane proteins and/or intracellular enzymes, will be best elucidated when in silico simulations based on molecular dynamics are adopted. This type of modeling is currently considered one of the most used approaches to reveal the biophysics of molecular targets.</p>	

Session	Number of slots
K03	5
Electromagnetics in life-science: methods for monitoring and manipulating cells and tissues	
Conveners: Lluís Mir, Francesca Apollonio	
Convener Emails: Luis.MIR@cnrs.fr, francesca.apollonio@uniroma1.it	
<p>The session has the scope to discuss advanced methods for monitoring and manipulating cells and tissues with electromagnetic fields providing state of the art and new opportunities. Microwave dielectric spectroscopy used for monitoring cells will open the session.</p> <p>The manipulation of cells with electric fields as well as with EM fields will be another important component of the session.</p>	

Session	Number of slots
K04	6
Permittivity characterization and dielectric spectroscopy in cells and tissues	
Conveners: Alexandra Paffi, Lars Ole Fichte, Marco Pasian	
Convener Emails: alessandra.paffi@uniroma1.it, lars-ole.fichte@hsu-hh.de, marco.pasian@unipv.it	
This session is dedicated to innovative researches, methods and tools used to characterize permittivity and dielectric spectroscopy at the cellular and molecular levels.	

Session	Number of slots
K05	6
Millimeter wave dosimetry and thermal considerations	
Conveners: Maxim Zhadobov, René de Seze, Akimasa Hirata	
Convener Emails: maxim.zhadobov@univ-rennes1.fr, Rene.DE-SEZE@ineris.fr, ahirata@nitech.ac.jp	
<p>Recently, international guidelines/standards for human safety related to electromagnetic fields have been updated. There still exist several gaps of knowledge for setting the limits especially at frequencies exceeding 6 GHz. This session focuses on the dosimetry techniques, human body modeling, multi-physics aspects, and other related topics covering the upper part of the microwave spectrum emerging for 5G wireless communication systems and beyond.</p>	

Session	Number of slots
K06	6
EMF and children	
Conveners: Monica Guxen, Noriko Kojimahara, Isabelle Lagroye, Masao Taki, Joe Wiart	
Convener Emails: monica.guxens@isglobal.org, nkojimah@outlook.jp, isabelle.lagroye@u-bordeaux.fr, masao@tmu.ac.jp, Joe.wiart@telecom-paris.fr	
Children are using more and more wireless communication. This session will focus on recent studies (In vivo, in vitro and epidemiological) that have been conducted to analyze the impact of EMF on children.	

Session	Number of slots
K07	6
Experimental exposure assessment for epidemiology	
Conveners: Kanako Wake, Joe Wiart	
Convener Emails: kana@nict.go.jp, Joe.wiart@telecom-paris.fr	
Epidemiology is key to assess the possible health risks induced by EMF exposure. Towards this aims the experimental exposure assessment (e.g incident field, power absorbed, actual power emitted by wireless phone) for epidemiology is a key question. This session will focus on recent studies that have been conducted to assess experimentally the exposure induced by wireless ICT.	

Session	Number of slots
K08	6
Numerical dosimetry for epidemiology	
Conveners: Tomoaki Nagaoka, Ae-kyoung Lee, Tongning Wu, Joe Wiart	
Convener Emails: nagaoka@nict.go.jp, aklee@etri.re.kr, wutongning@caict.ac.cn, Joe.wiart@telecom-paris.fr	
Epidemiology is key to assess the possible health risks induced by EMF exposure. Towards this aims the numerical exposure assessment (e.g SAR and power absorbed linked to wireless phone emission) is key for epidemiology. This session will focus on recent studies that have been conducted to assess numerically the exposure induced by wireless ICT. This session will discuss numerical models, methods and results.	

Session	Number of slots
K09	6
Dielectric properties and therapeutic thermal therapies in hyperthermia and RF & MW ablation	
Conveners: Lourdes Farrugia, Emily Porter	
Convener Emails: lourdes.farrugia@um.edu.mt, emily.e.porter@ieee.org	
<p>Electromagnetic (EM) hyperthermic technologies hold great potential for the treatment of diseases through modification of tissue temperature. Underpinning these technologies is the need for reliable, accurate knowledge of the dielectric and thermal properties of human tissues. Further, advances in the design, development and testing of EM thermal-based technologies (including treatment planning) for a wide range of clinical conditions are key. This session will cover these topics.</p>	

Session	Number of slots
K10	6
Innovative techniques for non-invasive brain stimulation: from models to bedside	
Conveners: Micaela Liberti, Niels Kuster	
Convener Emails: micaela.liberti@uniroma1.it, kuster@itis.ethz.ch	
<p>The focus of this session is to discuss the recent researches related to non-invasive brain stimulation and innovative techniques from models to bedside</p>	

Session	Number of slots
K11	5
Therapeutic, Rehabilitative and Healthcare Applications of RF EMF	
Conveners: Koichi Ito, Jose Gomez-Tames	
Convener Emails: ito.koichi@faculty.chiba-u.jp, jgomez@nitech.ac.jp	
<p>Recent developments in radiofrequency-electromagnetic field (RF-EMF) technologies are attracting attention for medical applications. RF-EMF based technologies are being used in healthcare support (e.g., RF identification (RFID) or telemetry), rehabilitation (e.g., assistive devices controlled by wireless-transmitted biosignals), and medical diagnosis or monitoring. Other important applications include thermal (e.g., ablation in cardiology and cancer treatment, coagulation device) and therapeutic treatments (e.g., diathermy). This session welcomes submissions for RF-EMF-related computational and theoretical studies, practical implementations, or emerging RF-EMF technologies in healthcare.</p>	

Session	Number of slots
K 12	6
Biomedical Applications of static and Low Frequency EMF (vagus nerve stimulation, TMS, DBS, MRI)	
Conveners: Masaki Sekino, Lluís Mir, Antonio Sarolic	
Convener Emails: sekino@bee.t.u-tokyo.ac.jp, Luis.MIR@cns.fr, antonio.sarolic@fesb.hr	
Recent developments of the Biomedical applications of static and low frequency electric and magnetic fields will be presented and discussed in this session. Stimulation of peripheral nerves with physiological repercussions both centrally and peripherally will be one of these applications. Invasive or noninvasive brain stimulation by pulsed magnetic fields or directly delivered small currents will be another central component of the session. New results of the application of short and intense pulsed electric fields will also be reported.	

Session	Number of slots
K 13	6
European Workers EMF directive 2013/35/EU. Environmental Exposure Assessment and Dosimetry	
Conveners: Isabelle Magne, Gernot Schmid	
Convener Emails: isabelle.magne@edf.fr, gernot.schmid@seibersdorf-laboratories.at	
The session shall give an update of latest scientific procedures for exposure assessment by measurements and/or numerical simulation in occupational settings according to European Workers EMF directive 2013/35/EU. Moreover, particular occupational settings leading to high personal exposure and/or settings which lead to open questions about the appropriate assessment procedures shall be pointed out.	

Session	Number of slots
K 14	6
Facing challenge of 5G Exposure: Assessment of exposure induced by MuMiMo	
Conveners: Emmanuelle Conil, Teruo Onishi, Sangbong. Jeon	
Convener Emails: emmanuelle.conil@anfr.fr, teruo.onishi@ieee.org, sbjeon@etri.re.kr	
5G exposure is inducing large debate. The challenges that are facing the assessment to 5G infrastructure is linked to new frequency (that is cover in other session) as well as the exposure induced by MuMiMo below 6 GHz. In this case the antenna pattern is time varying and methods that are usually used are not applicable . This session will focus on recent studies that have been conducted to define methods that can be used to assess experimentally or numerically the exposure induced by 5G MuMiMo below 6 GHz.	

Session	Number of slots
K 15	4
Facing challenge of 5G Exposure: Assessment of power density from wireless systems over 6 GHz	
Conveners: Teruo Onishi, Emmanuelle Conil, Kensuke Sasaki	
Convener Emails: teruo.onishi@ieee.org, emmanuelle.conil@anfr.fr, k_sasaki@nict.go.jp	
<p>This session focus on assessment method of exposure to protect human from excessive exposure from RF sources using new wireless technologies, such as 5G system, operating at the frequencies above 6 GHz where power density will be applied as metric in the international guidelines. The recent advances in the methodologies to assess power density close proximity to a RF source and the compliance procedures of EMF applications are important topics in this session. Exposure assessment for any other systems operate using millimeter-wave, e.g., radar system, high-speed wireless communication system, and base station, are also interest in this session.</p>	

Session	Number of slots
K 16	4
Methods and equipment for EMF monitoring	
Conveners: Masao Taki, Joe Wiart	
Convener Emails: masao@tmu.ac.jp, Joe.wiart@telecom-paris.fr,	
<p>The increasing use of wireless telecommunication systems with the risk perception that relative infrastructures are inducing, has pointed out the need for a monitoring of the Radio Frequency (RF) electromagnetic field (EMF) exposure. This need is important since the population concern about 5G networks deployment, illustrates the importance of such a characterization. This session will focus on recent studies that are addressing such monitoring via sensors networks, drive test or simulation.</p>	

Session	Number of slots
K 17	4
EMF Standards and Health Protection	
Conveners: Guglielmo D'Inzeo, Jafar Keshvari	
Convener Emails: guglielmo.dinzeo@uniroma1.it, jafar.keshvari@aalto.fi	
<p>EMF Standards and Health Protection and in particular those published by ICNIRP and IEEE are fundamental for Health Protection</p> <p>This session will focus on recent ICNIRP and IEEE publications and discussions.</p>	

Session	Number of slots
K 18	6
Effect of exposure to electric, magnetic, and electromagnetic field animal experiments	
Conveners: Young Hwan Ahn, Akira Ushiyama	
Convener Emails: yhahn00@naver.com, yhahn@ajou.ac.kr, ushiyama.a.aa@niph.go.jp	
This session will focus on animal experiment dedicated to study the effect of exposure to electric, magnetic, and electromagnetic field. The aim of this session is to discuss the recent investigations related to biological effects of animal exposed to electric, magnetic and electromagnetic fields.	

Session	Number of slots
K 19	6
Effect of exposure to electric, magnetic, and electromagnetic field cell experiments	
Conveners: Vijayalaxmi Vijayalaxmi, Junji Miyakoshi	
Convener Emails: VIJAY@uthscsa.edu, miyakoshi@rish.kyoto-u.ac.jp	
The focus of the session is to discuss the investigations related to the biological and health effects in animal and human cells exposed in vitro and/or in vivo to electric, magnetic and electromagnetic fields.	

Session	Number of slots
K 20	6
Open session	
Joe Wiart, Koichi Ito	
joe.wiart@telecom-paris.fr, ito.koichi@faculty.chiba-u.jp	
The session will host papers that do not adequately fall in the other topics of commission K.	