

XXX URSI General Assembly and Scientific Symposium
August 13-20, 2011 Istanbul, Turkey

FINAL SCIENTIFIC PROGRAM BY COMMISSION

All Commissions

Opening Ceremony

Sunday, August 14, 1520 – 1800

Room: Anadolu Auditorium

Opening Reception

Sunday, August 14, 1800 – 2000

General Lecture 1

Monday, August 15, 1100 – 1200

Room: Anadolu Auditorium

“Recent Advances and Problems in Millimeter Wave Communications”

Speaker: Aldo Paraboni paraboni@elet.polimi.it

Convener: Madhu Chandra madhu.chandra@etit.tu-chemnitz.de

General Lecture 2

Wednesday, August 17, 1100 – 1200

Room: Anadolu Auditorium

“The Radio Physics of Meteors: High Resolution Radar Methods Offering New Insights”

Speaker: Asta Pellinen-Wannberg asta.pellinen-wannberg@irf.se

Convener: Michael T. Rietveld mike.rietveld@eiscat.uit.no

Banquet

Wednesday, August 17, 1900 – 2200

General Lecture 3

Friday, August 19, 1100 – 1200

Room: Anadolu Auditorium

“Position, Navigation and Time via Global Positioning Systems”

Speaker: Per K. Enge per.enge@stanford.edu

Convener: Umran Inan inan@nova.stanford.edu

Public Lecture

Saturday, August 20, 1100 – 1200

Room: Anadolu Auditorium

“Lightning-induced Effects in the Ionosphere and the Radiation Belts”

Speaker: Umran S. Inan inan@nova.stanford.edu

Convener: Hamit Serbest hamitserbest@gmail.com

Closing Ceremony

Saturday, August 20, 1200 – 1340

Room: Anadolu Auditorium

Commission A – Electromagnetic Metrology

Room: Dolmabahçe C

Chair: P. Banerjee pbanerjee@mail.nplindia.ernet.in

Vice-Chair: William A. Davis wadavis@vt.edu

AD – Optical Frequency Metrology

Monday, August 15, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Feng-Lei Hong f.hong@aist.go.jp
Thomas Schibli trs@colorado.edu

Recent decade has seen tremendous progress in optical clocks. Optical clocks, which use light promise to be even more accurate than microwave atomic clock. With the development of frequency combs from femtosecond mode-locked lasers, it has become simpler to relate the stable optical frequency to a microwave frequency standard such as a cesium atomic clock. Topics include optical devices, instruments, and technologies for precision measurements of time and frequency; optical frequency standards; optical clocks; lasers, frequency-comb generation, precision optical interferometry and other novel measurement methods.

ABD – Low Noise Microwave Generation

Monday, August 15, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Mike Tobar mike@physics.uwa.edu.au
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Topics include: low noise microwave oscillators based on electrical or dielectric resonators, optoelectronic oscillators, cryogenic technologies for low noise oscillators, optical techniques for low noise microwave generation, microwave frequency references.

Commission A business meeting 1

Monday, August 15, 1720 - 1840

A03 – Time Scale

Tuesday, August 16, 0800 – 0920; 0940 – 1200 (11 papers)

Convener: P. Tavella tavella@inrim.it

Continuous efforts are being put by many laboratories to make the time scale more stable and more accurate. There is a need to review, from time to time, the progress and to deliberate on the strategy for the time scale keeping in view of the advancement of technology and availability of better clocks.

A04 – EM Materials

Tuesday, August 16, 1340 – 1540 (6 papers)

Convener: Sedki Riad sedki@vt.edu

This session is to review the methods of EM material measurement and point out new techniques, calibration issues, and validation of material measurement techniques.

API – Poster session 1

Tuesday, August 16, 1600 – 1900

Conveners: P. Banerjee pbanerjee@mail.nplindia.ernet.in
William A. Davis wadavis@vt.edu

A05 – Nano Metrology

Wednesday, August 17, 0800 – 0920; 0940 – 1040 (7 papers)

Convener: Alois P. Freundorfer al.freundorfer@queensu.ca

Research on nanoscience is prevalent in all parts of the world. Nanoscience demands measurement in nano scale particularly in dimensional measurement. This challenge opens up a new direction of research. Many laboratories are putting extensive efforts in this direction. The current status and strategies and of this field needs to be discussed and deliberated.

AB – Antenna Measurement

Wednesday, August 17, 1340 – 1540; 1600 – 1700 (10 papers)

Conveners: William A. Davis wadavis@vt.edu

Emmanuel Van Lil emmanuel.vanlil@esat.kuleuven.be

Advance the state-of-the-art in antenna measurements, with an emphasis on both near-field measurements and remote measurements. Near-field measurements have made many strides in recent years, with new fast methods. The methods have given rise to new concerns about calibration and interaction of the measurement system and the antennas. Remote measurements offer new techniques for the measurement of antennas without direct connection, removing the concerns of feed-line affects.

Commission A business meeting 2

Wednesday, August 17, 1720 – 1820

AJ – Pulsar Timing

Thursday, August 18, 0800 – 0920; 0940 – 1100 (8 papers)

Conveners: Demetrios.Matsakis matsakis.demetrios@usno.navy.mil

Michael Kramer mkramer@mpifr-bonn.mpg.de

Pulsar timing is not only of interest to pulsar astronomers and physicists for testing theories of gravity, but also to the timing community. Recent advances in radio astronomy technology enable significant progress in the timing precision that will cumulate in the extraordinary experiments possible with the future Square Kilometer Array (SKA). As SKA pathfinder instruments and experiments are being commissioned and/or completed, it is timely to review the current status of pulsar timing, its applications, and the prospects for the future.

AT – Single Electron Tunneling (SET)

Thursday, August 18, 1100 – 1200 (A tutorial lecture)

Speaker: Stephen Giblin stephen.giblin@npl.co.uk

Convener: P. Banerjee pbanerjee@nplindia.org

Standard of voltage and resistance have now been based on fundamental constants. However, there is no fundamental representation of current. Single electron tunneling (SET) technique is being explored to establish the standard of current relating it to fundamental constant.

AK – FM Exposure to Human Health

Thursday, August 18, 1340 – 1540 (6 papers)

Conveners: Dominique Placko dominique.placko@lesir.ens-cachan.fr

M. Kenderessy ???

There continues to be concerns raised in the public of the effects of exposure to electromagnetic radiation, particularly with cell phones. Techniques to address these concerns include specific absorption rate as well as standards for hearing-aid interference. Additional concerns address the evaluation of EM measurement techniques for evaluation of human health conditions, including cancer and heart condition.

AP2 – Poster Session 2

Thursday, August 18, 1600 – 1900

Conveners: P. Banerjee pbanerjee@mail.nplindia.ernet.in

William A. Davis wadavis@vt.edu

AG – Time Transfer: TWSTFT, GNSS Timing, etc.

Friday, August 19, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: P. Banerjee pbanerjee@mail.nplindia.ernet.in

W.Lewandowski wlewandowski@bipm.org

Susan Skone shskone@ucalgary.ca

With the availability of ultra stable clocks in different parts of the world separated by few thousands of kilometers, it has become a challenge to compare their performances with a short span of time. Different techniques of time transfer are being reviewed to improve their performances to meet the challenge. Satellite navigation systems also demand time transfer with high precision.

A10 – Quantum Detection: Counting of Single Flux and Single Charge Quanta for Metrology

Friday, August 19, 1340 – 1540; 1600 – 1720 (10 papers)

Convener: A. Manninen antti.manninen@mikes.fi

Commission A business meeting 3

Friday, August 19, 1720 – 1900

AC – Communication Metrology

Saturday, August 20, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Ozlem Kilic ozlem.kilic@ieee.org

P. Murphy p.murphy@ucc.ie

New communications technology leads to the inevitable need for new measurement techniques to properly characterize they systems. These measurements include techniques for evaluating spectrum use, antenna characterization, and modulation performance. Such measurement equipment includes sliding correlators, modulation displays, and many more system performance devices.

Commission B – Fields and Waves

Room: Anadolu Auditorium

Chair: Karl J. Langenberg langenberg@uni-kassel.de

Vice-Chair: Giuliano Manara g.manara@iet.unipi.it

B01 – Electromagnetic Theory

Monday, August 15, 0800 – 0920 (4 papers)

Conveners: Gerhard Kristensson gerhard.kristensson@eit.lth.se

Mats Gustafsson mats.gustafsson@eit.lth.se

This session addresses the most recent advances in electromagnetic theory. It includes all aspects of electromagnetics, and all frequency ranges from statics to optics, including both time and frequency formulations. Of special interest are advances in mathematical and material modeling, solutions of canonical problems, analytic identities, guided wave, mathematical aspects of numerical methods, random media, asymptotic methods, and antenna theory.

BT – Passive and Active Metamaterial Constructs and Their Impact on Electrically Small Radiating and Scattering Systems

Monday, August 15, 0940 – 1040 (B tutorial lecture)

Speaker: Richard W. Ziolkowski ziolkows@ece.arizona.edu

Convener: Karl J. Langenberg langenberg@uni-kassel.de

In the decade since the inception of the metamaterials field, there have been a number of exciting advances in understanding and confirming many of their exotic physics properties. Many of these attributes have led to the consideration of engineering metamaterials and metamaterial-inspired structures for a variety of applications. This includes the miniaturization of resonators and their use for improving the performance characteristics of electrically small antennas in the VHF, UHF and microwave regimes and of electrically small scatterers in the optical regime. Active metamaterial constructs have been introduced to increase the bandwidths at low frequencies and to overcome the losses at high frequencies. The theoretical designs of many of these highly

subwavelength systems and their simulated performance characteristics have been confirmed experimentally. These concurrences between theory and experiment will be highlighted.

BD1 – Metamaterial Theory

Monday, August 15, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Richard W. Ziolkowski ziolkows@ece.arizona.edu
Christophe Caloz christophe.caloz@polymtl.ca
Nader Engheta engheta@ee.upenn.edu

In the last decade, there has been a renewed interest in using fabricated structures at various length scales to develop composite materials that mimic known material responses or that qualitatively have new, physically realizable response functions that do not occur, or may not be readily available, in nature. Researchers have studied the exotic physics associated with these metamaterials and the potential use of their properties for interesting engineering applications, including lenses, cloaking, antennas, small waveguides and cavities, and other devices at microwave, millimeter-terahertz and optical frequencies. We have two sessions dedicated to this topic. This joint BD session on metamaterials, as a companion to another joint DB session, is intended to review and to present recent theoretical research advances in metamaterials.

Commission B business meeting 1

Monday, August 15, 1720 - 1840

B03 – Hybrid Methods

Tuesday, August 16, 0800 – 0920; 0940 – 1200 (11 papers)

Convener: Prabhakar H. Pathak pathak.2@osu.edu

This session will focus primarily on ray optical (UTD/GTD), or wave optical (PO/PTD), or beam optical (Gaussian beams and complex source beams) or numerical methods (MoM, FEM, FE-BI), etc., which may be used in some systematic form of an appropriately paired hybrid combination to solve a variety of electrically large, and also possibly complex, EM antenna and scattering problems that otherwise cannot be solved efficiently and in a tractable fashion by any of these methods when just used alone. Basically, each method will generally exhibit domains of applicability and domains where they fail or maybe even become intractable; thus, the main purpose of any hybridization is to overcome the limitations of any one approach by systematically combining it with one or more of the other appropriate methods, so that the resulting hybrid solution can remain valid over the entire domain of interest while being also relatively efficient for applications. Papers dealing with various hybrid approaches, as well as with many important issues encountered in the systematic development of various hybridization methods, respectively, will be expected to form the major part of the presentations within this special session.

B04 – Electromagnetic Field Transformations for Measurements and Numerical Methods

Tuesday, August 16, 1340 – 1540 (6 papers)

Convener: Thomas Eibert eibert@tum.de

Historically field transformation methods for measurements and numerical modeling techniques have been developed independent from each other. In both fields, enormous progress has been achieved during the past years and very powerful algorithms are available for various applications. Further progress can however be expected, if future research is stimulated by joint synergetic effects from both disciplines.

The session focuses on field transformation methods for measurements and numerical modeling. Particular contributions are invited from the field of near-field far-field transformations and from the field of near-field near-field transformations including diagnostics of antennas and scatterers. Novel algorithms with good numerical efficiency and wide applicability are of interest.

BP1 – Poster session 1

Tuesday, August 16, 1600 – 1900

Conveners: Karl Langenberg langenberg@uni-kassel.de
Giuliano Manara g.manara@iet.unipi.it

B05 – Multiscale Modeling and Applications to Composite Materials

Wednesday, August 17, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Niklas Wellander niklas.wellander@foi.se
Daniel Sjöberg daniel.sjoberg@eit.lth.se

Composite materials can exceed the performance of their component materials, for instance in terms of achieving high electrical conductivity while maintaining low weight. The modeling and characterization of such materials present many challenges: how can we compute the effective (or homogenized) properties when the microscopic structure is known and how sensitive is this calculation to modeling errors, how can we verify that these properties are actually present in the final design and application (there is a need for new measurement methodologies to characterize general material properties), and what can be said when our modeling assumptions (usually that the wavelength is very large compared to the microstructure) are not valid? In this session, we focus on the electromagnetic properties of composite materials, and the mathematical and engineering techniques used to describe them. This includes, but is not limited to: multiscale analysis, spectral theory, homogenization, two-scale convergence, measurements and characterization, applications of composite materials etc.

B06 – Adaptive Antennas

Wednesday, August 17, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Tapan Sarkar tsarkar@syr.edu
Magdalena Salazar-Palma salazar@tsc.uc3m.es

Historically adaptive antenna processing has been based primarily on beam forming. However, when superresolution is desired, i.e., cancellation of interferers located in the main beam then the classical beam forming techniques are not very useful. The goal of this session is to explore alternate ways of processing the data. Secondly, historically adaptive processing is based on statistical averages. This was a good start. However, when one is interested in sending data then each piece of information need to be extracted accurately. What happens on the average will not be very useful. Finally, modern environments are highly dynamic. Hence, it is necessary to discuss techniques that are suitable for highly dynamic environment. Finally, antenna mutual coupling and effects of the platform on which the array is mounted need to be considered for a real deployment. Adaptive techniques then should integrate the electromagnetic analysis with signal processing. This session will attempt to address these issues.

Commission B business meeting 2

Wednesday, August 17, 1720 – 1820

BD2 – Numerical Techniques for Multi-Physics Electromagnetics

Thursday, August 18, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: Peter Russer p.russer@gmail.com
Andreas Cangellaris cangella@ad.uiuc.edu

Multi-physics electromagnetics refers to physical phenomena that are governed by the coupled interaction of electromagnetic field theory with other physical domains such as mechanics, acoustics, fluid dynamics, thermodynamics, and quantum mechanics. While such coupled interactions have been relevant to numerous engineering electromagnetics problems for quite some time, recent trends and opportunities in the design of modern nano-electronic devices call for the implementation of modeling methodologies and computer algorithms that comprehend the

coupling of the different physical domains for the purpose of design exploration and quantitative performance behavior. The applications are numerous, with the conceptualization of novel devices for radio frequency and optics applications being one of the numerous opportunities for technological innovation. The objective of this session is to provide a forum for the discussion of some of the most recent advances in the development of models and algorithms for the solution of coupled systems of Maxwell's equations, transport equations, Euler-Lagrange equations, Navier-Stokes' equations, the heat equation and the Schroedinger equation. Of interest are both methods motivated by and streamlined to comprehend accurately the pertinent physics that govern the operation of specific multi-physics devices and methods that address computationally challenging issues in such modeling, including, the multi-scale (temporal and spatial) nature of multi-physics interactions and the presence of uncertainty or variability in the input parameters of the model.

BJ – Very Large Antenna Arrays for Radio Astronomy

Thursday, August 18, 1340 – 1540 (6 papers)

Conveners: Amir Zaghoul amirz@vt.edu
William Imbriale imbriale@jpl.nasa.gov

This is a joint session between Commissions B and J on Large Antenna Arrays for Radio Astronomy. The use of large arrays for radio astronomy spans a number of decades, and includes different technologies. Frequency bands from low frequencies to Terahertz have been employed. In addition to papers on current active topics such as the Square Kilometer Array (SKA), the Long Wavelength Array (LWA) and ground-based Terahertz Arrays, the session will also address design, analysis, optimization, and simulation techniques for large arrays in general, with the common thread of radio astronomy applications.

BP2 – Poster Session 2

Thursday, August 18, 1600 – 1900

Conveners: Karl Langenberg langenberg@uni-kassel.de
Giuliano Manara g.manara@iet.unipi.it

B09 – Beam Methods

Friday, August 19, 0800 – 0920; 0940 – 1040 (7 papers)

Convener: Amir Shlivinski amirshli@ee.bgu.ac.il

Beams being localized (in space and/or space-time) wave objects provide an efficient set of basis functions for numerous wave-propagation related problems. Moreover, beam summation methods being a mathematical tool with the possibility to physically realize new types of beam solutions make beams and beam methods an increasingly favorable template for wave-propagation analysis-design and modeling problems. This session will concentrate on beam methods with the intention to give a broad and an up-to-date view on analytical, numerical and experimental beam related issues in diverse disciplines such as wave propagation in stratified medium, antenna synthesis, medium imaging, and fast numerical methods, to name but a few.

B10 – Inverse Scattering and Imaging

Friday, August 19, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Christian Pichot christian.pichot@unice.fr
Toru Sato tsato@kuee.kyoto-u.ac.jp

Electromagnetic wave techniques, both active and passive, are gathering strong attention in sensing and imaging related to security applications. They include landmine detection, identification of intruders, finding human bodies in disaster events, vehicle collision avoidance, security checking at airports, etc. Used wavelength now ranges from radio to X-ray waves. One of recent driving forces is the use of UWB (Ultra Wideband) signals, which dramatically improves the range resolution, and thus extends the applicability of radar technique to targets

with very short ranges, such as indoor and medical imaging. Many of these applications require super resolution and/or very fast computation in order to provide real time images with high quality and reliability. Advanced inverse scattering algorithms and imaging techniques are the key issues of the session. Theoretical investigations and studies aiming to other type of applications are of course welcome.

Commission B business meeting 3

Friday, August 19, 1720 – 1900

B11 – Novel Mathematical Methods in Electromagnetics

Saturday, August 20, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Kazuya Kobayashi kazuya@tamacc.chuo-u.ac.jp

Yury Shestopalov yuri.shestopalov@kau.se

This session will cover recent achievements in the field of advanced mathematical techniques as applied to mathematical problems arising in all branches of electromagnetics. Topics of interest include, but are not limited to the following areas:

electromagnetic theory; novel mathematical techniques; analytical regularization methods; canonical problems; numerical methods; scattering and diffraction; high-frequency techniques; guided waves; inverse problems; random media and rough surfaces; waves in complex media; time-domain techniques; nonlinear phenomena; computational electromagnetic.

Commission C – Radiocommunication Systems
and Signal Processing

Room: Dolmabahçe A

Chair: Takashi Ohira ohira@tut.jp

Vice-Chair: Marco Luise marco.luise@iet.unipi.it

C01 – Frequency Converters and Mixers

Monday, August 15, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Kenji Itoh itoh.kenji@ieee.org

Kenichi Tajima tajima.kenichi@bp.mitsubishielectric.co.jp

In radio communication systems and radar systems, frequency generation and conversion techniques are quite important to improve the system performance in aspects of frequency spectrum efficiency and spurious free dynamic range. In this session, frequency generation and conversion techniques will be focused on along with new circuit topologies and theories.

C02 – Advanced Architectures of High-Performance Power Amplifiers for Mobile
Communications Systems

Monday, August 15, 1340 – 1540 (6 papers)

Conveners: Shoichi Narahashi narahashi@nttdocomo.co.jp

Noboyuki Itoh nobby.itoh@ieee.org

Future mobile communications systems will be required to provide high-capacity and high-speed data transmission services to cope with the growing and diversifying user needs. From the standpoint of RF circuit design for base stations or mobile terminals, it is indispensable to take "low power consumption" into consideration for not only providing easy maintenance and long-life operation, but also contributing to the establishment of sustainable human development. A power amplifier is the key device since it consumes most of the provided power in the RF circuit for base station and mobile terminals. Topics of interest in this session include nonlinear compensation techniques, highly-efficient power amplifier architectures including envelope tracking, envelope elimination and restoration.

CD – Advanced RF Integrated Circuits

Monday, August 15, 1600 – 1720 (4 papers)

Conveners: Nobuyuki Itoh nobby.itoh@ieee.org
Shoichi Narahashi narahashi@nttdocomo.co.jp

During this century, semiconductor devices of wireless application have been dramatically changed their process technology and chip integration scale. The compound semiconductor device such as GaAs, InP, etc. used to be main stream of wireless applications but nowadays silicon-based devices such as SiGe-BiCMOS and CMOS have been substituted. Simultaneously, number of transistors in wireless chip has been increasing approximately 100 times along this direction. This session will be covered all about wireless integrated circuits and their all related fields, the process technologies, device technologies, compact modeling, integrated circuits design such as PAN, LAN, MAN, and WAN, and individual wireless circuits design such as LNAs, Mixers, VCOs, and PLLs.

Commission C business meeting 1

Monday, August 15, 1720 – 1840

CB – Antenna Channel Interactions for Future Wireless Communications

Tuesday, August 16, 0800 – 0920; 0940 – 1020 (6 papers)

Conveners: Buon Kiong Lau bkl@eit.lth.se
Koichi Ogawa ogawa.koichi@jp.panasonic.com

Despite that multiple-input-multiple-output (MIMO) systems have been an active research topic for over a decade, relatively little attention was given to antenna and propagation (AP) issues. However, as the technology matures and is considered for practical implementations, AP aspects are gaining increasing attention. After all, AP characteristics will fundamentally influence the potential of MIMO systems, as can be seen by the MIMO channel being a function of antenna and propagation conditions. In this session, the purpose is to highlight the impact of antenna channel interactions in the design and implementation of future wireless communication systems such as LTE-Advanced. Topics of interest include design of small multiple antenna terminals, effect of user on the performance of such terminals and antenna channel polarization properties.

C05 – Radio Science for Information Security and Social Safety

Tuesday, August 16, 1020 – 1200 (5 papers)

Conveners: Takashi Ohira ohira@tut.jp
Masamune Takeda takeda3026@maspro.co.jp
Satoru Aikawa aikawa@eng.u-hyogo.ac.jp

Radio science is expanding its application fields not limited to usual wireless communications but also to a variety of areas such as information security and social safety. Wave propagation reciprocity in multiple-path channels can be exploited to create a common secret key for data encryption between wireless terminals. Secure generation of such keys versus steeling approach to them must be an exciting research topic. Wave propagation linearity in line-of-sight channels can be exploited to remotely sense an obstacle behind cloths and even behind a fire flame. Such property of waves and passive sensing techniques make it possible to find unsolicited items carried by suspicious passengers at airport security check gates. This session intends to discuss the theory and to present the latest research and development achievements based on those aspects.

C06 – Green Communications

Tuesday, August 16, 1340 – 1540 (6 papers)

Conveners: Jacques Palicot jacques.palicot@supelec.fr
Naoki Shinohara shino@rish.kyoto-u.ac.jp

The transmitted data volume increases approximately by a factor of 10 every 5 years, corresponding to an increase of the associated energy consumption by approximately 16 – 20 % per year. Currently, 3 % of the worldwide energy is consumed by the ICT sector contributing to about 2 % of the worldwide CO₂ emissions (comparable to the world-wide CO₂ emissions by airline industry or one quarter of the worldwide CO₂ emissions by cars). Doubling of energy consumptions every 5 years imposes serious concerns for the environment. Therefore, lowering energy consumption of future wireless radio systems is demanding greater attention and requires new technologies and solutions and is becoming an important area of research. This session aims to bring to Radio Sciences community new results dealing with sustainable development in the radio communications area. Among others, the topics of this session concern algorithms for energy efficiency, energy efficient hardware, spectrum recycling, electromagnetic pollution, and so on.

CP1 – Poster session 1

Tuesday, August 16, 1600 – 1900

Conveners: Takashi Ohira ohira@tut.jp
Marco Luise marco.luise@iet.unipi.it

CBD – Vehicular Communications

Wednesday, August 17, 0800 – 0920 (4 papers)

Conveners: Alain Sibille alain.sibille@ensta.fr
Tricia Willink tricia.willink@crc.ca

Vehicular communications are gaining a strong interest from both industry and governments as they can contribute to major societal progress such as transport safety, transport efficiency for people and last but not least energy efficiency and sustainable development. However the gaps to cross are both economical and technical, since such communications must be safe, secure, low-cost and flexible enough to accommodate a variety of vehicle types and operating conditions. Standards such as 802.11p have been developed for this purpose and spectrum allocations are currently under consideration throughout the world, but the demonstration of operational vehicular networks is still expected. Evaluating the performance of these systems requires radio channel models able to account for a variety of propagation environments between vehicles and with the infrastructure. Dedicated antennas need be developed with adequate performance and placement, given the various constraints. Finally security, robustness, throughput and latency are strong requirements which imply efforts in designing the various protocol layers, given the specificities of the radio and electromagnetic environment. These issues are at the heart of the “Vehicular communications” session, whose goal is to highlight the interacting technical challenges and solutions, for these systems to reach maturity in the near term.

CT – Six-port Wave Correlator Theory and Practical Application to RF Network Analysis

Wednesday, August 17, 0940 – 1040 (C tutorial lecture)

Speaker: Yoshiyuki Yakabe yakabe@ice.uec.ac.jp
Convener: Takashi Ohira ohira@tut.jp

This tutorial lecture is intended to introduce the basic concept and principle of the six-port wave correlator, and to present the latest advancements in its theory and techniques. The lecture starts with some fundamentals on the six-port reflectometer dating back to its first proposal by Glenn F. Engen. The key feature of the scheme is to measure the reflection coefficient of RF circuits without resorting to heterodyne conversion. This implies a possibility to measurement of S₁₁ in both magnitude and phase, free from frequency limitation. Next, the concept is extended to a sixport wave correlator on which we focus from the viewpoint of establishing a new scheme for characterizing the full S matrix, like what can be carried out by vector network analyzers. Finally, we explore some specific microwave applications of the six-port network, such as beam direction

finding, Doppler frequency measurement, and RF digital receiver. The lecture is full of interesting ideas and techniques for a variety of applications in microwave and millimeter-wave scientific fields.

CHGBDJK – Solar Power Satellites and Wireless Power Transmission

Wednesday, August 17, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Naoki Shinohara shino@rish.kyoto-u.ac.jp
Kozo Hashimoto kozy@rish.kyoto-u.ac.jp
Kristian Schlegel schlkris07@email.de

Solar power satellite (SPS) is important for a possible clean power supply for mankind in this century. URSI published White Paper on SPS Systems in 2007. One of the key issues of the SPS is wireless power transmission (WPT). Since all commissions are related to SPS, contributions from all the commissions are welcome. Session subjects include: WPT and its ground applications, passive and active microwave devices, huge antenna arrays, retrodirective systems, rectenna, antennas in plasmas, self calibration, compatibility with telecommunications and radioastronomy, bio-effects, the interactions of the microwave beam with the ionosphere and the atmosphere, effects of heavy ions ejected from the electric spacecraft propulsion engine to the magnetosphere.

Commission C business meeting 2

Wednesday, August 17, 1720 – 1820

CA – Propagation Measurement Based Performance Evaluation of Advanced MIMO Systems

Thursday, August 18, 0800 – 0920; 0940 - 1200 (11 papers)

Conveners: Reiner Thomae Reiner.Thomae@tu-ilmenau.de
Koichi Ogawa ogawa.koichi@jp.panasonic.com

Future mobile radio systems like 3GPP LTE and LTE Advanced will take more and more advantage from MIMO radio interfaces including distributed and cooperative MIMO, hybrid switching vs. diversity MIMO, enhanced precoding schemes, relay links etc. The performance of all these methods heavily depends on the propagation channel and its interaction with the antennas at both sides of the link. Realistic performance evaluation must rely on measured channel data and measurement based channel models which are representative for certain propagation environments and which explicitly contains the MIMO performance of the user equipment. This convened session should address the following topics: Results of channel sounder measurement campaigns in advanced MIMO deployment scenarios and test beds (LTE, LTE Advanced, WIMAX), link and system level performance prediction of distributed multi-user MIMO including meshed cooperative and relay networks based upon propagation measurements, MIMO channel model parameter estimation from sounding data, MIMO terminal evaluation in realistic environments based on synthesized electromagnetic wave fields (OTA, over-the-air testing).

C10 – Standardization Activities in Radio Science

Thursday, August 18, 1340 – 1540 (6 papers)

Conveners: Kenjiro Nishikawa nisikawa@ieee.org
Kenji Itoh itoh.kenji@ieee.org

This session covers the latest standardization activities of wireless systems and technologies including ITU, IEEE, ESTI, ECMA, IEC, etc. Frequency spectrum management, broadband and ultra-high-speed wireless communication systems, and important devices for wireless systems are highlighted and discussed.

CP2 – Poster Session 2

Thursday, August 18, 1600 – 1900

Conveners: Marco Luise marco.luise@iet.unipi.it
Takashi Ohira ohira@tut.jp

C11 – Power Amplifier Considerations for Software Radio Systems

Friday, August 19, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Yves Louët yves.louet@supelec.fr
Marco Luise marco.luise@iet.unipi.it

Software Radio systems are about to address any waveforms in multi-standard contexts. This implies many upcoming challenges regarding both software and hardware issues. One of these concerns power amplification which appears to be a salient bottleneck of Software radio systems because signals to be amplified may have high power fluctuations. This session intends to cover solutions to counteract impairments due to power amplification in a software radio context. It includes peak to average power ratio (PAPR), linearization, power amplifier design (and not limited to) issues in any multi-carrier systems.

C12 – Multiple Antenna Technologies for Communication Systems and Radar

Friday, August 19, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Sana Salous sana.salous@dur.ac.uk
Koichi Ogawa ogawa.koichi@jp.panasonic.com

Multiple antenna technology has been extensively studied for short range wireless applications in particular in the UHF band. The HF band suffers from long path delays which result in very low data rates on the order of a few kbps. Due to the relatively long wavelength, HF multiple antenna techniques require large sites for spatial separation of antennas. Antenna techniques that employ heterogeneous arrays and collocated antennas are a strong candidate for such applications. MIMO also offers advantages in radar where the radar cross section and Doppler estimates are dependent on the angle of arrival with possible blind Doppler angles. These disadvantages can be alleviated with multiple antenna technology and using orthogonal waveforms for the multiple transmissions in distributed sites. This differs from conventional radar systems. In contrast to multi-static radar, in which the different stations process the signals first separately and fuse their results later, the different received signals in MIMO radar are processed jointly. MIMO radar also offers transmit diversity where different orthogonal waveforms can be transmitted simultaneously. This session will cover aspects of MIMO in the HF band, homogenous versus heterogeneous antenna arrays and collocated antenna arrays as well as various aspects of MIMO radar.

Commission C business meeting 3

Friday, August 19, 1720 – 1900

C13 – Signal Processing Advances for Cognitive Radio

Saturday, August 20, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Jacques Palicot jacques.palicot@supelec.fr
Vinod Prasad asvinod@ntu.edu.sg

The concept of Cognitive Radio (CR) presents itself as the technology that will have the autonomy and the cognitive abilities to become aware of its environment as well as of its own operational abilities. The purpose of this new concept is to meet the user's expectations, i.e., maximizing his profit without compromising the efficiency of the network. Thus, it presupposes the capacity to collect information from its surrounding environment (perception), to digest it (learning, decision making and predicting problems) and to act in the best possible way by considering several constraints and the available information. Therefore, it is a new paradigm of wireless communication whose purpose is to combine Software Defined Radio technologies and Cognitive Abilities in order to achieve Cognitive Radio equipments. This basic idea of Cognitive

Radio involves a large spectrum of areas going from economical aspects to hardware and microelectronics problems through software architecture and middleware considerations. Among all these topics, Signal Processing (SP) is one of the most important because SP tools are used by all the others domains and because all the SP advances offer the possibility to reach cognitive radio. This session will describe advances in SP to reach this objective.

Commission D – Electronics and Photonics

Room: Dolmabahçe B

Chair: Franz X. Kaertner kaertner@mit.edu
Vice-Chair: S. Tedjini smail.tedjini@esisar.inpg.fr

D01: RFID Technology and Applications

Monday, August 15, 0800 – 0920; 0940 – 1040 (7 papers)

Convener: S. Tedjini smail.tedjini@esisar.inpg.fr

Even if the RFID concept was introduced many decades ago, it is still very attractive and fertile in terms of R&D and new applications. Today, RFID is seen as a very enabling technology and it is under consideration for thousands of applications covering a large variety of domains among them : ID papers, security, access control, toll road, ticketing, pharmacy, logistic, manufacturing, gambling, sensors, etc.. RFID is an enabling technology for identification by means of radiofrequency signals. RFID tags may be located on or in almost anything and RFID is used for a very wide variety of purposes in an extremely wide variety of locations. This session focus on the advances on RFID. It will cover all the aspects of RFID, from Tag technology to application like Internet Of Things.

DB1 – Modeling of High Frequency Devices and Circuits

Monday, August 15, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Peter Russer russer@tum.de
Irsadi Aksun iaksun@ku.edu.tr

The development will be characterized by a further increase of integration density, higher frequencies, lower power consumption and enhanced functionality. Wireless technology and vehicular technology and the need for high-speed digital circuits are major drivers for the increased demand for high-frequency and optoelectronic devices. On a long-term time scale also quantum information processing will come into consideration. The main characteristics of new technologies include nanoelectronic devices with structure dimensions from below 100 nm down to atomic structures, low-cost materials, low power electronics, and fast design cycles. Circuit elements will not only be connected via traditional wiring but also will directly interact via field coupling. In the near future nanoelectronics will be dominated by CMOS technology and the trends will include mixed signal techniques, systems on a chip, and systems in package. Long term research and development will go beyond CMOS and involve novel materials as graphene, carbon nanotubes, magnetic materials and superconductors, novel technologies as nanoimprint lithography and novel device concepts based on these materials and technologies. As the basis for the development of future high-frequency and optoelectronic nanoscale devices and circuits and systems based upon these devices advanced analytic and numerical modeling and simulation tools are required. These tools include the modeling oelectromagnetic, electron transport and other phenomena in a multiphysics environment. This session reviews the latest developments in this area.

Commission D business meeting 1

Monday, August 15, 1720 – 1840

D03 – Lasers

Tuesday, August 16, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: Alphan Sennaroglu asennar@ku.edu.kr
U. Morgner morgner@iqo.uni-hannover.de

This topic includes, but is not limited to laser sources covering all wavelength ranges from THz to the x-ray region. Lasing media comprise semiconductors, solid-state materials, fibers, gases or free electrons. The generated waveform may range from continuous waves to ultrashort pulses. Also high speed modulation of lasers, novel laser structures, amplifiers, laser applications and modeling are of interest.

DBC – Signal Processing Antennas

Tuesday, August 16, 1340 – 1540 (6 papers)

Conveners: S. Tedjini smail.tedjini@esisar.grenoble-inp.fr
H. J. Chaloupka h.chaloupka@hft.uni-wuppertal.de
Alain Sibille alain.sibille@ensta.fr

For many RF systems the antenna is the most important device and its performance will determine the overall characteristics of, for example, a wireless communication system. This session will focus on the evolution of the antenna function, which increasingly integrates electronics, sensors and signal processing. These new capabilities are transforming the original passive antenna to signal processing antenna (SPA). Signal-processing antennas combine a multiple-antenna-structure e.g. an array with signal-processing capabilities to enable adaptive and knowledge aided processing in space and time. By sensing the spatial and spectral properties of the electromagnetic environment SPAs can adaptively optimize the spatial and temporal signal processing operations in order to enhance system relevant performance metrics like the spectral efficiency in wireless communication systems and the probability of detection in radar. Furthermore, limits of adaptive SPAs can be overcome by combining prior knowledge with measured data (knowledge-aided processing).

DPI – Poster session 1

Tuesday, August 16, 1600 – 1900

Conveners: Franz X. Kaertner kaertner@mit.edu
S. Tedjini smail.tedjini@esisar.inpg.fr

DB2 – Plasmonics

Wednesday, August 17, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: F. de Fornel ffornel@u-bourgogne.fr
Nader Engheta engheta@ee.upenn.edu

Surface plasmons are interfacial electromagnetic modes that can be exploited to control the propagation and local oscillation of electromagnetic energy. This topical conference will explore fundamental and applied plasmonic concepts, the control and manipulation of local and propagating surface plasmons, plasmon dynamics, and novel plasmonic nanostructures.

DT – RFID Technology and Applications

Wednesday, August 17, 1340 – 1440 (D tutorial lecture)

Speaker: Manos M. Tentzeris etentze@ece.gatech.edu
Convener: Franz X. Kaertner kaertner@mit.edu

As the demand for low-cost, conformal, and power-efficient broadband wireless electronics increases, RF Identification (RFID) technologies get a more significant role, especially in "cognitive intelligence", "smart-skin" and "Internet-of-things" applications. The recent development of inexpensive, reliable, near-autonomous and durable wireless RFID-enabled sensor nodes could potentially revolutionize several applications, such as logistics, aero identification (aero-ID), anticounterfeiting, supply-chain monitoring, space, healthcare, and pharmaceutical, and is regarded as one of the most disruptive technologies to realize truly

ubiquitous ad-hoc networks. This tutorial will start with a historical review of RFID technologies as well as a brief description of their operation principle and the main challenges for RFID's widespread adoption. Major categories of RFID's (passive, active, semi-active) will be discussed in terms of pros and cons for various applications. Privacy, Health, Societal interrogations and issues will be covered. Plus, the foundations of the development of ultra-low-power RFID-enabled sensors will be presented along with ways to integrate power sources and power scavenging devices. Inkjet-printed RFID technologies on paper-based and flexible organic and plastic substrates will be reported and numerous potential future applications of RFID's in Internet of things, cognitive intelligence and ubiquitous sensor networks will conclude the tutorial.

DB3 – Metamaterial Applications

Wednesday, August 17, 1440 – 1540; 1600 – 1720 (7 papers)

Conveners: C. Caloz christophe.caloz@polymtl.ca
R. W. Ziolkowski ziolkows@ece.arizona.edu
N. Engheta engheta@ee.upenn.edu

In the last decade, there has been a renewed interest in using fabricated structures at various length scales to develop composite materials that mimic known material responses or that qualitatively have new, physically realizable response functions that do not occur, or may not be readily available, in nature. Researchers have studied the exotic physics associated with these metamaterials and the potential use of their properties for interesting engineering applications, including lenses, cloaking, antennas, small waveguides and cavities, and other devices at microwave, millimeter-terahertz and optical frequencies. We have two sessions dedicated to this topic. This joint DB session on metamaterials, as a companion to another joint BD session, is intended to review and to present recent research advances in the applications of metamaterials.

Commission D business meeting 2

Wednesday, August 17, 1720 – 1820

D07 – Micro and Nano Photonics

Thursday, August 18, 0800 – 0920; 0940 – 1200 (11 papers)

Convener: M. Watts mwatts@sandia.gov

High index contrast micro- and nano-photonics devices, photonic crystals, plasmonics, electronic and photonic integration. High density integrated photonics based on group IV as well as group III-VI semiconductor materials, metals and dielectrics. Passive and active devices and a combination thereof, design tools, or micro and nano-fabrication techniques. Nonlinear effects in micro and nano devices, linear and nonlinear effects enhanced by high index contrast waveguides, photonic crystals and plasmons.

D08 – Nonlinear Optics and Guided Wave Devices

Thursday, August 18, 1340 – 1540 (6 papers)

Conveners: Omer Ilday ilday@bilkent.edu.tr
G. Steinmeyer steinmey@mbi-berlin.de

This topic includes, but is not limited to, nonlinear wavelength conversion, optical parametric processes, QPM components and devices; wave mixing, stimulated scattering, self- and cross-phase modulation; nonlinear propagation and instabilities, continuum generation, filamentation and optical solitons; nonlinear optics in waveguides and fibers; novel nonlinear materials and structures; nonlinearities in gain media; nonlinear effects in nanostructures and semiconductor microstructures; methods and applications of nonlinear spectroscopy; novel optical applications of nonlinear phenomena; nonlinear optics of metamaterials; nonlinear optical effects in laser damage.

DP2 – Poster Session 2

Thursday, August 18, 1600 – 1900

Conveners: Franz X. Kaertner kaertner@mit.edu
S. Tedjini smail.tedjini@esisar.inpg.fr

DAF1 – Enabling Technologies for Millimeter and THz Wave Applications

Friday, August 19, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Rene Beigang rene.beigang@ipm.fraunhofer.de
Sami N. Gopalsami gopalsami@anl.gov
Hakan Altan haltan@metu.edu.tr
Tadao Nagatsuma nagatuma@ee.es.osaka-u.ac.jp

The latest developments in millimeter-wave and terahertz-wave devices for signal generation, transmission and detection including photonic/electronic devices and materials, metamaterials, MEMS, transmission media, etc. will be discussed, including their implementation to measurement and sensing systems.

DAF2 – Millimeter and THz Wave Applications, including NTU, security, communication, sensors, spectroscopy, etc.

Friday, August 19, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Rene Beigang rene.beigang@ipm.fraunhofer.de
Sami N. Gopalsami gopalsami@anl.gov
Hakan Altan haltan@metu.edu.tr
Tadao Nagatsuma nagatuma@ee.es.osaka-u.ac.jp

The topic includes recent progress in real-world and/or industrial applications of millimeter and THz waves in non-destructive testing, security, medicine/biology communications, spectroscopic and sensors.

Commission D business meeting 3

Friday, August 19, 1720 – 1900

DF – Hyperspectral Sensing and LIDAR

Saturday, August 20, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Emile Schweicher emile.schweicher@gmail.com
Maurus Tacke tacke@fom.fgan.de

Hyperspectral sensors (HS) may offer significant improvement over existing sensors in detecting camouflaged and hidden targets. HS is the paradigm of all multispectral sensors, because of its high spectral (or wavelength) resolution and, thereby, with the advent of high performance staring arrays, is potentially able to defeat any CCD (Camouflage, Concealment and Deception) measure! LIDAR (also termed LADAR or Laser raDAR) is an acronym for Light Detection and Ranging.

Contributions may address: humanitarian demining by HS & LIDAR, camouflage removal by HS & lidars, various corrections and thematic algorithms for HS, whiskbroom and pushbroom scanning HS, various kind of lidars: mechanical scanning, electronic scanning, coherent (laser vibrometry) and incoherent, 2-D, 3-D & n-D, sensing of atmospheric aerosols by LIDAR, air data systems (aircraft flow fields), pollution monitoring, chemical agent detection, biological (pathogen) agent detection, Differential Absorption Lidar (DIAL) as example of incoherent LIDAR, coherent processing by LIDAR: Atmospheric flow field mapping, wind sensing, ballistic wind determination; underwater detection & imagery & bathymetry; spectral signature data bases for HS, fishing zones and other sorts of monitoring (like novice, applications of HS in agriculture, geology, health, management of resources, urban zone management, soil practicability & traffic

ability, coastal zone bathymetry, pollution detection, maritime applications of HS, like oil spills & discerning objects and organisms below the sea surface, military applications of HS like target identification & target mitigation.

Commission E – Electromagnetic Environment and Interference

Room: Galata

Chair: Christos Christopoulos christos.christopoulos@nottingham.ac.uk

Vice-Chair: A. P. J. Van Deursen a.p.j.v.deursen@tue.nl

E01 – EMC Interactions in Complex Systems

Monday, August 15, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Flavio Canavero flavio.canavero@polito.it

Christopher L. Holloway holloway@boulder.nist.gov

The session addresses one of the central issues in electromagnetic compatibility and interference, namely the treatment of complexity. Complex systems consist of many interacting components participating to the EM interaction response. The complexity of a system increases with the number of distinct components, the complexities of the components and of their connections. The challenge resides in being able to reduce the system to blocks of manageable size, without losing the critical interactions that can possibly influence (and sometimes disrupt) the functioning of the entire system. The scope of the session is to present work which focuses on modelling, simulation and experimental characterization of complex systems such as found in aerospace applications, communications etc.

E02 – Lightning and Related Effects

Monday, August 15, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: V. A. Rakov rakov@ece.ufl.edu

Z. Kawasaki zen@comm.eng.osaka-u.ac.jp

The lightning discharge is one of the two natural sources of electromagnetic interference (EMI), the other one being the electrostatic discharge. Electric and magnetic fields generated by lightning represent a serious hazard to various systems, particularly those containing sensitive electronics. The session aims at presenting recent work on the characterization of lightning and its interaction with engineering systems and with the environment, as well as on lightning detection and testing. It will cover all aspects of lightning research, including observations, field and laboratory experiments, theoretical studies, and modeling.

Commission E business meeting 1

Monday, August 15, 1720 – 1840

E03 – High Power and Intentional EMI

Tuesday, August 16, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: F. Sabath frank.sabath@t-online.de

W. A. Radasky wradasky@aol.com

Recent work on the generation and application of high-power high-frequency pulses will be described together with applications to the survivability of systems subject to severe electromagnetic threats.

EGH – Terrestrial and Planetary Electromagnetics

Tuesday, August 16, 1340 – 1540 (6 papers)

Conveners: M. Hayakawa hayakawa@whistler.ee.uec.ac.jp

Yurdanur Tulunay ytulunay@metu.edu.tr

Colin Price cprice@flash.tau.ac.il

This session aims at presenting recent works on electromagnetic noise and phenomena in the terrestrial atmosphere and upper atmosphere (ionosphere/magnetosphere). Different kinds of electromagnetic noises will be dealt with, including atmospheric noises originated in lightning discharges (ELF Schumann resonances, mesospheric optical emissions etc.), man-made noises and noises due wave-particle and wave-wave interactions. Corresponding electromagnetic noise environment on other planets will also be welcome.

EP1 – Poster session 1

Tuesday, August 16, 1600 – 1900

Conveners: Christos Christopoulos christos.christopoulos@nottingham.ac.uk
A. P. J. Van Deursen a.p.j.v.deursen@tue.nl

E05 – Spectrum Management

Wednesday, August 17, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: T. Tjelta terje.tjelta@telenor.com
R. Struzak struzak@gmail.com

This session addresses effective utilization of the radio spectrum. It covers presentations on sound scientific spectrum management methods such that services are available in an interference-free environment, collaboration and interoperability between various spectrum users, and more recent ideas of sharing spectrum in a dynamic manner.

EB – Electromagnetic Modelling for EMC

Wednesday, August 17, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Levent Gurel lgurel@bilkent.edu.tr
A. G. Tjhuis a.g.tjhuis@tue.nl

The session aims at addressing EM modelling issues which are specific to EMC and in particular multi-scale problems, and software accelerators for large scale EMC computations. New developments in materials modelling and the treatment of complexity will be included.

Commission E business meeting 2

Wednesday, August 17, 1720 – 1820

E07 – EMC in Wire and Wireless Communication Systems

Thursday, August 18, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: A. Zeddami ahmed.zeddami@francetelecom.com
F. Rachidi farhad.rachidi@epfl.ch

The intensive use of the electromagnetic spectrum for communications has resulted in issues of compatibility and interoperability between different users. In addition the continual increase in operating frequency of products and higher frequency sources of disturbances (such as Ultra-Wide Band systems) resulted in an increase of potential EMC problems in communication systems and the use of power lines for carrying data is adding to interference problems. This session will focus on theoretical and experimental EMC aspects in both wire and wireless communication systems. Potential remedies will be also addressed.

E08 – Surveys of the Electromagnetic Environment

Thursday, August 18, 1340 – 1540 (6 papers)

Convener: F. Leferink frank.leferink@UTwente.nl

The session aims to highlight updated information on the general levels of man-made interference in industrial and urban environments in light of recent changes in the intensity of use of the EM spectrum and the potential for EM emissions from electronic equipment.

EP2 – Poster Session 2

Thursday, August 18, 1600 – 1900

Conveners: Christos Christopoulos christos.christopoulos@nottingham.ac.uk
A. P. J. Van Deursen a.p.j.v.deursen@tue.nl

E09 – EMC Challenges for Automotive Applications

Friday, August 19, 0800 – 0920; (4 papers)

Conveners: Danilo Erricolo erricolo@ece.uic.edu
Alastair Ruddle alastair.ruddle@mira.co.uk

EMC engineers face increasing challenges in the automotive industry due to the rising number of electric systems that exist in today's cars as well as those planned for the future. These systems may potentially interfere among each other and/or become susceptible to external radiation. Existing test procedures cannot capture the whole complexity of the EMC phenomena to which cars could be exposed. As an example, solutions are needed to reduce damage and functional upsets in automotive electronic control modules caused by electrostatic discharge transients, power transients and radio frequency pulse emissions. This is in response to a sharp increase in field reports concerning unexplained upsets in automotive electronics. This trend exists, despite products already passing stringent EMC immunity tests under SAE and ISO standards as well as even more rigorous tests, required by carmakers

In this convened session, we seek contributions to define new tests to assess susceptibility of automotive electrical systems as well as method to study the electromagnetic coupling to automotive electrical systems and resulting effects.

ET – EMC Measurements in the Time-Domain

Friday, August 19, 0940 – 1040 (E tutorial lecture)

Speaker: Peter Russer russer@tum.de
Convener: Christos Christopoulos christos.christopoulos@nottingham.ac.uk

This tutorial session will discuss the techniques used to make EMC measurements directly in the time-domain thus reducing considerably testing time.

E10 – Stochastic Techniques in EMC

Friday, August 19, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Luk Arnaut luk.arnaut@googlemail.com
Sergio A. Pignari sergio.pignari@polimi.it

There is significant current interest in the development of analysis and design techniques in EMC which take account of the inherent uncertainty of system parameters. The session will address these issues and give updated information on developments in EMC testing and characterization in the presence of stochastic fields and uncertain parameters.

Commission E business meeting 3

Friday, August 19, 1720 – 1900

E11 – EMC and Signal Integrity

Saturday, August 20, 0800 – 0920; 0940 – 1040 (7 papers)

Convener: Rodolfo Araneo rodolfo.araneo@uniroma1.it

As EMC requirements extend to higher frequencies and clock speed increases there is significant overlap between what is commonly considered as EMC and what are truly SI issues. More often, the techniques that are most effective at promoting EMC at the PCB or circuit level turn out to be also incisive means of improving SI. Through the presentation of cutting-edge papers, the session is aimed at clarifying the close relationship between EMC, which is regarded by many to be

nothing more than a regulatory burden, and SI, addressing similarities and differences of what are just two different aspects of the same physical phenomena.

Commission F – Wave Propagation and Remote Sensing

Room: *Haliç*

Chair: Madhu Chandra madhu.chandra@etit.tu-chemnitz.de
Vice-Chair: Roger H. Lang lang@gwu.edu

F01 – State-of-the-Art Developments in Propagation and Remote sensing

Monday, August 15, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Madhu Chandra madhu.chandra@etit.tu-chemnitz.de
Roger H. Lang lang@gwu.edu

This session features invited contributions that reflect on the current state-of-the-art in some key areas of Commission-F topics. The presentations are meant to provide insight into research activities which form the forefront of current developments across the spectrum of Commission-F topics. The session will provide a timely update on the state-of-the-art issues and their current status.

1. Millimetre Wave Propagation (0800 – 0840)
Thomas Kürner (Institute for Communications Technology, Braunschweig Technical University, Braunschweig, Germany)
2. Systems and Data in Remote Sensing and Propagation (0840 – 0920)
Antonio Martellucci (ESA/ESTEC, Noordwijk, The Netherlands)
3. Microwave Radiometry and Remote Sensing of the Environment (0940 – 1020)
Roger H. Lang (Department of Electrical & Computer Engineering, The George Washington University, Washington DC, USA)
4. To be chosen from contributed papers (1020 – 1040).

F02 – Attenuation and Depolarization in Satellite and Terrestrial Propagation

Monday, August 15, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Aldo Paraboni paraboni@elet.polimi.it
Bertram Arbesser-Rastburg bertram.arbesser-rastburg@esa.int

This session is concerned with propagation effects along links found in Earth-Space and terrestrial scenarios at microwave and millimetre-wave frequencies. Contributions to this session will focus on propagation modeling and measurements of attenuation and depolarization along such links. Papers relating to system-design-issues such as fade-mitigation techniques (e.g., power control, diversity, adaptive modulation etc) are also welcome. Highly encouraged are papers bearing upon the attenuation and depolarization properties required in the planning of the next generation satellite and terrestrial systems.

1. Review Presentation on Attenuation and Depolarization along Satellite Links (1340 – 1420)
Aldo Paraboni (Dipartimento di Elettronica e Informazione, Politecnico di Milano, Italy)
2. Slots 3-10 to be chosen from contributed papers.

Commission F business meeting 1

Monday, August 15, 1720 – 1840

F03 – Tropospheric Modeling for Radiowave Propagation and Radar Remote Sensing

Tuesday, August 16, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: Robert J. Watson r.j.watson@bath.ac.uk
Marlene S. Pontes mshpontes@cetuc.puc-rio.br

The session welcomes contributions reflecting on recent developments in Tropospheric Modelling for applications in (1) radio-wave-propagation and (2) radar remote sensing. The papers could be based on data analysis, measurements and algorithms for quantitatively and

qualitatively assessing the tropospheric properties. The reported work is expected to help improve or verify prediction models used in system design and planning in diverse areas of propagation and remote sensing (e.g. fading-outages, spatial and temporal dependence rain-intensity, etc). The session seeks contributions that particularly emphasize cross-connections to current research campaigns, international actions and system developments.

F04 – Active and Passive Remote Sensing of Vegetation (in honor of Roger H. Lang)

Tuesday, August 16, 1340 – 1540 (6 papers)

Conveners: Simonetta Paloscia s.paloscia@ifac.cnr.it
Martti Hallikainen martti.hallikainen@tkk.fi

This session, in honour Prof. Roger Lang (USA), will focus on the fundamental aspects of active and passive microwave remote sensing of vegetated surfaces, considering both forests and agricultural areas and including the effects of vegetation on the measurements of soil parameters. Topics will comprise field and laboratory experiments, physical models, and retrieval algorithms. Special interests will be also on the use of data from the most advanced sensors and missions. The purpose will be to provide an updated state of the art of the discipline from theory to applications.

1. Lead talk by Saul A. Torrico (1340 – 1400)
2. Papers 2-6 to be invited.

FP1 – Poster session 1 – Focus: Remote Sensing

Tuesday, August 16, 1600 – 1900

Conveners: Mahta Moghaddam mmoghadd@umich.edu
Madhu Chandra madhu.chandra@etit.tu-chemnitz.de

F05 – SAR Applications: Polarimetric Interferometry, Smart Systems and Propagation Impairment

Wednesday, August 17, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Alberto Moreira alberto.moreira@dlr.de
Eric Pottier eric.pottier@univ-rennes1.fr

SAR methodology, systems and applications now span a vast field that includes radar polarimetry, interferometry, smart-antennas, and holography. The session welcomes topical contributions relating to all aspects of SAR systems and their applications. Particularly welcome are papers that relate to the recent developments such as, TANDEM-X, TerraSAR and Ku-band SAR-Systems. Also welcome are papers relating to design and planning of the next generation SAR systems that employ digital beam-forming methods, multistatic or bistatic observations, and Ku-band systems.

F06 – Remote Sensing of Oceans and Cryosphere

Wednesday, August 17, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Albin Gasiewski al.gasiewski@colorado.edu
Steven C. Reising steven.reising@colostate.edu

The session welcomes contributions from all areas of active and passive remote sensing of the oceans and the cryosphere. The papers could be related to observation systems and data obtained from either spaceborne, airborne or land-based platforms. Special consideration will be given to contributions based either on measurements, results or data-analysis which relate to (i) climatic change and (ii) disaster management. Projects reports and latest findings resulting from national and international efforts in these two areas are especially welcome.

Commission F business meeting 2

Wednesday, August 17, 1720 – 1820

F07a – Scintillations, Fading and Ducting in Propagation Links and Radar Applications

F07b – Remote Sensing of the Atmosphere: Temperature, Humidity and

Non-precipitating Clouds

Thursday, August 18, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: Antonio Martellucci antonio.martellucci@esa.int
Ondrej Fišer ondrej@ufa.cas.cz

In many areas of satellite communications, Earth observation, geophysics, including numerical weather forecasting, aircraft-icing, climate and radiative transfer research, there exists a growing need for accurate measurements of atmospheric parameters such as temperature, humidity, and clouds. This session will include a variety of measurement techniques that are currently available, as well emerging technologies. Contributions will include active (radar and lidar) and passive (radiometric and GPS) techniques over wavelength regions that include microwave, millimeter wave, infrared, and optical.

FT – Remote Sensing, Systems and Applications: Present and Future

Thursday, August 18, 1340 – 1440 (F tutorial lecture)

Speaker: Alberto Moreira alberto.moreira@dlr.de
Convener: Madhu Chandra madhu.chandra@etit.tu-chemnitz.de

The advent of SAR (synthetic aperture radar) marks a major milestone in the field of radar remote sensing. The application of aerospace SAR systems has opened up diverse applications in the observation of Earth and its environment. Likewise, the SAR method has prompted phenomenal developments in the area of radar signal processing and radar-system design. In this tutorial talk, the state of the art developments in the field will be presented.

F08 – Role of Remote Sensing Science and Propagation Effects in Disaster Management

Thursday, August 18, 1440 – 1540 (3 papers)

Conveners: Orhan Altan oaltan@itu.edu.tr
Jean Isnard jisnard-isti@club-internet.fr

Commission F is participating in the development of an URSI White Paper on remote sensing. The white paper will identify and elaborate on scientific issues from propagation effects and remote sensing methodology that not only limit the present day functioning of remote sensing systems used in disaster management, but also, in so doing, pinpoint fundamental scientific issues that need to be addressed in order to advance the current state of the art. In this session, contributions will highlight the results of this international endeavor.

1. Key Scientific Issues of Present Day Disaster Management Scenario (1440 – 1520)
Orhan Altan (Turkey)
2. Propagation Issues in Radar Imaging of Earth and Weather Observation (1520 – 1540)
J. Isnard (France) and M. Chandra (Germany)

FP2 – Poster Session 2 – Focus: Propagation

Thursday, August 18, 1600 – 1900

Conveners: Piotr Sobieski piotr.sobieski@uclouvain.be
Emanuel Costa epoc@cetuc.puc-rio.br

F09 – Sub-millimetric and Terahertz Propagation

Friday, August 19, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Thomas Kuerner kuerner@ifn.ing.tu-bs.de
Emanuel Costa epoc@cetuc.puc-rio.br

This session will address research and measurement activities dealing with propagation aspects in the frequency region ranging from tens of gigahertz up to orders of terahertz from both, physical and communication point of view. This includes topics such as indoor, outdoor and urban

propagation. The session thus covers aspects of reflection/diffraction, surface properties and specific measurement scenarios in terahertz region. In addition, the session also welcomes papers on atmospheric propagation of terahertz waves and their interaction with small particles in regard of gas attenuation, spectroscopy etc. In general, all issues that emerge mainly at such (high) frequencies and that are commonly neglected at lower frequencies will be considered as well.

FG – Ionospheric and Tropospheric Effects in Precision GNSS

Friday, August 19, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Achim Hornbostel achim.hornbostel@dlr.de
Manuel Hernandez-Pajares manuel@mat.upc.es

Precise GNSS positioning is affected by multipath and by both ionospheric and tropospheric delays, which can be very significant. The session addresses this interdisciplinary field of research, inviting submissions on recent improvements in mitigating the ionospheric, tropospheric and topographic effects, and in taking advantage of its knowledge in real-time, on precision GNSS. Carrier phase positioning and ambiguity fixing in RTK and TCAR and the operation of SBAS systems such as WAAS and EGNOS are timely topics. Papers on supporting techniques such as data combination, assimilation, improvements in mapping functions and tomography would also be welcome. The session, in addition, invites contributions on techniques for counteracting the effects of scintillations on precision GNSS applications.

1. Review of Propagation Effects/Scientific Issues in Navigation and Global Positioning Systems (1340 – 1420), Manuel Hernandez-Pajares (AGE/UPC, Spain).
2. Slots 3-10 to be filled from contributed papers.

Commission F business meeting 3

Friday, August 19, 1720 – 1900

FCA – Channel Modeling, Measurements and Characterization in Communications and Remote Sensing

Saturday, August 20, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Ian A. Glover ian.glover@eee.strath.ac.uk
Sana Salous sana.salous@durham.ac.uk

Papers are invited from the areas of wireless propagation and channel modeling for future radio systems. Topics include (but are not limited to) 4G and beyond networks, fixed wireless access, personal area networks, vehicle-to-vehicle propagation, environmental and biomedical sensor networks, MIMO communications, localization, etc. Considerations related to multi-user or multi-sensor channels and large-scale multidimensional channels are also welcome. Likewise, paper relating to the spin-off-use of radio networks and GNSS systems for deriving atmospheric parameters will receive full consideration as well.

Commission G – Ionospheric Radio and Propagation

Room: Topkapi A

Chair: Michael T. Rietveld mike.rietveld@eiscat.uit.no

Vice-Chair: John D. Mathews jdm9@psu.edu

G01 – Open Session and Latest Results

Monday, August 15, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Paul S. Cannon pcannon@qinetiq.com
Michael T. Rietveld mike.rietveld@eiscat.uit.no

This session welcomes all papers related to the Commission G terms of reference, particularly those not covered by the other sessions. The session also very much welcomes latest results. Topics may include papers on global morphology, theory, modelling and modification of the ionosphere, on the development of tools and networks to measure ionospheric parameters and

trends, on the theory and practice of ionospheric radio propagation and on the application of ionospheric knowledge to radio systems. In particular, papers that review results from new remote sensing techniques and from new analysis techniques are solicited.

G02 – Distributed Ground and Space-based Observatories for Space Weather Studies

Monday, August 15, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Anthea J. Coster ajc@haystack.mit.edu
Lee-Anne McKinnell lmckinnell@hmo.ac.za
Patricia H. Doherty patricia.doherty@bc.edu

Multiple networks composed of scientific instruments, ranging from ionosondes, GNSS receivers, the super dual auroral radar network (SuperDARN), passive radars, have been recently installed at various locations around the world for the purpose of Space Weather monitoring. Examples of these new arrays include the low-latitude ionospheric sensor network (LISN) in South America, ionospheric and geodetic networks in Africa, the intercepted signals for ionospheric science (ISIS) arrays, and the Canadian high Arctic ionospheric network (CHAIN) network. These new arrays are making significant observations that contribute to our understanding of the coupled space-atmosphere system. The new arrays also present challenges as to how best to store, verify, and assimilate their data into a global perspective. Papers are solicited that introduce these arrays, focus on the new science topics that can be addressed, and examine how best to assimilate data into larger models.

Commission G business meeting 1

Monday, August 15, 1720 – 1840

G03 – New Science Initiatives on Irregularities and Scintillation using Beacon Satellites

Tuesday, August 16, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: Paul A. Bernhardt paul.bernhardt@nrl.navy.mil
Patricia H. Doherty patricia.doherty@bc.edu

With the increasing availability of new Beacon satellites including COSMIC, C/NOFS, STSSat1, CASSIOPE/ePOP the new generation of GPS and the emerging Global Navigation Satellite Systems of GALILEO, GLONASS and Beidou/Compass there are greater opportunities to expand our knowledge of the dynamic structures of the ionosphere. Specifically, this greater number of satellites presents opportunities to define the drivers of equatorial electrodynamics that produce irregularity structures and scintillation. This session will focus on the measurements of the new Beacon satellites and Beacon Receiver Satellites together with new initiatives on utilizing these measurements with a variety of techniques to answer the remaining and challenging questions of low-latitude ionosphere.

G04 – Practical Applications and Techniques for the Use of Ionosonde Data

Tuesday, August 16, 1340 – 1540 (6 papers)

Conveners: Lee-Anne McKinnell lmckinnell@hmo.ac.za
Paul S. Cannon pcannon@qinetiq.com

The global network of ionosondes has grown considerably over the past few years, and so have the number of users of ionosonde data. Long term databases of good quality archived ionospheric data are cherished for ionospheric modeling purposes and real time data is sought after for high-frequency communication applications as well as for other purposes. Techniques for using the available data in many different applications have improved with the advent of high performance computing. This session will address the practical applications and techniques for using ionosonde data. Solicited and contributed papers, particularly those that highlight the practical importance of ionosonde data in a technologically advanced society, will make up the session.

GPI – Poster session 1

Tuesday, August 16, 1600 – 1900

Conveners: John D. Mathews jdm9@psu.edu
Frederic Pitout frederic.pitout@obs.ujf-grenoble.fr

G05 – Coordinated Studies with Multiple Incoherent Scatter Radars

Wednesday, August 17, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Ian W. McCrea i.w.mccrea@rl.ac.uk
Anja Strømme anja.stromme@sri.com

The international network of incoherent scatter radars is well-established and growing, with the US AMISR systems now producing world-leading science and new radars being developed for operation in Northern Europe, Canada and Antarctica, among other locations. In recent years, the science programme of the ISRs has been augmented by a number of collaborative operations, including the experiments in support of the International Polar Year, and by support for space missions including Cluster and THEMIS. A number of future missions, such as SWARM, will also benefit strongly from collaboration with ISRs. This session provides an opportunity to review recent studies in which observations from multiple radars have been co-ordinated, either for purely ground-based observations, or to support space-based measurements. It also looks forward to the future science opportunities which will be presented by the coming radars and missions, for example in studying inter-hemispheric conjugacy and the structure of the Earth's magnetic field.

G06 – Recent Developments in Incoherent Scatter Radar

Wednesday, August 17, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Michael Nicholls michael.nicolls@sri.com
Ingemar Häggström ingemar@eiscat.se

The last several years has seen exciting advances for incoherent scatter based probing of the upper atmosphere and ionosphere, including deployments of the Poker Flat and Resolute Bay Advanced Modular Incoherent Scatter Radars, progress on EISCAT-3D conception and prototyping, significant developments in experimental and data analysis techniques, and unprecedented long-duration operations. Papers on a broad range of topics relating to ISR systems, may include progress relating to the deployment and design of new systems and the development of new experimental techniques including pulse coding, inversion, imaging, interferometry, and analysis. Papers addressing scientific applications of new ISR-based techniques are also welcome. These may include studies of the middle and lower atmosphere, micro- and macro-physics of the associated processes at all latitudes, and general aeronomy of the ionosphere.

Commission G business meeting 2, held jointly with Commission H

Wednesday, August 17, 1720 – 1820

G07 – Ionospheric Research for Radio Systems Support. Part 1: Observations, Data Management. Part 2: Products, as the Result of Models and Theory including Maps, Forecasts and Alerts

Thursday, August 18, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: Iwona Stanislawska stanis@cbk.waw.pl
Hal J. Strangeways h.j.strangeways@leeds.ac.uk

Knowledge of the behavior of the ionosphere is very important for radio systems. A wide variety of ground based and satellite existing and future systems (communications, radar, surveillance, intelligence gathering, satellite operation, etc) is affected by the ionosphere. There are the needs for reliable and efficient support for such systems against natural hazard and minimalization of

the risk failure. This session is devoted to science, techniques and to more application oriented areas of ionospheric investigation in order to support radio systems. Requested topics concern the studies based on data mining philosophy increasing the knowledge of ionospheric physical properties, modelling capabilities and gain applications of various procedures in ionospheric monitoring and forecasting, international and national activities embedded in joint integrated efforts.

G08 – Measuring and Modeling the Ionospheric Electron Density Profile

Thursday, August 18, 1340 – 1540 (6 papers)

Conveners: D. Bilitza dieter.bilitza-1@nasa.gov
Bruno Zolesi zolesi@ingv.it
Bodo Reinisch bodo_reinisch@uml.edu

Many radio propagation studies and radio applications require knowledge of the electron density profiles in the ionosphere. Measurements of ionospheric characteristics like hmF2 and NmF2 provide essential inputs for any model, but they are not sufficient to describe the global electron density distribution in the ionosphere up to the plasmasphere. This session will review the current status of profile modeling and invites papers that discuss current modeling approaches and their global reliability. Papers are welcome that present new measurement results for the bottomside and topside profiles from the ground and from space. We are also interested in presentations that discuss future mission and measurement plans. The session will consist of invited, contributed and poster presentations.

GP2 – Poster Session 2

Thursday, August 18, 1600 – 1900

Conveners: John D. Mathews jdm9@psu.edu
Frederic Pitout frederic.pitout@obs.ujf-grenoble.fr

G09 – CAWSES-2 Ionospheric Campaigns and Results

Friday, August 19, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Christian Haniuise christian.haniuise@cnrs-orleans.fr
Jorge Chau chaujro@gmail.com

CAWSES-2 (Coupling of the Atmosphere With Sun-Earth System) is the latest scientific program of SCOSTEP, covering the ascending phase of solar cycle 24. It is aimed at studying the Earth's response to solar activity by taking a systems approach to solar-terrestrial science. This approach is required because predictive capability can only be achieved by examining all interacting components, and system behaviour can change depending on the history of system conditions. Some of the key scientific questions that are addressed are the effects of short-term solar activity on the geospace environment and the response of geospace to variable waves from the lower atmosphere. This session welcomes all contribution related to these questions and to the ionospheric component of the CAWSES-2 program.

GT – Sprites and Energetic Radiation Above Thunderstorms

Friday, August 19, 1340 – 1440 (G tutorial lecture)

Speaker: Martin Füllekrug eesmf@bath.ac.uk
Convener: Michael T. Rietveld mike.rietveld@eiscat.uit.no

The discovery of transient airglows above thunderstorms, known as sprites and jets, have shed a fresh new light on a 'terra incognita' in the Earth's atmosphere, the area above thunderstorms. The fast discovery pace of novel phenomena has spurred studies of energetic radiation and relativistic particles emanating from inside thunderclouds and above thunderclouds. These observations mark a profound advance in our understanding of the Earth's atmospheric electrodynamic behaviour. Namely, the discoveries mandate the inclusion of cosmic rays, relativistic electron

beams, large scales, and energetic feedback processes in our thinking about the Earth's atmosphere, perhaps best collectively summarised as relativistic atmospheric electrodynamics. Electromagnetic processes in the Earth's atmosphere are intimately linked to the global atmospheric electric circuit which may play an important role in mediating solar-terrestrial relationships into climate through cloud microphysics.

GHE1 – Lightning Induced Effects in the Ionosphere and Magnetosphere

Friday, August 19, 1440 – 1540; 1600 – 1720 (7 papers)

Conveners: Martin Füllekrug eesmf@bath.ac.uk
Victor Pasko vpasko@psu.edu
Farhad Rachidi farhad.rachidi@epfl.ch

The recent discovery that lightning discharges can cause energetic radiation, relativistic particles, and transient luminous events has marked a profound advance in our understanding of the Earth's atmospheric electrodynamic behaviour. This session explores these novel processes and their impact on the near-Earth environment. The session solicits contributions which advance knowledge in the areas of the global atmospheric electric circuit, lightning physics, transient luminous events, energetic radiation, relativistic particles, and their impact on the Earth's upper atmosphere and the magnetosphere. Interdisciplinary studies which emphasise the connection between atmospheric layers and the relation between lightning related effects and climate change are particularly welcome.

Commission G business meeting 3

Friday, August 19, 1720 – 1900

GHE2 – Electromagnetic Effects in Lithosphere-Atmosphere-Ionosphere Coupling

Saturday, August 20, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Sergey Pulnits pulse1549@gmail.com
Michel Parrot michel.parrot@cnsr-orleans.fr
M. Hayakawa hayakawa@whistler.ee.uec.ac.jp

Recent successes in the development of electromagnetic techniques for earthquake precursor registration makes seismo-electromagnetics widely acknowledged by the scientific community. But still we lack the physical substantiation of many of registered effects. Multiparameter measurements in seismically active regions and cross-validation of results obtained by different groups will help to understand the background physics of the observed anomalies. This session will accept papers demonstrating progress in understanding the electromagnetic effects preceding strong earthquakes including experimental findings and theoretical papers on lithosphere-atmosphere-ionosphere coupling.

Commission H – Waves in Plasma

Room: Topkapi B

Chair: Yoshiharu Omura omura@rish.kyoto-u.ac.jp
Vice-Chair: O. Santolik os@ufa.cas.cz

H01 – Nonlinear Waves and Turbulence in Plasmas

Monday, August 15, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Meers Oppenheim meerso@bu.edu
Hideyuki Usui h-usui@port.kobe-u.ac.jp
David Shklyar david@iki.rssi.ru

Satellite and ground based plasma wave observations have shown that nonlinear processes in space plasmas play a crucial role in the evolution and dissipation of energy throughout the ionosphere, magnetosphere, and space environment. For example, to understand VLF wave penetration, reflection, scattering and mode conversion within the ionosphere, one must consider

nonlinear processes. In recent spacecraft observations, highly localized and coherent nonlinear structures such as solitary waves and weak double layers have been found in many energetic regions of the magnetosphere. In the Magnetosphere and the Sun, magnetic reconnection plays an essential role in energy transport and dissipation. Ionospheric instabilities such as the Farley-Buneman, Gradient-Drift, Sporadic-E, and Spread-F require an understanding of their nonlinear behavior for effective modeling. In self-consistent wave-particle interactions involving a wide random wave spectrum and a discrete spectrum, the role and interrelation of these wave spectra remain a topical problem. This session solicits presentations of recent observations, theories, and simulations of nonlinear waves and turbulence in space plasmas.

H02 – Micro/macro-scale Kinetic Processes at Boundary Layers in Terrestrial and Planetary Environments

Monday, August 15, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Bertrand Lembege bertrand.lembege@latmos.ipsl.fr
Gurbax S. Lakhina lakhina@iigs.iigm.res.in
Iku Shinohara iku@stp.isas.jaxa.jp

A large variety of microscopic/macrosopic processes take place in the internal physics of boundary layers and occur over micro/meso/macro-scales. These are based on intricate wave-particle interactions, nonlinear effects and nonstationary mechanisms, which partially or fully control the overall dynamics of these frontiers. The present session welcomes the discussion of results issued from theory, mono/multi-dimensional numerical simulations and experimental data obtained from various space missions. The comparison between these approaches is possible thanks to refined measurements obtained on board of recent multi-spacecraft missions (e.g., Cluster, Themis). Comparison with data issued from other missions (Geotail, Wind, Double Star) are also encouraged. Applications include magnetospheric, ionospheric and space plasma physics. Examples of boundary layers include: (i) collisionless shocks, (ii) the magnetopause, (iii) plasma sheet currents, (iv) magnetotail dynamics, (v) potential drops in the ionosphere, (vi) basic particle acceleration processes, and (vii) dynamics of interface in active space experiments. Any contributions related to these topics are very welcome. Comparative analysis of results dedicated to terrestrial and planetary environments are also encouraged, in order to approach a more synthetic view of their understanding.

Commission H business meeting 1

Monday, August 15, 1720 – 1840

H03 – Wave-particle Interactions and Their Effects on Planetary Radiation Belts I

Tuesday, August 16, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: Jacob Bortnik jbortnik@gmail.com
Craig Rodger crodger@physics.otago.ac.nz
Richard Horne rh@bas.ac.uk
Bruce T. Tsurutani bruce.t.tsurutani@jpl.nasa.gov

The interactions of energetic, radiation belt particles with the various plasma waves found in the inner magnetosphere of the Earth and other magnetized planets, plays a crucial role in driving large-scale radiation belt dynamics. Recent work has shown that waves play a key role in the acceleration and transport of electrons from suprathermal to relativistic energies on the timescale of days in the recovery phase of storms. However, the precise nature of which plasma waves play the dominant role in this process, their spatial location, and interaction among the various competing processes remains an open problem. In addition, waves are also responsible for the rapid removal of energetic electrons from the radiation belts in the main phase of storms via wave-particle interactions. This scattering of electrons into the atmosphere results in the well-known diffuse aurora, and may affect atmospheric chemistry with potential implications for

global warming. In self-consistent wave-particle interactions involving a wide random wave spectrum and a discrete spectrum, the role and interrelation of these wave spectra remain a topical problem. In this session we aim to explore the multifaceted causes, effects, and implications of wave-particle interactions in planetary radiation belts. Contributions involving observational, theoretical, and modeling results are welcome.

HT – Major developments in our understanding of electric antennas in space plasmas

Tuesday, August 16, 1340 – 1440 (H tutorial lecture)

Speaker: H. Gordon James gordon.james@crc.ca

Salient points in the history of the science of dipoles as an important part of space radio science methodology are reviewed. From its earliest days, the study of spontaneous radio emissions of geospace has required accurate measurements of wave electric fields. This review starts with the work done early in the space age on distributed dipole behaviour in cold magnetoplasmas. Evidence of the effects of hot-plasma wave modes and of the response of space plasma excited by active antennas led to a broadening of the dipole theory to include the generation and detection of electrostatic waves. The observations of plasma nonlinearities during the operation of active dipoles required further explanation. Indications of nonlinearity included spectra implying parametric processes and the RF- pumping of ambient ions and electrons, both in the dipole near fields. The challenge today of understanding the inherent complexity of dipoles in magnetoplasmas may be met by recourse to particle-in-cell methods to predict classic antenna properties such as impedance, radiated field or effective length.

H04 – Wave-particle Interactions and Their Effects on Planetary Radiation Belts II

Tuesday, August 16, 1440 – 1540 (3 papers)

Conveners: Jacob Bortnik jbortnik@gmail.com

Craig Rodger crodger@physics.otago.ac.nz

Richard Horne rh@bas.ac.uk

Bruce T. Tsurutani bruce.t.tsurutani@jpl.nasa.gov

HP1 – Poster session 1

Tuesday, August 16, 1600 – 1900

Conveners: Yoshiharu Omura omura@rish.kyoto-u.ac.jp

O. Santolik os@ufa.cas.cz

HG1 – Radio Sounding in Ionospheres and Magnetospheres and Associated Plasma Phenomena I

Wednesday, August 17, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Robert F. Benson robert.f.benson@nasa.gov

Vikas S. Sonwalkar vssonwalkar@alaska.edu

H. Gordon James gordon.james@crc.ca

Bodo W. Reinisch bodo_reinisch@uml.edu

This session will present the latest scientific and technical results and concepts of space-borne radio sounding in ionospheres and magnetospheres using data from previous, current, and planned space-borne sounders. Relaxation sounding in the magnetospheres of Jupiter and Saturn and ionospheric sounding at Mars are included. The basic physics of the injection, propagation or detection of plasma waves, with active or passive antennas, in laboratory or spatial magnetoplasmas, are important related topics. Investigations of geospace structures using spontaneously generated or artificially injected waves are also solicited, as are reviews of earlier radio-sounding accomplishments highlighting outstanding questions yet to be addressed by radio sounders.

HG2 – Radio Sounding in Ionospheres and Magnetospheres & Associated Plasma Phenomena II

Wednesday, August 17, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Robert F. Benson robert.f.benson@nasa.gov
Vikas S. Sonwalkar yssonwalkar@alaska.edu
H. Gordon James gordon.james@crc.ca
Bodo W. Reinisch bodo_reinisch@uml.edu

Commission H business meeting 2, held jointly with Commission G

Wednesday, August 17, 1720 – 1820

HG3 – Active Experiments in the Ionosphere and Magnetosphere I

Thursday, August 18, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: Bo Thide bt@irfu.se
Keith Groves keith.groves@hanscom.af.mil

Controlled, active experiments have proven useful both for studies of the natural upper atmosphere and magnetosphere through observations of the ionospheric response to HF induced perturbations, for basic physics investigations exploiting the ionosphere as a large, natural plasma laboratory-without-walls and for understanding fundamental wave propagation and wave-particle interactions in the magnetosphere. This experimental diversity has attracted the attention and participation of physicists from a wide range of disciplines. As a result, research exploiting active experiments continues to be strongly motivated by its many applications in the fields of aeronomy, space physics, plasma physics, and telecommunications science. This session solicits papers addressing the nonlinear nature of HF radio wave-plasma interactions, their dependence on specific radio wave properties, such as frequency, power, polarization and orientation with respect to the geomagnetic field, and the physical processes responsible for their occurrence. Presentations dealing with other active techniques, such as in situ radio frequency transmissions and chemical releases, including rocket motor exhaust effects, are also welcome.

HG4 – Active Experiments in the Ionosphere and Magnetosphere II

Thursday, August 18, 1340 – 1540 (6 papers)

Conveners: Bo Thide bt@irfu.se
Keith Groves keith.groves@hanscom.af.mil

HP2 – Poster Session 2

Thursday, August 18, 1600 – 1900

Conveners: Yoshiharu Omura omura@rishi.kyoto-u.ac.jp
O. Santolik os@ufa.cas.cz

H09 – Laboratory Simulation of Space and Dust-related Phenomena

Friday, August 19, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: William E. Amatucci bill.amatucci@nrl.navy.mil
Toshiro Kaneko kaneko@ecei.tohoku.ac.jp

The plasma environments surrounding the Earth and other solar system bodies display a rich variety of phenomena, which can now be observed with unprecedented spatial and temporal resolution by modern space probes. These plasmas consist of thermal and energetic particle populations, a variety of ion and neutral species, and also particulate matter, which can also become charged and influence the dynamics of the system. While in situ observations can provide tantalizing snapshots of events and statistical overviews of dynamical behavior, repeatable experiments under strictly controlled conditions are not possible in space. Laboratory experiments can play a vital complementary role in investigating the underlying physics under appropriately scaled, controlled plasma conditions. Among these are studies of wave propagation characteristics, wave-particle interactions, plasma stability, nonlinear dynamics, double layer

formation, dusty plasma dynamics, and development of plasma thrusters. Papers on basic and applied laboratory studies addressing such space processes are solicited.

H10 – Waves as Signatures of Inflowing Plasma Interaction with Solar System Bodies

Friday, August 19, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Christian Mazelle christian.mazelle@cesr.fr
Yoshiya Kasahara kasahara@is.t.kanazawa-u.ac.jp
Cesar Bertucci c.bertucci@imperial.ac.uk

Various kinds of radio emissions and plasma waves are generated in numerous regions of our solar system as signatures of the interaction with the environment of solar system bodies of an inflowing magnetized plasma, such as the solar wind or internal magnetospheric plasma flow at moons of giant planets. There is a great difference between non-magnetized and magnetized bodies in such interaction process; for instance, the solar wind plasma directly impacts on the exosphere, atmosphere or surface of non-magnetized bodies such as Mars, Venus and moon and plasma wake is created in the nightside tail region, while magnetized planets are protected by their intrinsic magnetic fields and the solar wind-magnetosphere coupling plays an important role in plasma dynamics. The aim of this session is to present recent progress in spacecraft observations, computer simulations and theoretical studies on waves related to the solar wind and plasma flow interaction with solar system bodies. Papers related to future missions and research projects are also welcome.

Commission H business meeting 3

Friday, August 19, 1720 – 1900

H11 – Open session

Saturday, August 20, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Ondrej Santolik os@ufa.cas.cz
Yoshiharu Omura omura@rish.kyoto-u.ac.jp

This session solicits papers on all aspects of waves in space and laboratory plasmas that do not easily fit in to the other sessions within Commission H, including solar and planetary plasmas, spacecraft-plasma interactions, applications to space weather, the use of space as a laboratory, and results from the latest space missions and goals of forthcoming satellite missions. Papers from new areas of research such as plasma waves associated with ion thrusters are also solicited.

Commission J – Radio Astronomy

Room: Marmara A

Chair: S. Ananthkrishnan subra.anan@gmail.com
Vice-Chair: Donald C. Backer dbacker@astro.berkeley.edu

J01 – Low Frequency Radio Astronomy I – (LOFAR, LWA, MWA, GMRT, any other)

Monday, August 15, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Mike Garrett garrett@astron.nl
Colin Lonsdale cjl@haystack.mit.edu

The advent of new radio arrays like LOFAR, LWA and MWA in addition to the existing large arrays like GMRT is expected to usher in a new era of low frequency research. The first example is the possibility of looking for hydrogen from the early universe. The others are cosmic magnetism, transient events etc.

JT – Exploring the Epoch of Reionization with Low-Frequency Radio Telescopes

Monday, August 15, 1340 – 1440 (J tutorial lecture)

Speaker: Aaron Parsons aparsons@astro.berkeley.edu
Convener: S. Ananthkrishnan subra.anan@gmail.com

The Epoch of Reionization (EoR) was a key period of cosmic structure formation, and represents a major frontier of cosmic evolution yet to be explored. Redshifted emission from the 21cm hyperfine transition of neutral hydrogen provides a unique tracer of the primordial intergalactic medium. But with foregrounds that exceed the expected EoR signal by more than five orders of magnitude, the level of calibration needed for detecting this signal is unprecedented in the 100-200MHz band expected to encompass EoR. We will discuss the various instrumental approaches underway for achieving the necessary sensitivity and calibration, and discuss plans for second-generation antenna arrays that might explore EoR tomographically.

J02 – Low Frequency Radio Astronomy II

Monday, August 15, 1440 – 1540; 1600 – 1720 (7 papers)

Conveners: Joseph Lazio joseph.lazio@nrl.navy.mil
Yashwant Gupta ygupta@ncra.tifr.res.in
Anthony Beasley tbeasley@neoninc.org

The advent of new radio arrays like LOFAR, LWA and MWA in addition to the existing large arrays like GMRT is expected to usher in a new era of low frequency research. The first example is the possibility of looking for hydrogen from the early universe. The others are cosmic magnetism, transient events etc.

Commission J business meeting 1

Monday, August 15, 1720 – 1840

J03 – Technology Development for the SKA Program

Tuesday, August 16, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: Ken Kellermann kkellerm@nrao.edu
Richard Schilizzi schilizzi@skatelescope.org

Preparations for the SKA are making good progress. The system design is in full swing and a number of precursor and pathfinder telescopes are producing their first results or are in advanced stages of construction. The many aspects of the SKA design, and the multi-dimensional tradeoffs of technology and science capability required, will be the subject of Session 2. Particular topics will include the dish sub-systems, the aperture array sub-systems, feeds, receivers, signal transport, signal processing, software & computing, and operations.

J04 – Space and Moon Science and Technology

Tuesday, August 16, 1340 – 1540 (6 papers)

Conveners: Leonid I. Gurvits lgurvits@jive.nl
H. Falcke h.falcke@astro.ru.nl

There are a very large number of spacecraft that have been launched in recent years by many countries, including USA, Japan, China and India on the basis of a renewed interest in the Moon. Recently, one of the Chandrayaan I (India) payload has reported traces of water on the Moon. Besides, spacecraft like Cassini and Planck are providing a wealth of new data on the solar system planets. This session could bring all the concerned researchers together to get an overview of the new science that is coming out.

JP1 – Poster session 1

Tuesday, August 16, 1600 – 1900

Conveners: S. Ananthakrishnan subra.anan@gmail.com
Donald C. Backer dbacker@astro.berkeley.edu

J05 – Sun and Solar System Science

Wednesday, August 17, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: P. Kaufmann kaufmann@craam.mackenzie.br
Noah Brosch nbrosch@yahoo.com

Solar system science is undergoing rapid changes with a host of spacecraft being launched. In this session, apart from solar science in various wavelengths, an attempt will be made to include a wide variety of solar system radio /radar observations that are being made by multi-frequency instruments.

J06 – Signal Processing, Calibration and Imaging in Radio Astronomy

Wednesday, August 17, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: T. J. Cornwell tim.cornwell@csiro.au
S. Bhatnagar sbhatnag@aoc.nrao.edu

Signal processing has assumed great importance in view of the massive data processing required by the new generation instruments like LOFAR and SKA.. The direction dependent effects impacting the imaging and calibration process is being stressed. The ever-green topics of RFI mitigation, calibration and data flagging could be reviewed again. The non-trivial efforts for writing software for handling the tera and peta bytes of data flow also needs a careful look. The session J5 will include all the above aspects.

Commission J business meeting 2

Wednesday, August 17, 1720 – 1820

J07 – Observatory Reports

Thursday, August 18, 0800 – 0920; 0940 – 1200 (up to 22 brief reports, max.10 minutes each)

Convener: Donald C. Backer dbacker@astro.berkeley.edu

It is traditional to present short (<10 minutes) reports by all the active observatories around the world in this session. Up to twenty-two speakers can be accommodated.

J08 – Spectrum Management Issues and RFI Mitigation

Thursday, August 18, 1340 – 1540 (6 papers)

Conveners: A. Tzioumis tasso.tzioumis@csiro.au
Masatoshi Ohishi masatoshi.ohishi@nao.ac.jp

The electromagnetic spectrum is becoming very crowded because of the hunger for broadband 3G and 4G mobile Communication systems as well as a myriad other uses. Radio astronomy data processing will increasingly have to rely on robust mitigation strategies that are being developed by a large number of radio astronomy groups. Besides this, vigorous attempts are required by the RA community to protect the RA spectrum already allocated by the WRC conferences of ITU. On the other hand, a discussion on whether one could use Satellite signals to calibrate large and physically extended arrays may also be of interest.

JP2 – Poster Session 2

Thursday, August 18, 1600 – 1900

Conveners: S. Ananthkrishnan subra.anan@gmail.com
Donald C. Backer dbacker@astro.berkeley.edu

JG – Ionospheric Calibration for Radio Astronomy

Friday, August 19, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Richard A. Perley rperley@acc.nrao.edu
Cathryn N. Mitchell c.n.mitchell@bath.ac.uk

The Earth's ionosphere and plasmasphere introduce serious challenges to the calibration of the new generation of low-frequency radio astronomy arrays now under construction, including the Low Frequency Array (LOFAR) in the Netherlands, the Long Wavelength Array (LWA) in New

Mexico, the Murchinson Widefield Array (MWA) in Australia, and the Precision Array to Probe the Epoch of Ionization (PAPER), in South Africa. All of these arrays share the goal of wide-field noise-limited imaging, and all share the same challenges of calibrating out the dynamic, angle-variant phase corruptions introduced by the the Earth's ionosphere and plasmasphere. This session will include all ionospheric effects that impact radio telescopes. Of particular interest, however, are the plans for ionospheric calibration of the new low frequency arrays being built. The products of these calibration schemes have the potential of measuring and monitoring ionospheric gradients and irregularities at unprecedented amplitude resolution, high temporal rates, and, in some cases, high spatial resolution and wide angular extent.

J10 – Mm and Sub-mm Science and Technology with a Special Focus on ALMA

Friday, August 19, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Richard Hills rhills@alma.cl
Goutam Chattopadhyay goutam.chattopadhyay@jpl.nasa.gov
Shep Doleman dole@haystack.mit.edu

The commissioning of ALMA will mark a major milestone for mm/sub-mm wavelength astronomy - not only will the traditional fields of study at these wavelengths, such as star formation, high-redshift galaxies and the chemistry of molecular clouds, be enormously enhanced, but many new topics will be opened up for investigation. The J3 session will provide an overview of the scientific possibilities and also include recent results and technical progress from the many other dishes and arrays in operation or under development at these wavelengths.

Commission J business meeting 3

Friday, August 19, 1720 – 1900

J11 – New Observations and Results

Saturday, August 20, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Subramanian Ananthakrishnan subra.anan@gmail.com
Richard Schilizzi schilizzi@skatelescope.org

Any new, unexpected but exciting results will be given a chance to be presented in this short session.

Commission K – Electromagnetics in Biology and Medicine

Room: Marmara B

Chair: G. D’Inzeo dinzeo@uniroma1.it
Vice-Chair: M. Taki taki@eei.metro-u.ac.jp

K01 – Interactions Between EMF and Biosystems: Modeling and Molecular Effects

Monday, August 15, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Guglielmo d’Inzeo dinzeo@die.uniroma1.it
Jan Vrba vrba@fel.cvut.cz

Description and evaluation of models are proposed to explain the biological effects of electric, magnetic and electromagnetic fields of low intensity from ELF to Terahertz. Attention is focused on biological structures and processes at the microscopic level and on critical experiments needed to support or reject theories. Contributions will identify processes in biological systems that could help linking low level molecular modifications to cellular alterations.

KBE – Non-ionizing Electromagnetic Breast Imaging

Monday, August 15, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Susan C. Hagness hagness@engr.wisc.edu
Elise Fear fear@ucalgary.ca

This session is devoted to non-ionizing electromagnetic (and hybrid-electromagnetic) systems for breast imaging, tissue characterization, and the detection/identification of breast tumors. Much progress has been made on the development of such systems ranging from very low frequencies all the way up to optical frequencies. Examples include electrical impedance tomography, microwave imaging, near-infrared tomography, and THz imaging. Specific topics of interest include, but are not limited to, tomographic and other image construction algorithms and experimental results from laboratory and clinical imaging systems.

Commission K business meeting 1

Monday, August 15, 1720 – 1840

K03 – Environmental EMF Exposure Assessment

Tuesday, August 16, 0800 – 0920; 0940 – 1100 (8 papers)

Conveners: Yngve Hamnerius yngve.hamnerius@chalmers.se

Georg Neubauer georg.neubauer@ait.ac.at

Environmental EMF exposure assessments are for example used in epidemiological studies and for showing compliance with exposure standards. In order to perform valid assessments reliable instrumentation and measurement methods are needed. The EU directive 2004/40/EC on protection of workers to the risks arising from electromagnetic fields, which is planned to be enforced in the Union in the year 2012, stresses the need for accurate and cost effective measurement methods for the whole frequency range 0 Hz to 300 GHz.

KT – Epidemiology of RF and Cancer

Tuesday, August 16, 1100 – 1200 (K tutorial lecture)

Speaker: Joachim Schüz schuzj@iarc.fr

Convener: Emilie Van Deventer vandeventere@who.int

There is still an ongoing scientific controversy whether exposure to electromagnetic fields is associated with an increased cancer risk in humans. Epidemiological studies have shown a consistent association between exposure to extremely low-frequency (ELF) magnetic fields and the risk of leukemia in children, but even after decades of investigations it is unclear whether the observed association is causal or due to bias and limitations of the studies. The International Agency for Research on Cancer (IARC) has therefore classified ELF magnetic fields as possible carcinogenic to humans. Several studies of different designs investigated the association between radiofrequency (RF) electromagnetic fields related to the use of mobile phones and the risk of brain tumors. While short-term use of mobile phones of less than ten years was not related to any increased tumor risk, uncertainty remains particularly for longer term heavy users. Mobile phone studies are methodologically challenging and future study protocols need to reduce limitations observed in studies available today.

K04 – Biological Effects of Nano and Microsecond Pulses

Tuesday, August 16, 1340 – 1540 (6 papers)

Conveners: Lluís M. Mir luis.mir@igr.fr

P. Thomas Vernier vernier@usc.edu

Short, intense electric pulses have varied and useful effects on biological systems, with important applications in biology and medicine. In the microsecond range, these pulses permeabilize the cell membrane and are routinely used to treat tumors in combination with non-permeant anticancer drugs (electrochemotherapy). Longer pulses are used in research and in clinical trials to introduce nucleic acids into cells for non-viral gene therapy and DNA vaccination. Shorter pulses, in the nanosecond range, allow for the manipulation of intracellular organelles and constitute an emerging field of research, with potential future applications. The session will cover all these aspects.

KP1 – Poster session 1

Tuesday, August 16, 1600 – 1900

Conveners: Vitas Anderson vitasanderson@swin.edu.au
Jing Bai deabj@tsinghua.edu.cn

K05 – Biomedical Applications

Wednesday, August 17, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Ruggero Cadossi r.cadossi@igea.it
James C. Lin lin@uic.edu

Recent advances in applications of electromagnetic energies in biology and medicine from across the entire electromagnetic spectrum will be presented by scientists who have made significant research contributions. The topics will include fundamental and applied investigations in therapeutic intervention, diagnostic imaging, security screening and safety applications using technologies that involve short pulses to terahertz waves.

K06 – Interactions with Human Body and Implanted Systems

Wednesday, August 17, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Niels Kuster kuster@itis.ethz.ch
Koichi Ito ito.koichi@faculty.chiba-u.jp

This session focuses on the latest research on the electromagnetic interaction between the human body and external or internal antennas/systems for wireless or medical applications. Given the growing number of applications that involve close coupling between antennas or stimulating devices and the human body, it is increasingly important to develop methods to accurately characterize this interaction as well as to design antennas and systems that account for the close proximity with the human tissue. Applications include interactions with wireless devices, telemetry systems for biomedical implantable devices, and electric/magnetic neural stimulation/recording.

Commission K business meeting 2

Wednesday, August 17, 1720 – 1820

K07 – Biological Effects of EMF: Cellular, Animal

Thursday, August 18, 0800 – 0920; 0940 – 1200 (11 papers)

Conveners: Rafi Korenstein korens@post.tau.ac.il
Anne Perrin aperrin.crssa@gmail.com

For public and professional use, guidelines are established by the ICNIRP to prevent sanitary effects. First precautionary measure consists in doing studies to insure that there are no unknown health effects below the limits. During the last decades, the effects of exposure on cancer, genotoxicity, HSP, apoptosis, blood brain barrier, cognition, etc. have been widely studied with *in vitro* and *in vivo*, especially for mobile phone signals. To date, no specific mechanism was shown and no health effects were identified. Nevertheless, a few biological effects are still controversial and it is still difficult to provide clear input for policy development. Moreover, the therapeutic role of such fields remains to be understood. This session will be an opportunity to present results and discuss the current research on emerging trends in this domain.

K08 – Biomedical Applications: Imaging and Brain Mapping

Thursday, August 18, 1340 – 1540 (6 papers)

Conveners: Frank Prato prato@lawsonimaging.ca
Shoogo Ueno ueno@athena.ap.kyushu-u.ac.jp

Brain imaging methods such as fMRI or PET and brain mapping methods such as EEG and MEG have advanced to the point of being able to record physiological changes associated with subtle brain processing including the ability to detect cognition. In the past EMF effects on cognitive function have been largely recorded using behavioral measures and are affected by individual variability. Recently brain imaging and mapping methods have been used to detect changes in brain activation associated with EMF exposure including sinusoidal ELF exposures and pulsed ELF exposures including TMS. Most recently EMF exposure systems have been integrated into hybrid brain imaging and brain mapping platforms such as EEG/PET/MR and MRI/SQUID allowing determination of effects during exposure. This session will be devoted to the presentation of the effects or non-effects on brain imaging and mapping from EMF exposures. Brain imaging and mapping hold the potential to not only provide objective measures of effects but also to infer the importance of these effects.

KP2 – Poster Session 2

Thursday, August 18, 1600 – 1900

Conveners: Jitendra Behari jbehari2000@yahoo.co.in
Maila Hietanen maila.hietanen@ttl.fi

K09 – Occupational EMF Safety and Health with Focus on Medical Environment

Friday, August 19, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Jolanta Karpowicz joker@ciop.pl
Ken Joyner ken.joyner@bigpond.com

This session will deal with practical problems of ensuring safe EMF exposure in the work environment, particularly relating to the needs of workers with active electro-medical implants and possible adverse electromagnetic interference effects and metallic implants with possible excess heating in the vicinity of the implant. Papers are also welcome on real exposures in different workplaces, health risk assessments, appropriate protective measures to reduce exposure levels and other issues arising from the implementation of relevant safety standards and guidelines.

KAE – Anatomical Human Models Development and Exposure Assessment

Friday, August 19, 1340 – 1540; 1600 – 1720 (10 papers)

Conveners: Soichi Watanabe wata@nict.go.jp
You'n-M'young Gimm gimm@dku.edu

The anatomical human models or voxel phantoms are indispensable for numerical EMF dosimetry. Various anatomical human models from children to adults and pregnant women have been developed and used for numerical dosimetry not only for EMF safety, e.g., to cellular-phone exposure but also for medical engineering, e.g., MRI design, RF mammography, etc. This session consists of the comprehensive reviews of the development of the anatomical human models together with their exposure assessments to electromagnetic fields, and their application in biology and medicine by the invited speakers and state of the art research results by the contributing speakers.

Commission K business meeting 3

Friday, August 19, 1720 – 1900

KB – Uncertainty Management in Numerical Calculation and EM Field Dosimetry

Saturday, August 20, 0800 – 0920; 0940 – 1040 (7 papers)

Conveners: Joe Wiart joe.wiart@orange-ftgroup.com
Man Fai Wong manfai.wong@orange-ftgroup.com

Uncertainty management is a key question for electromagnetic numerical simulation facing

variable inputs, such as posture and morphology parameters in dosimetry. The deterministic approach based on a set of well determined input parameters has to be enhanced by novel approaches to deal with different sources of uncertainties e.g. variabilities, uncontrollable variations, unknown parameters or tolerances. Classical Monte Carlo methods are in principle able to propagate the input uncertainties to the output parameters such as the Specific Absorption Rate. But they are unpractical when the experiments are provided by full-wave electromagnetic computations. Hence more efficient methods like surrogate modelling, chaos polynomial or stochastic collocation approaches are under development to handle these questions.