

XXIX URSI General Assembly

Chicago, Illinois, USA 7 – 16 August 2008

Scientific Program

Friday 8 August 2008 08:00 – 12:00

Student Prize Paper Competition

Friday 08/08/2008 08:00 – 12:00 / Oral Session / 10 papers *Location:* Columbus Hall

Convener: S. C. Reising, <steven.reising@colostate.edu>

Friday 8 August 2008 PM

Workshops and Short Courses (titles, times and location to be announced)

Saturday 9 August 2008 AM and PM

Workshops and Short Courses (titles, times and location to be announced)

Monday 11 August 2008 08:00 – 12:00

A03: RF and Microwave Standards; Realisation and Dissemination

Monday 11/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Columbus IJ

Convener: J. Randa, <randa@boulder.nist.gov>

Summary: Standards for RF and microwave have always been important, but several current trends are making them more essential than ever. Remote sensing applications are experiencing more demanding uncertainty requirements, the growing importance of long-term studies for climate change, and combining or comparing data from different instruments, including instruments from different frequency ranges (infrared and microwave, etc.). International trade requires the global realization and harmonization of standards, including those for RF and microwave quantities. As higher frequencies are exploited, standards are required for these new ranges. This session is devoted to new developments in the realization, traceability, harmonization, and dissemination of standards for RF and microwave frequencies.

B07: Wave Field Imaging for Homeland Security

Monday 11/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Grand B

Conveners: K. Langenberg, <langenberg@uni-kassel.de>

J. Detlefsen, <detlefsen@tum.de>

Summary: “Homeland Security” covers all aspects of science and engineering that may contribute to ensuring the safety and security of persons in a public environment. As such, wave fields in a general sense (acoustic, elastic and electromagnetic waves in every

frequency regime) can be relevant to the development of imaging systems to screen persons for concealed objects, to scan buildings to assess their integrity, and to monitor the aging of materials non-destructively. Therefore, papers from rather distant disciplines are solicited in order to exchange ideas and to recognize common approaches.

C01: Metropolitan Area Networks (WiMax) and Local Area Networks (WiFi)

Monday 11/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus GH

Conveners: V. Koivunen, <visa.koivunen@hut.fi>
Eldad Peraiha, <eldad.perahia@intel.com>

Summary: WiMax and WiFi are the two most important standards for wireless data communications networks. WiMax tries to cover large areas, while the ubiquitous WiFi is suitable for shorter distances. The current session will cover all aspects for data communications systems, from propagation and electromagnetic compatibility aspects, to physical-layer techniques for improving data rates, to techniques for ensuring quality of service and robustness.

D01: RFID Technology and Applications

Monday 11/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus AB

Convener: S. Tedjini, <smail.tedjini@esisar.inpg.fr>

Summary: The birth of the Radio Frequency IDentification (RFID) was in October 1948 after the paper of H. Stockman "Communications by Means of Reflected Power". One of the first applications was "Identification of Friend or Foe" (IFF) for aircraft. Nowadays, the technological advances in microelectronics, microwaves, and embedded software are drastically expanding the application field of the RFID. This session will address the current development of RFID system including tags and readers.

E01: Intentional Electromagnetic Interference

Monday 11/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus CD

Conveners: M. Bäckström, <mats.backstrom@saabgroup.com>
W. A. Radasky, <wradasky@aol.com>

Summary: Intentional Electromagnetic Interference (IEMI) covers the area of interference of commercial equipment and systems through criminal or terrorist actions. The emphasis in this area is determining the levels of vulnerability that exist to modern commercial equipment and the methods to protect them from these threats.

F01: Remote Sensing and Propagation Effects of Vegetation

Monday 11/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus EF

Convener: P. Pampaloni, <p.pampaloni@ifac.cnr.it>

Summary: This session 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.

G01: Open Session and Latest Results

Monday 11/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Grand E

Conveners: C. Hanuise, <hanuise@cnr-orleans.fr>
A. Coster, <ajc@haystack.mit.edu>

Summary: 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. We encourage papers presenting the latest results from the International Heliospheric Year (IHY) and the International Polar Year (IPY). Topics may include papers on global morphology, theory, modeling 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.

H01: Dynamics of the Plasmasphere using Wave Techniques

Monday 11/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Grand F

Conveners: B. Fraser, <brian.fraser@newcastle.edu.au>
H. Laakso, <harri.laasko@esa.int>

Summary: The co-rotating high density plasmasphere, separated from the low density outer magnetosphere by the plasmopause and often overlapping the ring current, supports a wide variety of wave processes. Through monitoring and applying diagnostics to small- and large-scale instabilities, discontinuities and boundary regions we can gain a more detailed understanding of the dynamic nature of the plasmasphere and its considerable structure. This session solicits satellite and ground experimental and observational papers and theory/modeling papers on the role of waves in all frequency regimes from ULF-ELF-VLF to higher frequencies. Also important is the plasmasphere relationship to the ring current and outer radiation belt.

J01a: Future Large Telescopes

Monday 11/08/2008 08:00 – 09:20 / Oral Session / 4 Papers Room: Grand A

Convener: P. Wilkinson, <pnw@jb.man.ac.uk>

Summary: The next generation radio telescopes with dramatically new capabilities at metre and centimetre wavelengths is on the way. In the next few years a giant phased array, LOFAR, will make unique searches for hydrogen in the early universe and for new types of transient events. Advanced signal processing technology is allowing other long wavelength phased arrays, with wide-area scanning capabilities, to be built in Australia (MWA) and the USA (LWA). A 500-m diameter Arecibo-like telescope, FAST, will come into operation in China in 2013. In the lead up to the Square Kilometre Array (SKA) the USA (ATA), Australia (Miranda) and South Africa (MeerKAT) are constructing dish-based interferometers with much wider fields-of-view than current arrays, appropriate for a range of new sky surveys. Construction for the SKA itself may start in 2012. Its massive collecting area and wide field-of-view will allow it to address fundamental physical questions on the nature of gravitation, matter and energy.

JT - Tutorial J : Phased Arrays in Radio Astronomy

Monday 11/08/2008 9:40 – 10:40 Room: Grand A

Convener: R. Schilizzi, <schilizzi@skatelescope.org>
Lecturer: Arnold van Ardenne (ASTRON, Netherlands)

K01: Modelling of Interactions Between EMF and Biosystems

Monday 11/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Columbus KL

Conveners: G. d'Inzeo, <dinzeo@die.uniroma1.it>
J. Vrba, <vrba@fel.cvut.cz>

Summary: Description and evaluation of models are proposed to explain the biological effects of electric, magnetic and electromagnetic fields of low intensity from ELF to microwaves. 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 in linking low level molecular modifications to cellular alterations.

General Lecture 1

Monday 11/08/2008 11:00 – 12:00

Microwave Imaging in Medicine, Promises and Future Challenges

Convener: F. Lefeuvre, <lefeuvre@cnrs-orleans.fr>
Speaker: Susan Hagness (University of Wisconsin-Madison, USA),
<hagness@engr.wisc.edu>

Monday 11 August 2008 13:40 – 17:20

A01: Primary Frequency Standards

Monday 11/08/2008 13:40 – 17:20 / Oral Session / 10Papers *Room:* Columbus IJ

Convener: F. Riehle, <fritz.riehle@ptb.de>

Summary: Research in the area of microwave and optical frequency standards, including femtosecond optical combs.

BT - Tutorial B: Transmission-Line Metamaterials: Fundamentals and Applications

Monday 11/08/2008 13:40 – 14:40 *Room:* Grand B

Conveners: L. Shafai, <shafai@ee.umanitoba.ca>
K. Langenberg, <langenberg@uni-kassel.de>
Lecturer: George Eleftheriades, (University of Toronto, Canada),
<gelefth@waves.utoronto.ca>

B03: Inverse Scattering

Monday 11/08/2008 14:40 – 17:20 / Oral Session / 7 Papers *Room:* Grand B

Conveners: E. Marengo, <emarengo@ece.neu.edu>
Q. H. Liu, <qhliu@ee.duke.edu>

Summary: This session covers contributions that detail new advances in the wave inverse theory, its methods and applications. This includes the development of efficient and rapid algorithms for solving linear and nonlinear inverse scattering problems in areas such as geophysical probing, remote sensing, non-destructive testing, medical imaging, target identification, etc. Radio frequency, microwave tomography and applications,

iterative nonlinear inverse scattering techniques and electromagnetic techniques for nondestructive testing and evaluation are also of interest.

C02: 4G Cellular Communications

Monday 11/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Columbus GH

Conveners: M. Shafi, <mansoor.shafi@telecom.co.nz>

J. Medbo, <jonas.medbo@ericsson.com>

Summary: The debate for IMT advanced (4G) air interfaces is gathering momentum. WRC 07 is expected to identify spectrum needs for 4G. The ITU R is expected to standardise the air interface in 2008 or early 2009. Various candidate proposals for the air interface are already being pursued. This session will focus on:

1. What are the key requirements and objectives of IMT advanced and how are they different from IMT 2000 and its enhancements
2. What kind of techniques are needed to be deployed in the air interface e.g. , Single carrier vs multi carrier systems, Wider bandwidths up to 100 MHz, Spatial multiplexing, Spatial signal processing, Beam forming, Diversity, TDD vs FDD and channel reciprocity issues, Joint optimisation of MAC and PHY layers
3. Propagation models that are relevant for evaluation and dimensioning of 4G systems- specifically models that are valid for frequencies up to 6GHz and for carrier bandwidths that range fro 10-100 MHz

D02: Optical Devices Including Guided Waves

Monday 11/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Columbus AB

Convener: Thyagarajan, <kttrajan@physics.iitd.ac.in>

Summary: This session could include both linear and nonlinear optical effects in guided waves. It concerns plasmonic optical waveguides, waveguides based on photonic crystals and Bragg effects, parametric down conversion and four waves mixing in guided waves to generate entangled photon pairs etc.

E06: Lightning Discharges and Related Phenomena

Monday 11/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Columbus CD

Conveners: Z. Kawasaki, <zen@comm.eng.osaka-u.ac.jp>

V. A. Rakov, <rakov@ece.ufl.edu>

Summary: The lightning discharge is one of the two natural sources of electromagnetic interference (EMI), the other one being the electrostatic discharge. Lightning can be defined as a transient, high-current (typically tens of kiloamperes) electric discharge whose length is measured in kilometers. Electric and magnetic fields generated by lightning represent a serious hazard to various systems, particularly those containing sensitive electronics. The scope of the session includes the following topics: Properties of the lightning discharge important for EMC, lightning return-stroke models, lightning electromagnetic pulse (EMP), coupling of lightning electromagnetic fields to overhead lines and buried conductors, lightning locating systems, atmospheric effects, lightning effects in the middle and upper atmosphere, lightning protection and testing standards.

F02: Remote Sensing of Oceans and Precipitating Atmosphere

Monday 11/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Columbus EF

Convener: A. Gasiewski, <al.gasiewski@colorado.edu>
Summary: (not available)

G02: Density Profiling and Models

Monday 11/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Grand E

Conveners: B. Reinisch, <Bodo_Reinisch@uml.edu>
D. Bilitza, <dieter.bilitza.1@gsfc.nasa.gov>
B. Zolesi, <zolesi@ingv.it>

Summary: This session will address point, local, and world-wide models of the electron density and other characteristics of the ionosphere, including empirical and physical models. Improvement of existing climatological models, e.g., the CCIR/ITU-R and URSI foF2 and hmF2 maps, is an important issue. We invite progress reports on this subject for both global and regional maps and all new model validations. Papers will be welcomed addressing the operational applicability of the models.

H02: Observations of Waves and Coherent Structures in Space Plasmas

Monday 11/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Grand F

Conveners: O. Santolik, <ondrej.santolik@mff.cuni.cz>
J. Pickett, <pickett@uiowa.edu>

Summary: This session will cover all aspects of waves and coherent structures in space plasmas, including multi-point measurements, analysis techniques, theory and simulation results. Reports on new results related to waves observed in plasmas of different regions of the Earth's and planetary magnetospheres and in the solar wind are welcome, as well as papers on progress in understanding highly localized coherent structures such as solitary waves and weak double layers. Magnetospheric boundary regions such as bow-shock, magnetosheath, magnetopause boundary layers, cusp, auroral field lines, and neutral sheet are of special interest. Sophisticated wave and particle instruments onboard different spacecraft (CLUSTER, THEMIS, Cassini, DEMETER, and Stereo, among others) form a good basis for new results on nonlinear wave-wave interactions and on wave-particle interactions such as wave emission and particle heating. We also expect new results on the generation mechanism of coherent structures and their role in ongoing physical processes, particularly in boundary layers. Papers on experimental results, theory, and computer simulation studies are solicited.

J02: Aperture and Focal Plane Arrays in Radio Astronomy

Monday 11/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Grand A

Convener: B. Veidt, <bruce.veidt@hia.nrc.ca>

Summary: In the coming decades, many science goals of radio astronomers require large areas of the sky to be mapped to very deep sensitivity. This need, along with advancements in electronics which enable low noise and high data rate systems, has lead radio engineers to explore array technologies as a way to expand the field of view of next-generation radio telescopes. This session will examine these techniques, namely low-noise wide-band phased arrays, and focal-plane arrays on reflectors based on either phased arrays or on clusters of wide-band horns. Papers are invited that describe theory, design, testing of prototypes or demonstrators, and plans for science-capable instruments.

KBE: Biomedical Applications: Microwave Breast Imaging

Monday 11/08/2008 13:40 – 17:20 / Oral Session / 10 Papers Room: Columbus KL

Conveners: J. LoVetri, <lovetri@ee.umanitoba.ca>

S. Hagness, <hagness@engr.wisc.edu>

Summary: This session is devoted to electromagnetic (and hybrid-electromagnetic) imaging systems using microwave frequencies for breast imaging and the detection/identification of breast tumors. Much progress has been made during the last ten years on the development of such systems and some clinical applications have already been reported. Specific topics of interest are: (1) tomographic, and other, image construction algorithms, (2) signal and image processing techniques for the detection and identification of tumors, (3) experimental results from prototype and clinical imaging systems, (4) the description of such systems, and (5) the electromagnetic characterization of biological tissues found in the breast.

Business meeting 1 of all Commissions

Monday 11/08/2008 17:20 – 18:40

Tuesday 12 August 2008 08:00 – 12:00**A02: Time Scales and Time Dissemination**

Tuesday 12/08/2008 08:00 – 12:00 / Oral Session / 11 Papers Room: Columbus IJ

Convener: D. Matsakis, <matsakis.demetrios@usno.navy.mil>

Summary: Research and development to support the realisation and maintenance of time scales including time scale algorithms, synchronisation and time dissemination.

B01: Electromagnetic Theory

Tuesday 12/08/2008 08:00 – 12:00 / Oral Session / 11 Papers Room: Grand B

Conveners: G. Kristensson, <gerhard.kristensson@es.lth.se>

B. Z. Steinberg, <steinber@eng.tau.ac.il>

Summary: This session focuses on the fundamental aspects of electromagnetic theory in a broad sense. It includes new solution methods and approaches for problems in electromagnetics, as well as other theoretical aspects of electromagnetic theory. Advances in mathematical methods, solutions to canonical problems and electromagnetism in micro-and nano-technologies are of interest. Optimization and design for EM applications, as well as, mathematical modeling of nonlinear phenomena, EM problems of complex and nonlinear materials and new approaches for solving wave propagation problems in these materials are especially welcome.

C03: Multi-antenna Systems

Tuesday 12/08/2008 08:00 – 12:00 / Oral Session / 11 Papers Room: Columbus GH

Conveners: M. Chiani, <mchiani@deis.unibo.it>

B. K. Lau, <buon-iong.lau@es.lth.se>

Summary: Multiple antenna systems can exploit the spatial resource to mitigate multipath, to reduce multiuser interference and to increase spectral efficiency. For these reasons, the usage of multiple antenna is one of the key technologies in modern radio communication systems, including cellular systems, high-speed wireless LAN, as well as

energy-constrained multi nodes wireless systems. This session will cover radio communication systems performance, channel characterization and antenna design for multiple antenna systems, including MIMO and distributed MIMO.

DB: Plasmonics

Tuesday 12/08/2008 08:00 – 12:00 / Oral Session / 11 Papers Room: Columbus AB

Conveners: F. de Fornel, <ffornel@u-bourgogne.fr>
N. Engheta, <engheta@ee.upenn.edu>
R. W. Ziolkowski, <ziolkows@ece.arizona.edu>

Summary: 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.

E07: Electromagnetic Compatibility in Wire and Wireless Communication Systems

Tuesday 12/08/2008 08:00 – 12:00 / Oral Session / 11 Papers Room: Columbus CD

Conveners: A. Zeddham, <ahmed.zeddham@orange-ftgroup.com>
F. Rachidi, <farhad.rachidi@epfl.ch>

Summary: 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. This session will focus on theoretical and experimental EMC aspects in both wire and wireless communication systems.

F03: Satellite and Terrestrial Propagation

Tuesday 12/08/2008 08:00 – 12:00 / Oral Session / 11 Papers Room: Columbus EF

Convener: R. J. Watson, <r.j.watson@bath.ac.uk>

Summary: This session is concerned with propagation issues affecting terrestrial and slant-path Earth Space propagation at microwave and millimetre-wave frequencies. Contributions to this session will focus on propagation modelling and measurements of scintillation, clouds, gaseous absorption and precipitation. Papers relating to associated system issues such as fade-mitigation techniques (e.g., power control, diversity, adaptive modulation etc) are also welcome. In addition, papers describing future satellite and terrestrial propagation experiments will be considered.

G03: Irregularities and Scintillation

Tuesday 12/08/2008 08:00 – 12:00 / Oral Session / 11 Papers Room: Grand

E Conveners: P. Doherty, <dohertpd@bc.edu>
A. Bhattacharya, <archana@iigs.iigm.res.in>
E. de Paula, <eurico@dae.inpe.br>

Summary: This session seeks to review the latest developments in the study of ionospheric irregularities and scintillation. It will welcome papers addressing theoretical developments, together with modelling and morphological studies. Papers will also be welcomed describing new experimental results, including those based on GPS,

GLONASS and Galileo signals, beacon transmissions from the COSMIC satellites and insitu satellite irregularity measurements. Ionospheric irregularities and scintillation are a challenge for society's increasing dependence on satellite based technological systems; therefore, studies of scintillation and irregularity effects on operational navigation and communication systems will also be welcomed.

HG1a: Wave-particle Interactions and Radiation Belt Remediation

Tuesday 12/08/2008 08:00 – 11:00 / Oral Session / 8 Papers Room: Grand F

Conveners: J. Albert, <jay.albert@hanscom.af.mil>
G. Ganguli, <gurudas.ganguli@nrl.navy.mil>
K. Groves, <keith.groves@hanscom.af.mil>

Summary: It is increasingly recognized that naturally occurring waves in space play a key role in the acceleration and loss of charged particles, at Earth, the magnetized planets, and other astrophysical objects. This session is mainly focused on these processes in the Earth's radiation belts, aurora, and elsewhere, as well as the possibility of applying such mechanisms to mitigate the effects of energetic particles on man-made systems. Papers are solicited on wave-particle interactions in space plasmas, including experimental, observational (ground- and space-based), theoretical, and modeling studies.

HT - Tutorial H: Wave Acceleration and Loss Processes at the Earth and Planets

Tuesday 12/08/2008 11:00 – 12:00 Room: Grand F

Convener: R. B. Horne, <r.horne@bas.ac.uk>
Lecturer: R. M. Thorne (University of California at Los Angeles, USA),
<rmt@atmos.ucla.edu>

J03a: Mm and Sub-mm Radio Astronomy

Tuesday 12/08/2008 08:00 – 12:00 / Oral Session / 11 Papers Room: Grand A

Convener: T. Beasley, <tbeasley@alma.cl>
Summary: Bolometric and heterodyne radio observations at mm/submm wavelengths provide unique information about the formation of planets, stars and galaxies, and allow the study of star formation from molecular gas and warm dust at high redshifts. Worldwide there are several major single-dish telescopes and interferometers currently under construction at high-altitude sites, and numerous scientific programs combining these instruments to consider. In session J06 the development status of these new projects will be reviewed, with a focus on emerging technologies and the new science being opened up in this little-explored region of the spectrum.

K03a: Wireless Communication and Health: Molecular, Cellular, Animal

Tuesday 12/08/2008 08:00 – 12:00 / Oral Session / 11 Papers Room: Columbus KL

Conveners: D. Leszczynski, <dariusz.leszczynski@stuk.fi>
J. McNamee, <james_mcnamee@hc-sc.gc.ca>

Summary: This session will overview the present status of research on the possible biological effects of non-ionizing radiation emitted by wireless communication devices (cell phones and other hand-held devices, base stations, WiFi networks etc.) and the potential impact of these effects on human health. Special emphasis will be given to the

plausibility of the available evidence for non-thermal effects and to the application of modern molecular biology technologies (proteomics, transcriptomics, DNA damage analysis) in the search for target molecules and biophysical mechanism of RF-EMF exposure.

Tuesday 12 August 2008 13:40 – 18:20

A04: Antenna Characterisation

Tuesday 12/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Columbus IJ

Convener: Q. Balzano, <qbalzano@umd.edu>

Summary: Measurement techniques to characterize antennas, including smart antennas.

BCK: Body Area Networks, Including Medical Application

Tuesday 12/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Grand B

Conveners: Y. Rahmat-Samii, <rahmat@ee.ucla.edu>

K. Ito, <ito.koichi@faculty.chiba-u.jp>

Summary: Wireless systems, especially mobiles, require antennas with system-dependent requirements. They include operation near the human body, operation in a multi-path environment, extremely small size, space, beam and polarization diversity, dual-frequency operation, pattern reconfiguration, smart antennas and adaptive techniques. Unique quality factors, in contrast to the classical ones, are also introduced such as mean effective gain, correlation factor and efficiency in terms of volume, design techniques for antennas featured for mobile wireless systems, implementation of new concepts, cost-effective realization of antennas and field-test results are of special interest. Introduction of latest projects such as ACE are introduced.

C04: Interference-limited Scenarios and Multiuser Detection for Wireless

Tuesday 12/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Columbus GH

Conveners: R. Mueller, <ralf@iet.ntnu.no>

U. Mitra

Summary: This session is dedicated to algorithms used in wireless communication for mitigating, reducing or exploiting the effects of interference and crosstalk which arise due to MIMO, multiple-access or broadcast. The scope of the session spans novel algorithms, their performance analysis, as well as a unified view of the covered areas and the examination of the theoretical limits of reliable communication under presence of interference.

D03: Microwave Photonics

Tuesday 12/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Columbus AB

Convener: N. J. Gomes, <n.j.gomes@kent.ac.uk>

Summary: The interaction and interfacing between the optical and microwave domains is a challenging area for current research, with many potential benefits as it can bring together the high bandwidth capabilities of fibre optic technology with the flexibility of wireless systems. This session will address current developments in microwave photonics, from components to systems, and from applications in wireless

communication systems to those in high-speed and microwave/millimetre-wave measurements.

E02: High Power Electromagnetics

Tuesday 12/08/2008 13:40 – 15:40 / Oral Session / 6 Papers *Room: Columbus CD*

Conveners: C. E. Baum, <cebaum@ece.unm.edu>

F. Sabath, <franksabath@bwb.org>

Summary: The subject of this session is the physics and engineering associated with electromagnetic sources for which nonlinear effects associated with high-field regions must be avoided or included in the analysis and design. This includes (but is not limited to) EMP simulators, high-power narrowband and mesoband sources and antennas, and hyperband (impulse) sources and antennas. It also includes the environment near lightning channels and in nuclear EMP source regions. It also includes the high-field regions on, or in targets.

F04: Multiparameter SAR Interferometry

Tuesday 12/08/2008 13:40 – 15:40 / Oral Session / 6 Papers *Room: Columbus EF*

Conveners: A. Moreira, <alberto.moreira@dlr.de>

M. Sato, <sato@cneas.tohoku.ac.jp>

Summary: The session seeks contributions reporting on the state-of-the-art developments in the field of multiparameter SAR Interferometry. Papers emphasizing methodology, applications and results arising from from multibaseline, polarimetric and bistatic measurements are particularly welcome. Contributions dwelling on current international projects and actions, such as TerraSAR, TandemX will be an important feature of the session.

G04a: Assimilation and Imaging of the Ionosphere and Plasmasphere

Tuesday 12/08/2008 13:40 – 15:40 / Oral Session / 6 Papers *Room: Grand E*

Conveners: G. Bust, <gbust@astraspace.net>

N. Jakowski, <norbert.jakowski@dlr.de>

M. Codrescu, <mihail.codrescu@noaa.gov>

Summary: In recent years ionospheric imaging (tomography and other techniques) and assimilative mapping have matured. These techniques are providing new scientific insights and are providing improvements to the operational capability of various systems. Although still largely driven by ground based TEC sensors, there are also opportunities to use and assimilate new ground and space based data types. While this session will welcome a broad range of papers addressing techniques, validation, scientific results and operational benefits, the following topics are especially encouraged: 1) the ingestion of new data sources, 2) the validation and accuracy limitations of imaging and assimilation, 3) new scientific results obtained by use of imaging and assimilation, and 4) the estimation of underlying physical drivers or input drivers from imaging and assimilation.

HG1b: Wave-particle Interactions and Radiation Belt Remediation

Tuesday 12/08/2008 13:40 – 15:40 / Oral Session / 6 Papers *Room: Grand F*

Conveners: J. Albert, <jay.albert@hanscom.af.mil>

G. Ganguli, <gurudas.ganguli@nrl.navy.mil>

K. Groves, <keith.groves@hanscom.af.mil>

Summary: It is increasingly recognized that naturally occurring waves in space play a key role in the acceleration and loss of charged particles, at Earth, the magnetized planets, and other astrophysical objects. This session is mainly focused on these processes in the Earth's radiation belts, aurora, and elsewhere, as well as the possibility of applying such mechanisms to mitigate the effects of energetic particles on man-made systems. Papers are solicited on wave-particle interactions in space plasmas, including experimental, observational (ground- and space-based), theoretical, and modelling studies.

J03b: Mm and Sub-mm Radio Astronomy

Tuesday 12/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Grand A

Convener: T. Beasley, <tbeasley@alma.cl>

Summary: Bolometric and heterodyne radio observations at mm/submm wavelengths provide unique information about the formation of planets, stars and galaxies, and allow the study of star formation from molecular gas and warm dust at high redshifts. Worldwide there are several major single-dish telescopes and interferometers currently under construction at high-altitude sites, and numerous scientific programs combining these instruments to consider. In session J06 the development status of these new projects will be reviewed, with a focus on emerging technologies and the new science being opened up in this little-explored region of the spectrum.

KT - Tutorial K : Wireless Communication and Health: Epidemiology

Tuesday 12/08/2008 13:40 – 14:40 Room: Columbus KL

Convener: F. Prato, <prato@lawsonimaging.ca>

Lecturer: D. Krewski (University of Ottawa, Canada),
<dkrewski@uottawa.ca>

K03b: Wireless Communication and Health: Genotoxicity

Tuesday 12/08/2008 14:40 – 15:40 / Oral Session / 3 Papers Room: Columbus KL

Conveners: M. R. Scarfi, <scarfi.mr@irea.cnr.it>

Vijayalaxmi, <vijay@uthscsa.edu>

Summary: Non-ionizing radiofrequency radiation (RFR) in the frequency range of 300 MHz – 300 GHz has tremendous impact in modern society. In recent years the number of people subscribing to use wireless communication systems has increased at an extraordinary rate. This escalated use is accompanied by an increase in public concern about possible adverse effects on human health. Induction of damage to the DNA in somatic cells can lead to the development of cancer or cell death. Changes in the DNA of germ cells can lead to mutations which can be transmitted to subsequent generations.

Poster Session I: 15:40 – 18:20

Conveners:

Com. A: P. Banerjee, <pbanerjee@mail.nplindia.ernet.in>

Com. B: D. R. Jackson, <djackson@uh.edu>

A. Petosa, <aldo.petosa@crc.ca>

Com. C: T. Ohira, <ohira@ieee.org>

- Com. D:** F. de Fornel, <ffornel@u-bourgogne.fr>
F. Kaertner, <kaertner@mit.edu>
Summary: Contributed papers related to :
(a) Electronic devices, circuits, systems and applications;
(b) Photonic devices, systems and applications;
(c) Physics, materials, CAD, technology and reliability of electronic and photonic devices *down to nanoscale including quantum devices*, with particular reference to radio science and telecommunications.
- Com. E:** C. Christopoulos, <christos.christopoulos@nottingham.ac.uk>
Com. F: P. Sobieski, <piotr.sobieski@uclouvain.be>
M. Chandra, <madhu.chandra@infotech.tu-chemnitz.de>
Com. G: M. Rietveld, <mike.rietveld@eiscat.uit.no>
T. Maruyama, <tmaru@nict.go.jp>
Com. H: Y. Omura, <omura@rish.kyoto-u.ac.jp>
Com. J: S. Ananthakrishnan, <ananth@ncra.tifr.res.in>
Com. K: B. Greenebaum, <greeneba@uwp.edu>

Wednesday 13 August 2008 08:00 – 12:00

A06: Characterisation of EM Materials

Wednesday 13/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Columbus IJ

Convener: B. Clarke, <bob.clarke@npl.co.uk>

Summary: Characterization of the electromagnetic properties of materials.

BCD: Physical Limitations of Electromagnetic Metamaterials

Wednesday 13/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Grand B

Conveners: A. Sihvola, <ari.sihvola@tkk.fi>

A. Yaghjian, <a.yaghjian@verizon.net>

C. Caloz, <christophe.caloz@polymtl.ca>

Summary: This session shall focus on the limitations and restrictions that basic principles of physics and engineering practicalities place upon the development of electromagnetic materials and their applications. Recent research on the design and use of various metamaterials has created a large amount of theoretical studies on the behavior and use of materials with unconventional material parameters such as negative permittivity and permeability or large anisotropies. On the other hand, fundamental principles such as causality, energy, and dispersion relationships as well as practical considerations such as losses, tolerances, and bandwidth may preclude the existence or practical realization of certain metamaterials and their applications. In this session, these limits will be charted.

C05: Ultrawideband Systems

Wednesday 13/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Columbus GH

Conveners: L. Lampe, <lampe@ece.ubc.ca>

D. Goeckel, <goeckel@chloe.ecs.umass.edu>

Summary: Wireless communication using ultra-wideband (UWB) signals has received great attention among industry groups, academia, and standardization and

regulation bodies, not to mention the military. The key feature of UWB radios is that very low-power signals are emitted over an extremely broad radio spectrum, typically between several hundred Megahertz and a few Gigahertz. As such UWB signals enable highly-efficient use and reuse of frequency spectrum and accurate device localization. The major boost for commercialization of UWB technology came in February 2002 with the decision by the U.S. Federal Communications Commission (FCC) to allow unlicensed operation of UWB devices in the 3.1-10.6 GHz band, and subsequent regulation efforts on a global scale. UWB enabled devices are believed to have enormous potential in various areas like radar and safety applications and data communications. Possible obstacles for the UWB vision to become reality (in the near future) come from concerns about coexistence with established radio-communication services, inhomogeneities in the international radio regulation and fragmentation of the radio spectrum, dissensions in standardization efforts, and technological challenges arising from the unprecedentedly large bandwidth of UWB signals. This session will feature seven invited presentations that revolve around current developments of UWB communications including UWB communications technology, applications, standards, coexistence issues, etc.

D04: Transistor Session

Wednesday 13/08/2008 08:00 – 9:20 / Oral Session / 4 Papers *Room:* Columbus AB

Convener: M. Östling, <ostling@imit.kth.se>

Summary: The session called "Ultimate limits in transistor performances" should be composed of a series of different invited talks where each talk should focus on a particular transistor technology. The session should cover:

1) Ultimate high frequency performance bipolar transistors in SiGe HBT technology as well as in III-V technology 2) Ultimate high frequency CMOS transistor performances 3) Ultimate high frequency performances for emerging techniques. i.e carbon nanotube transistors 4) Ultimate high speed performances in spintronic transistor technology.

DT - Tutorial D: (title not available)

Wednesday 13/08/2008 09:40 – 10:40 *Room:* Columbus AB

Convener: F. de Fornel, <ffornel@u-bourgogne.fr>

Lecturer: Micha Lipson <ml292@cornell.edu>

E04: Interaction with Complex Systems

Wednesday 13/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Columbus CD

Conveners: M. D'Amore, <marcello.damore@uniroma1.it>

J. LoVetri, <lovetri@ee.umanitoba.ca>

Summary: This session covers the different aspects of electromagnetic (EM) interaction with complex systems. 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 number of connections between them, the complexities of the components and of the connections. Relationships between components give rise to the collective behaviours of a system, which interacts with its environment. Complex systems can be of large dimensions, like transportations systems or information/communication wireless structures, or of micro/nano dimensions, like very large scale integration circuits. The scope of the session includes experimental or

numerical simulations, methodology to analyse EM interaction, applications of combined measurement and numerical modelling techniques on such complex systems.

FG: Mitigation of Ionospheric and Tropospheric Effects in Precision GNSS.

Wednesday 13/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus EF

Conveners: B. Arbesser-Rastburg, <bertram@tec-ee.esa.int>
M. Hernández-Pajares, <manuel@mat.upc.es>

Summary: Precise GNSS positioning is affected by both ionospheric and tropospheric delays, which can be very significant. The session is addressing this interdisciplinary field of research, inviting submissions on recent improvements in mitigating the ionospheric and tropospheric effects 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 important topics. Papers on supporting techniques such as data combination, assimilation, improvements in mapping functions and tomography would also be welcome. In addition techniques which are counteracting the effects of scintillations for precision GNSS applications can be considered.

GHE: Modification of the Ionosphere and Magnetosphere

Wednesday 13/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Grand E

Conveners: K. Groves, <keith.groves@hanscom.af.mil>
Y. Ruzhin, <ruzhin@izmiran.ru>
M. Kosch, <m.kosch@lancaster.ac.uk>
O. A. Molchanov, <oleg@molchanov.org>, <oleg@uipe-ras.scgis.ru>

Summary: This session will include chemical and radio frequency methods and natural lighting effects. There is a separate session led by Commission H on Wave Particle Interactions and Radiation Belt Remediation. A number of active techniques for perturbing the natural space environment have been employed to both study the response of the ionosphere and/or magnetosphere and to investigate fundamental plasma physics in an unbounded medium. The principal technique of interest here is the use of high power, high frequency (HF) radio waves to induce numerous space plasma effects such as elevated temperature, electron acceleration, artificial airglow, stimulated electromagnetic emissions, and the formation of density irregularities. Furthermore, it is anticipated that the recently completed High frequency Active Auroral Research Program (HAARP) HF transmitter near Gakona, Alaska will achieve higher effective radiated power levels than previous or existing facilities and may facilitate the discovery and exploration of new non-linear HF wave-plasma interactions. This session seeks papers addressing the nature of radio wave-plasma effects, 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 chemical releases, including rocket motor exhaust effects, are also welcome.

J01b: Future Large Telescopes

Wednesday 13/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Grand A

Convener: P. Wilkinson, <pnw@jb.man.ac.uk>

Summary: The next generation radio telescopes with dramatically new capabilities at metre and centimetre wavelengths is on the way. In the next few years a giant phased array, LOFAR, will make unique searches for hydrogen in the early universe and for new types of transient events. Advanced signal processing technology is allowing other long wavelength phased arrays, with wide-area scanning capabilities, to be built in Australia (MWA) and the USA (LWA). A 500-m diameter Arecibo-like telescope, FAST, will come into operation in China in 2013. In the lead up to the Square Kilometre Array (SKA) the USA (ATA), Australia (Miranda) and South Africa (MeerKAT) are constructing dish-based interferometers with much wider fields-of-view than current arrays, appropriate for a range of new sky surveys. Construction for the SKA itself may start in 2012. Its massive collecting area and wide field-of-view will allow it to address fundamental physical questions on the nature of gravitation, matter and energy.

K04a: Biomedical Applications: Neurostimulation

Wednesday 13/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Columbus KL

Conveners: A. Thomas, <athomas@lawsonimaging.ca>
M. Jog, <mandar.jog@lhsc.on.ca>

Summary: Neurostimulation (neuromodulation) of electric and magnetic stimulation is one of the newest and most controversial therapeutic practices. Deep brain stimulation (DBS), vagal nerve stimulation, and transcutaneous nerve stimulation may have common mechanisms but they target very different areas to elicit therapeutic relief. Transcranial magnetic stimulation (TMS) and complex neural pulses (CNP) also offer a method of neurostimulation, but differ greatly in both proposed mechanisms and targets. Here, experts in DBS, TMS, and CNP will present some of their latest data and perspectives.

General Lecture 2

Wednesday 13/08/2008 11:00 – 12:00

Pulsars, General Relativity, and Gravitational Waves

Convener: F. Lefeuvre, <lefeuvre@cnrs-orleans.fr>
Speaker: James M. Cordes (Cornell University, USA),
<cordes@astro.cornell.edu>

Wednesday 13 August 2008 13:40 – 17:20

AE: EMC Measurements

Wednesday 13/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Columbus IJ

Conveners: A. C. Marvin, <acm@ohm.york.ac.uk>
B. Demoulin, <bernard.demoulin@univ-lille1.fr>

Summary: Measurement techniques to characterise EM emissions, immunity and interference, including anechoic chambers and reverberation chambers.

B02: Scattering and Diffraction

Wednesday 13/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Grand B

Conveners: L. Klinkenbusch, <lbk@tf.uni-kiel.de>
G. Manara, <d6951@ing.unipi.it>

Summary: The session will review topics covering a wide range of scattering and

diffraction problems, including edge diffraction, high frequency methods, hybridization with high frequency methods, use of artificial structures for optimal control of wave propagation, scattering from disordered media and potential applications. Study of scattering from non-linear/anisotropic media as well as mathematical problems will also be emphasized.

CT - Tutorial C: Cooperative Communications

Wednesday 13/08/2008 13:40 – 14:40 Room: Columbus GH

Convener: A. F. Molisch, <andreas.molisch@ieee.org>

Lecturer: M. Z. Win, <moewin@mit.edu>

C06: Cooperative Communications

Wednesday 13/08/2008 14:40 – 17:20 / Oral Session / 7 Papers Room: Columbus GH

Conveners: A. Nosratinia, <aria@utdallas.edu>

L. VandenDorpe, <luc.vandendorpe@uclouvain.be>

Summary: Cooperative communications is a new paradigm for radio communication. While conventional systems compete for resources and interfere with each other when accessing the radio channel, transmitters in cooperative communications work together to transmit or forward information. As a consequence, robustness of the transmission can be greatly enhanced (higher diversity order), and overall energy consumption for successfully transmitting a message to its destination is reduced. The current session will cover both theoretical and practical investigations of cooperative communications.

DE: Simulation and Characterization of Mixed Signals and Power Integrity

Wednesday 13/08/2008 13:40 – 17:20 / Oral Session / 10 Papers Room: Columbus AB

Conveners: V. Nair, <Vijay.k.nair@intel.com>

S. Tedjini, <smail.tedjini@esisar.inpg.fr>

J. Kim, <joungho@ee.kaist.ac.kr>

Summary: System level modeling and simulation of hybrid integrated systems are major steps for their efficient design. Nowadays embedded systems could include analogue and digital electronics, radiofrequency parts, physical sensors and actuators. The optimization of such system requires the use of simulator able to address analogue, digital and RF signals. This session is dedicated to mixed simulators and their application.

EGH: Terrestrial and Planetary Electromagnetic Disturbances and Effects

Wednesday 13/08/2008 13:40 – 17:20 / Oral Session / 10 Papers Room: Columbus CD

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

C. Price, <cprice@flash.tau.ac.il>

M. Füllekrug, <m.fullekrug@bath.ac.uk>

Summary: This session welcomes papers on the general topic of natural and anthropogenic electromagnetic disturbances in the atmospheres of the Earth and other planets. Papers dealing with ULF, ELF and VLF disturbances are particularly encouraged, although papers dealing with any frequency range are welcome. Some topics related to this session include geomagnetic pulsations and VLF/ELF emissions, Schumann resonances and global lightning, lightning detection and thunderstorm research, upper atmosphere discharges, ionospheric and magnetospheric remote sensing,

electromagnetic noise, their effects on transmission lines, etc.

FC1: Propagation Measurements of Indoor-outdoor Channels (including Polarization Aspects)

Wednesday 13/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Columbus EF

Conveners: I. Glover, <ian.glover@eee.strath.ac.uk>

P. Kyritsi, <persa@kom.aau.dk>

Summary: Papers are invited that address propagation measurements and modelling of radio channels spanning the indoor-outdoor interface. All such measurements in any frequency band will be considered including narrowband measurements, but papers that address the following topics are especially welcome: broadband (including UWB), space diversity, polarisation diversity, material and elevation dependence, and MIMO issues. Considerations relating to undesired radiation across the indoor-outdoor interface are also welcome. Results that are theoretically supported are also welcome.

GF: Radio Occultation – Techniques, Validation, Science and Applications

Wednesday 13/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Grand E

Conveners: C. Mitchell, <c.n.mitchell@bath.ac.uk>

C.-H. Liu, <chliu@cc.ncu.edu.tw>

T. Schueler, <dr_schueler@gmx.net>

Summary: Radio-occultation of the neutral or ionised atmosphere of the Earth are both of interest to this joint G-F session. Papers are welcome that focus on either technique development or scientific results, in particular those that capitalize on using multiple occultation satellites. Results may include data from either past (e.g. GPS/MET) or current (e.g. CHAMP, SAC-C, COSMIC) missions. Descriptions of future planned missions are also of interest to this session.

HSR: Special Review - Roger Gendrin, In Memory of an Outstanding Scientist

Wednesday 13/08/2008 13:40 – 14:20 *Room:* Grand F

Convener: R. B. Horne, <r.horne@bas.ac.uk>

Reviewer: F. Lefeuvre, <lefeuvre@cnrs-orleans.fr>

H03: Open Session and Latest Results

Wednesday 13/08/2008 14:20 – 17:20 / Oral Session / 8 Papers *Room:* Grand F

Conveners: Y. Omura, <omura@rish.kyoto-u.ac.jp>

R. B. Horne, <r.horne@bas.ac.uk>

Summary: 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 new results from the International Polar Year and International Heliospheric Year.

JF: Radio Frequency Interference, Problems and Solutions

Wednesday 13/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Grand A

Conveners: S. Ellingson, <ellingso@vt.edu>

J. T. Johnson, <johnson@ece.osu.edu>

Summary: Radio frequency interference (RFI) poses a continuing challenge to many forms of radio science observing, including radio astronomy and passive remote sensing at radio frequencies. This session is open to contributions which (1) characterize and quantify the extent to which RFI impedes productive science, (2) propose technical solutions for the mitigation of RFI, or (3) document real-world examples of attempts to mitigate RFI using technical methods. Objectives of this session are to share information about some of the considerable efforts in this area that have been performed independently and in parallel within the astronomy and remote sensing communities, and to review current issues in spectrum management.

K02a: Biological Effects of EMF: Antenna Interactions with the Human body and Implanted Systems

Wednesday 13/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Columbus KL

Conveners: G. Lazzi, <lazzi@ncsu.edu>
C. Furse, <cfurse@ece.utah.edu>

Summary: 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.

Business meeting 2 of all Commissions

Wednesday 13/08/2008 17:20 – 18:20

Thursday 14 August 2008 08:00 – 12:00

A05: Measurements to Support Advanced Communications Systems

Thursday 14/08/2008 08:00 – 12:00 / Oral Session / 11 Papers *Room:* Columbus IJ

Conveners: (not available)

Summary: Standards and measurements techniques to support the development and exploitation of advanced communication systems, including time domain measurements.

BK: Future Challenges of Computational Electromagnetics

Thursday 14/08/2008 08:00 – 12:00 / Oral Session / 11 Papers *Room:* Grand B

Conveners: T. Sarkar, <tsarkar@syr.edu>
M. Salazar-Palma, <salazar@tsc.uc3m.es>

Summary: In the future the processors will be multicore. In addition the clock speeds are changing rapidly. They will have a tremendous impact on the computational electromagnetics. The objectives of this session are surveying the state of the art in computational electromagnetics and understanding what the future will bring.

C07: Cognitive Radio and Software Radio

Thursday 14/08/2008 08:00 – 10:20 / Oral Session / 6 Papers *Room:* Columbus GH

Convener: J. Sydor, <john.sydor@crc.ca>

Summary: Cognitive Radio (CR) is now on the cusp of implementation. What was once an academic study on the behavior of radio systems endowed with artificial intelligence qualities has become a realizable technology garnering the attention of cellular implementers and spectrum policy makers around the world. In large measure this rapid evolution is fueled by a new generation of broadband wireless standards that support protocols and modulation techniques capable of undertaking sophisticated radio sensing and dynamic bandwidth assignment tasks. To the wireless scientist CR provides an unprecedented capability by a wireless network to measure and characterize its own propagation and interference environment. Theoretical examinations tell us that if sufficient information about the interference and propagation channel is obtained, then system capacities rivaling those obtained by MIMO systems can be achieved by Cognitive Radio. Understanding how such information is obtained and stored and the manner it is used to control the spatial, temporal and spectral attributes of a wireless link offers exciting insights into and about Cognitive Radio. New wireless challenges have proliferated: spectrum sub-licensing, trading, and sharing concepts based on game-theoretic and economic models are being devised; radio designers are contemplating VOIP handsets endowed with opportunistic algorithms that forage for WIFI spectrum and increasing capacity by scheduling a multiplicity of interfering wireless users working on a common channel becomes achievable if a cognitive network has knowledge of its instantaneous offered traffic and the interference interactions amongst its community of users. The creation of a rich environmental knowledge data base and the ability to make coordinated data communications decisions seems to be key to some Cognitive Radio strategies. Alternatively there may be simpler algorithmic approaches that are as efficient when faced with the complexity of coordinating the operation of a multitude of interacting wireless devices, be they within mesh networks or serviced by set of base stations having re-configurable antenna patterns. Whatever the approaches, indications are that the next generation of broadband radio standards and computationally intensive wireless chipsets will have the facility and processing power to support Cognitive Radio. The URSI 2008 Conference Commission C Session on Cognitive and Software Radio will examine such issues, and contributions in this field are solicited.

C08: Signal Processing for Software Radio

Thursday 14/08/2008 10:20 – 12:00 / Oral Session / 5 Papers *Room:* Columbus GH

Conveners: Y. Louët, <yves.louet@rennes.supelec.fr>
J. Palicot, <jpalicot@rennes.supelec.fr>

Summary: Software Radio systems have recently gained increased attention because it refers basically to an ensemble of techniques that permit the reconfiguration of a communication system without the need to change any hardware system element. The consequence is that almost all topics of signal processing and digital communications are involved in this trend. This session will attempt to address some key signal processing advances for Software Radio systems design. Power amplification, analog to digital converters or spectrum sensors are examples of topics of high interest for this session.

D05: Modeling of High Frequency Devices and Circuits

Thursday 14/08/2008 08:00 – 12:00 / Oral Session / 11 Papers *Room:* Columbus AB

Conveners: S. El-Ghazaly, <elghazaly@utk.edu>

Summary: The demand for high-frequency devices and circuits is steadily growing. Increased commercial and personal use of wireless technology is a major driver for the increased demand. Moreover, there is a staggering need for high-speed digital circuits to satisfy the requirements for faster computers, which proliferate in the form of computational tools or as embedded systems. The main characteristics of new technologies include high-density circuits, relentless miniaturization, low-cost materials, low power, and fast design cycles. To meet strict standards and satisfy often-conflicting requirements, device and circuit designers rely heavily on accurate modelling tools to achieve first-path success. Hence, new device and circuit modelling and simulation tools are needed. This session reviews the latest developments in this area.

EB: EM Modelling for EMC

Thursday 14/08/2008 08:00 – 12:00 / Oral Session / 11 Papers *Room:* Columbus CD

Conveners: C. Christopoulos, <christos.christopoulos@nottingham.ac.uk>

K. Langenberg, <langenberg@uni-kassel.de>

Summary: The session will focus on aspects of modelling and simulation as applied to EMC problems. Particular attention will be paid to multi-scale problems, complexity reduction techniques and hybridization of methods to deal with complex practical problems. It is expected that the requirements placed on modelling by the ever increasing clock frequencies used in the design of high-speed systems and the use of mixed electronic and optical components will also be addressed.

F05: Remote Sensing of the Cryosphere

Thursday 14/08/2008 08:00 – 11:00 / Oral Session / 8 Papers *Room:* Columbus EF

-Conveners: M. Tedesco, <mtedesco@umbc.edu>

R. Kelly, <rejkelly@fesmail.uwaterloo.ca>

Summary: (not available)

FT - Tutorial F: (title not available)

Thursday 14/08/2008 11:00 – 12:00 *Room:* Columbus EF

Conveners: P. Sobieski, <piotr.sobieski@uclouvain.be>

M. Chandra, <madhu.chandra@infotech.tu-chemnitz.de>

Lecturer: (not available)

GH: Radio Sounding Techniques for the Ionosphere and Magnetosphere.

Thursday 14/08/2008 08:00 – 12:00 / Oral Session / 11 Papers *Room:* Grand E

Conveners: L.-A. McKinnell, <l.mckinnell@ru.ac.za>

G. James, <gordon.james@crc.ca>

Summary: Techniques in radio sounding the ionosphere and magnetosphere have advanced considerably in the past 10 years. This session will address the latest techniques in ionosondes and space-borne sounders and how these may generate a new understanding of the complex geospace environment. Solicited and contributed papers covering ionosondes, space sounders and the applications of these sounders in the field of space physics research will make up this session. Papers that highlight the differences in the current available sounders as well as those highlighting new sounding techniques will

be welcome.

H04: Kinetic Processes at Boundary Layers

Thursday 14/08/2008 08:00 – 12:00 / Oral Session / 11 Papers *Room: Grand F*

Conveners: B. Lembege, <Bertrand.Lembege@cetp.ipsl.fr>

G. Lakhina, <lakhina@iig.iigm.res.in>

K. Quest, <quest@ecepops.ucsd.edu>

Summary: A large variety of microscopic processes take place in the internal physics of boundary layers and occur over micro- and meso-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 session welcomes the discussion of results from theory, multi-dimensional numerical simulations and experimental data obtained from space missions. Such a comparison between these approaches is now 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) potential drops in the ionosphere, (iv) basic particle acceleration process, and (v) dynamics of interface in active space experiments. Any contributions related to these topics are very welcome.

J04: Observatory Reports

Thursday 14/08/2008 08:00 – 12:00 / Oral Session / 11 Papers *Room: Grand A*

Convener: S. Ananthkrishnan, <ananth@ncra.tifr.res.in>

Summary: Brief reports will be given on recent developments at radio astronomy observatories around the world.

K02b: Biological Effects of EMF: Molecular, Cellular, Animal

Thursday 14/08/2008 08:00 – 12:00 / Oral Session / 11 Papers *Room: Columbus KL*

Conveners: J. Behari, <jbehari2000@yahoo.co.in>

R. Korenstein, <korens@post.tau.ac.il>

Summary: The areas of current debate are the interactions between living organisms and technologically generated fields at power line frequencies, cell phones and microwave oven. However, the exact mechanism of non-thermal interaction of radiation with biological system is yet to be elucidated. Therefore, the phenomena relating to the low level interaction of electromagnetic field exposure to biological system is one of continuing interest for it produces results which are diversified and unexplainable by any single or multiplicity of theoretical formulations. It is planned to review and evaluate the existing scientific information on the possible effects of animal exposure to EMFs on the incidence on reproduction, developmental abnormalities, and on neurobiological response as reflected in learning and behavior. Moreover, the therapeutic role of such fields remains to be understood. Furthermore, the role of modulated fields has not yet been established. More irrefutable experimental evidence, particularly at the cellular and molecular levels, is needed to fully understand these phenomena. This session aims to discuss and update on emerging trends and results.

Thursday 14 August 2008 13:40 – 18:20

AT - Tutorial A: From Nanoscience to Nanometrology and its impact on electrical metrology

Thursday 14/08/2008 13:40 – 14:40 Room: Columbus IJ

Convener: P. Banerjee, <pbanerjee@mail.nplindia.ernet.in>

Lecturer: J.T.Janssen <jt.janssen@npl.co.uk>

AC: Measurements Methods and Model Extractions for Wireless Systems

Thursday 14/08/2008 14:40 – 15:40 / Oral Session / 3 Papers Room: Columbus IJ

Conveners: R. Thomae, Reiner.Thomae@TU-Ilmenau.de

M. Jensen, <jensen@ee.byu.edu>

Summary: Measurement of wireless propagation channels forms the basis for our fundamental understanding of propagation models, and is also the basis for channel models, which in turn are used for the design and testing of new wireless systems. The emergence of new wireless communication technologies (MIMO, UWB, etc.) has also led to new challenges for wireless channel measurement technology. The session will give an overview of recent developments in the area.

BKF: Stochastic Modeling and Uncertainty Management in Electromagnetics

Thursday 14/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Grand B

Conveners: M.-F. Wong, <manfai.wong@orange-ftgroup.com>

J. Wiart, <joe.wiart@orange-ftgroup.com>

Summary: While electromagnetic modeling has made great progress, known deterministic data imply very accurate analyses. A great challenge of electromagnetic modeling is to take into account stochastic processes (random media) or to manage uncertainties (lack of knowledge). Classical Monte-Carlo methods are unpractical in real life applications, thus specific techniques are needed.

C09: Radio Resource Allocation

Thursday 14/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Columbus GH

Convener: J.-C. Imbeaux, jeanclaude.imbeaux@orange-ftgroup.com

Summary: In a radiocommunication system, resources such as frequency channel, time slot, spreading code, transmitted power... must be shared between users to avoid interference and to ensure a good QoS. The objective is to utilize the limited radio spectrum resources and radio network infrastructure as efficiently as possible. This session is dedicated to mechanisms for dynamic and adaptive radio resource allocation in multi-users systems, considering traffic requirements, and the impact on the capacity of the system. A wide variety of mechanisms for RRM (Radio Resource Management) can be considered : distributed (autonomous or with some coordination by exchange of information between base stations) or centralised management ; use or not of reports returned by terminal users ; physical layer or/and upper layer mechanisms (such as scheduling algorithms at MAC layer)... Description of new algorithms with possible application to existing radio access systems, and performance evaluation are awaited.

D06: Plastic Devices for Nomad Apparatus (Mobile Phone....)

Thursday 14/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Columbus AB

Convener: A. Moliton, <amoliton@unilim.fr>

Summary: Plastic optoelectronic devices exhibit huge developments in nomad systems (mobile phone or mobile computer) because of their low weight and their aptitude to be integrated on such apparatus. These plastic devices can act as well as light emitter (OLEDs: Organic Light Emitting Devices) as photonic receptor (OPV: Organic Photovoltaic solar cell) that renew electrical power. Furthermore, organic transistor (TFT: thin film transistor) can be also integrated to control pixels of displays made of individual OLEDs.

E03: Electromagnetic Noise and Interference Control

Thursday 14/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Columbus CD

Conveners: A.P.J. van Deursen, <A.P.J.v.Deursen@tue.nl>

F. Silva, <ferran.silva@upc.edu>

Summary: This session focuses on the EMC issues in electronic circuits at component and PCB level. Particular attention will be paid to the EMC aspects in new electronic technologies like those that integrate high and low power applications. Examples of these are wireless communication systems where the compatibility between transmitter and sensitive stages present new challenges. EM behavior and reliability of microcircuits, micro electromechanical systems (MEMS) or smart textiles can also be considered. The session may also deal with new techniques applied to classical topics such as shielding, cabling and connectors, coupling and grounding.

F06: Sub-millimetric and Terahertz Propagation

Thursday 14/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Columbus EF

Conveners: S. Zvanovec, <xzvanove@fel.cvut.cz>

M. Mazanek, <mazanekm@fel.cvut.cz>

Summary: This session will address research and measurement activities dealing with propagation aspects in the frequency region ranges from hundreds of gigahertz up to orders of terahertz from both, physical and communication point of view. This includes topics focused on the atmospheric propagation of terahertz waves, interaction of electromagnetic waves with small particles, gas attenuation, spectroscopy etc. The session moreover covers also aspects of reflection/diffraction, surface properties and specific measurement arrangements in terahertz region. Many other issues that emerge mainly at such higher frequencies and that are neglected during solving propagation of electromagnetic waves at lower frequencies are introduced as well.

G04b: Assimilation and Imaging of the Ionosphere and Plasmasphere

Thursday 14/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Grand E

Conveners: G. Bust, <gbust@astraspace.net>

N. Jakowski, <norbert.jakowski@dlr.de>

M. Codrescu, <mihail.codrescu@noaa.gov>

Summary: In recent years ionospheric imaging (tomography and other techniques) and assimilative mapping have matured. These techniques are providing new scientific insights and are providing improvements to the operational capability of various systems.

Although still largely driven by ground based TEC sensors, there are also opportunities to use and assimilate new ground and space based data types. While this session will welcome a broad range of papers addressing techniques, validation, scientific results and operational benefits, the following topics are especially encouraged: 1) the ingestion of new data sources, 2) the validation and accuracy limitations of imaging and assimilation, 3) new scientific results obtained by use of imaging and assimilation, and 4) the estimation of underlying physical drivers or input drivers from imaging and assimilation.

HG2: Dusty Plasmas

Thursday 14/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Grand F

Conveners: M. Rosenberg, <rosenber@ecepops.ucsd.edu>

P. Bernhardt, <bern@ppd.nrl.navy.mil>

Summary: Dusty plasmas (plasmas containing charged particulates) comprise a wide range of phenomena in both laboratory and space environments. In the laboratory, dusty plasmas have applications in materials processing as well as studying strongly coupled Coulomb systems. In space, dusty plasmas are found in the mesosphere coincident with polar mesospheric clouds, in micro-gravity and chemical release experiments, in meteor trails, on the lunar surface, in comet tails, in planetary atmospheres and rings, and in the interplanetary medium. Research on dusty plasma runs the full range of theory, computation, experiment and observations. Both invited and contributed papers will be solicited for the URSI General Assembly Session on Dusty Plasmas.

JG: Low Frequency Radio Astronomy and the Ionosphere

Thursday 14/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Grand A

Conveners: G. de Bruyn, <ger@astron.nl>

P. Rao, <rao@ncra.tifr.res.in>

B. Junor, <bjunor@lanl.gov>

Summary: Sensitive low frequency radio telescopes require a deeper look at ionospheric effects on signal propagation. New approaches are required to deal efficiently with non-isoplanaticity over wide fields of view. Data from existing and new satellite systems will provide new opportunities for 3-D modelling. The session will present results from low frequency observations, algorithms for coping with non-isoplanatic effects, and the underlying theory.

K04b: Biomedical Applications: Brain Imaging and Brain Mapping

Thursday 14/08/2008 13:40 – 15:40 / Oral Session / 6 Papers Room: Columbus KL

Conveners: S. Ueno, <ueno@athena.ap.kyushu-u.ac.jp>

F. Prato, <prato@lawsonimaging.ca>

Summary: The recent developments in non-invasive brain function measurement technologies have contributed to the rapid progress of brain science research and clinical medicine. The session will cover various non-invasive techniques of brain imaging and brain mapping based on the usage of electric, magnetic, and electromagnetic fields with wide spectral ranges from DC to light bands. Current advances in electrical impedance tomography (EIT), magnetic resonance imaging (MRI), magnetoencephalography (MEG), electroencephalography (EEG), THz wave imaging, near-infrared spectroscopy (NIRS), transcranial magnetic stimulation (TMS), and related techniques and biomedical

applications will be discussed.

Poster Session II: 15:40 – 18:20

Conveners:

Com. A: P. Banerjee, <pbanerjee@mail.nplindia.ernet.in>

Com. B: D. R. Jackson, <djackson@uh.edu>

A. Petosa, <aldo.petosa@crc.ca>

Com. C: T. Ohira, <ohira@ieee.org>

Com. D: F. de Fornel, <ffornel@u-bourgogne.fr>

F. Kaertner, <kaertner@mit.edu>

Summary: Contributed papers related to :

(a) Electronic devices, circuits, systems and applications;

(b) Photonic devices, systems and applications;

(c) Physics, materials, CAD, technology and reliability of electronic and photonic devices *down to nanoscale including quantum devices*, with particular reference to radio science and telecommunications.

Com. E: C. Christopoulos, <christos.christopoulos@nottingham.ac.uk>

Com. F: P. Sobieski, <piotr.sobieski@uclouvain.be>

M. Chandra, <madhu.chandra@infotech.tu-chemnitz.de>

Com. G: M. Rietveld, <mike.rietveld@eiscat.uit.no>

T. Maruyama, <tmaru@nict.go.jp>

Com. H: Y. Omura, <omura@rish.kyoto-u.ac.jp>

Com. J: S. Ananthkrishnan, <ananth@ncra.tifr.res.in>

Com. K: B. Greenebaum, <greeneba@uwp.edu>

Friday 15 August 2008 08:00 – 12:00

A07: EM Dosimetry

Friday 15/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Columbus IJ

Convener: N. Kuster, <kuster@itis.ethz.ch>

Summary: Standards and measurements techniques for EM fields.

B05: Numerical, Asymptotic and Hybrid Methods

Friday 15/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Grand B

Conveners: V. Galdi, <vgaldi@unisannio.it>

M. Ando, <mando@antenna.ee.titech.ac.jp>

Summary: This session will address the developments in the construction of integral and differential equation methods, as well as, hybrid and asymptotic techniques for efficient solution of radiation and scattering problems. Special interest will be also on solvers for large problems, and application of model based parameter estimation techniques to speed up field computations in time and frequency domains.

C10: Millimeter-wave Systems (including 60 GHz) for Radar and High-data-rate Communications

Friday 15/08/2008 08:00 – 10:40 / Oral Session / 7 Papers *Room:* Columbus GH

Convener: L. Correia, <luis.correia@lx.it.pt>

Summary: Millimetre waves are gaining interest again, due to the increase in data rates that are foreseen for mobile and wireless systems. In fact, the increase of the data rates made available at the air interface is one of the major topics for research these days, as a natural consequence of systems development. Therefore, all aspects related with wave propagation at millimetre waves, as well as their interaction with system design, are attracting, again, an increased interest, namely path loss modelling, fading statistics, time channel characterisation, and MIMO channel implementation, just to name a few. The specific scenarios, being indoor or outdoor, also play a major role, and need to be taken into consideration. This session intends to address these many aspects, by attracting papers from researchers working in this area, which will enable not only a timely presentation of a state of the art on the topic, but also the possibility to discuss the many aspects involved in it.

D07: Terahertz Technology

Friday 15/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus AB

Convener: E. J. Schweicher, <schweicher@rma.ac.be>

Summary: NDI/NDT/NDE means Non Destructive Inspection/ Testing/ Evaluation. Terahertz (THz) radiation fills the gap between microwaves and infrared; it is non-ionizing & safe for humans. It can identify the unique molecular signatures of substances: all macromolecules (like explosives, drugs) exhibit resonance frequencies in the THz. It offers significant advantages in medical imaging, homeland security, high-speed wireless networks, space exploration and other applications. For example, it can penetrate clothing to detect hidden items and be used to image skin cancers. THz waves are also a marvelous NDI/NDT/NDE tool (example: imaging applications include flaw detection in the Sprayed- On-Foam-Insulation (SOFI) for the Space Shuttle program), they perform detection of threat objects in checked airline baggage and stand-off detection of threat objects in packages or on people, because a lot of materials are transparent - cloth, paper, plastics, ceramics, food and human tissue. At the same time, large molecules have characteristic spectra. Recent reports of shoebox-sized scanners for drugs and explosives (which exhibit unique THz fingerprints) also promise easier law enforcement. THz waves exhibit a single drawback: they do not penetrate water & metals, because metals reflect THz waves while water absorbs them. Similar to X-ray images, THz waves penetrate through most materials and can easily reveal imperfections such as voids, delaminations, cracks and density variations. THz offers some advantages over X-ray including that the THz radiation is non-ionising and thus is completely safe. THz NDT will be used in pharmaceutical industry (a very conservative industry) & in cloth, plastics, ceramics, paper, food industries, etc.

E05: Spectrum Management

Friday 15/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus CD

Conveners: T. Tjelta, <terje.tjelta@telenor.com>

G. Yougang, <lichuanjun@datangmobile.cn>

Summary: The electromagnetic spectrum is a limited, natural resource with a multitude of competing demands for access, particularly now for broadband wireless communication. Spectrum managers are seeking means of applying the best technologies for developing countries that lack adequate telecommunication infrastructure. However,

as new systems continue to develop, it is critical to protect incumbent services, especially science services and those that use passive technology in bands that see encroaching, deleterious energy in the form of out-of-band and even in-band emissions. This session is devoted to 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. Development of innovative, intelligent radios, such as those that are cognitive, as low cost products, to help in establishment and maintenance of profitable business, is needed. Presentations on these leading-edge technologies will give impetus to such development.

FC2: Wireless Propagation and Channel Modelling

Friday 15/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus EF

Conveners: C. Oestges, <oestges@emic.ucl.ac.be>
I. Glover, <ian.glover@eee.strath.ac.uk>

Summary: Papers are invited in the area of wireless propagation and channel modelling 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 multi-dimensional channels are also welcome.

G05a: Radar Studies

Friday 15/08/2008 08:00 – 09:20 / Oral Session / 4 Papers Room: Grand

E Conveners: W. Swartz, <wes@ece.cornell.edu>
M. Lester, <mle@ion.le.ac.uk>
J. Chau, <chau@geo.igp.gob.pe>

Summary: Papers on a broad range of radar topics related to the study of the upper atmosphere and ionosphere and the resulting scientific results will be welcomed. We expect this session to include new technique driven approaches to incoherent scatter and coherent scatter radars and to meteor radars, such as the use of two and three dimensional imaging, pulse coding and decoding, interferometry, passive radar, plus the use of new on-line and off-line analysis approaches. Papers will also be welcomed that address the science resulting from the radar data - including the microphysics of the aurora, small scale structures and processes at all latitudes and the general aeronomy of the ionosphere. Papers on simulations that relate to the radar results or the implications of the radar results upon the underlying physics are also appropriate for this session.

GT - Tutorial G: Ionospheric Assimilation – Techniques and Performance

Friday 15/08/2008 09:40 – 10:40 Room: Grand E

Convener: P. Cannon, <pcannon@qinetiq.com>
Lecturer: Brian Wilson (Jet Propulsion Laboratory, USA),
<brian.d.wilson@jpl.nasa.gov>

H05: Wave Experiments in Laboratory Plasmas and Applications to Space

Friday 15/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Grand F

Conveners: W. Amatucci, <bill.amatucci@nrl.navy.mil>

T. Kaneko, <kaneko@ecei.tohoku.ac.jp>

Summary: Modern high-resolution satellites report localized coherent structures and short wavelength fluctuations, often in association with high-energy particles, field aligned currents, localized electric fields, and spatial inhomogeneities. Many of these small-scale phenomena have been simulated in scaled laboratory devices under controlled and repeatable conditions, improving physical understanding. In addition, laboratory studies of wave heating, wave propagation characteristics, wave-particle interactions, plasma stability, nonlinear dynamics, and double layer formation are relevant to space plasmas and are finding new applications, such as to plasma thrusters for spacecraft. Papers on basic and applied laboratory studies related to space plasma processes are solicited.

J05: Radio Astronomy in Space and on the Moon

Friday 15/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Grand A

Convener: L. Gurvits, <gurvits@jive.nl>

Summary: The first decade of the 21st century is seeing a steady advance of radio astronomy into space. After the successes of NASA's microwave telescopes COBE and WMAP, the first European Space-based CMB explorer, the Planck mission, is about to take off. The first dedicated Japan-led Space VLBI observatory VSOP-HALCA completed its mission in 2004 and provided a solid basis for the next generation Space VLBI mission VSOP-2/Astro-G approved by JAXA for launch in 2012. A long-wavelength astronomy facility on the Moon is being discussed as an attractive science component of the imminent first wave of exploration missions to the Earth's satellite. Session J07 will provide a review of the recent results of space-based radio astronomy missions and address the scientific and technological challenges of the near term space-based radio astronomy projects and initiatives.

K02c: Biological Effects of EMF: Imaging the Human Response

Friday 15/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus KL

Conveners: N. Kuster, <kuster@itis.ethz.ch>

P. Achermann, <acherman@pharma.unizh.ch>

Summary: 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 and claims have been made that effects at the individual level can be detected as well as for groups. 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.

General Lecture 3

Friday 15/08/2008 11:00 – 12:00

Topic: Wireless Communications in 2020

Convener: F. Lefeuvre, <lefeuvre@cnrs-orleans.fr>

Speaker: William Webb (OFCOM, U.K.)

Friday 15 August 2008 13:40 – 17:20

A09: Wireless Sensor Networks

Friday 15/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Columbus IJ

Convener: N. Goldsman, <neil@umd.edu>

Summary: Measurements to support the development and exploitation of Wireless Sensor Networks.

B04: Antennas and arrays

Friday 15/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Grand B

Conveners: H. Nakano, <nakano@k.hosei.ac.jp>

R. W. Ziolkowski, <ziolkows@ece.arizona.edu>

Summary: This session will concentrate on methods for the design, analysis and synthesis of antennas and arrays with a particular emphasis on electromagnetics aspects. It will include wideband and multiband elements and arrays, novel and exotic materials as well as material modifications for antenna performance enhancements, miniaturization methods and associated issues relating to bandwidth and efficiency, applications of formal antenna shape and volume design optimization methods and related algorithms, large finite arrays and associated fast methods, reconfigurable antennas and arrays, and coupling among antenna elements and large arrays/subarrays, interaction and coupling effects with the environment, numerical and hybrid methods, conformal antennas and antennas in layered media, antennas for space-based applications, efficient design methods for arrays and associated feed networks, fabrication and integration aspects of antennas and arrays, including material development processes.

C00: Forum on Radio Science and Telecommunications

Friday 15/08/2008 13:40 – 17:20 / Oral Session / 4 Papers *Room:* Columbus GH

Convener: G. Brussaard, <gert.brussaard@radicom.nl>

Summary: The Forum will address potential and challenges of novel developments in wireless telecommunications, which are of prime importance to anyone involved in radio science and system development, both from a user's and a policy maker's standpoint.

It will have 4 invited papers of 40 minutes (25 minutes presentation plus 15 minutes discussion time) each, followed by a Panel Discussion. The papers will aim at stimulating discussions. The Panel Discussion of 40 minutes will focus on possible activities/actions for URSI to deploy in this area.

The following subjects will be presented and discussed:

- 1) Cognitive Radio: Wireless systems in which the networks and/or the radio stations are sufficiently intelligent to provide and/or use ("grab") radio resources flexibly and adaptively;

- 2) Ultra-wideband wireless systems: Systems employing ultra large bandwidth and/or signals of ultra low spectral density; their unique features, potential and weaknesses;
- 3) Interference Management: novel methods to protect communication and remote sensing system integrity and regulate spectrum usage in a dynamic and flexible manner, while catering for ultra-wideband and intelligent radio systems;
- 4) Health aspects of the proliferation of wireless communications in a deregulated arena.

D08: Micro and Nanophotonics

Friday 15/08/2008 13:40 – 17:20 / Oral Session / 10 Papers *Room:* Columbus AB
Convener: F. Kaertner, <kaertner@mit.edu>

Summary: 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.

ET - Tutorial E : Reverberation Chambers

Friday 15/08/2008 13:40 – 14:40 *Room:* Columbus CD

Convener: F. Canavero, <flavio.canavero@polito.it>

Lecturer: John Ladbury (NIST, Boulder, USA)

E08: Experimental Techniques for EMC Compliance

Friday 15/08/2008 14:40 – 17:20 / Oral Session / 7 Papers *Room:* Columbus

CD *Conveners:* P. Corona, <paolo.corona@uniparthenope.it>

J. Catrysse, <johan.catrysse@khbo.be>

Summary: Electromagnetic Compatibility (EMC) compliance is an increasing aspect in the broad landscape of EMC. In fact there are still open problems in the consistency between measurements in a standard environment and the real world performance of equipments. On the other hand the expansion in telecommunications has either led to the reduction of the margins and broadened the possible operating conditions for the equipments. New techniques are requested and in progress. They should consider since their starting the statistic nature of the electromagnetic environment and of the susceptibility or emission process. All the above shall be framed in the following (provisional) items:

1. Quantitative aspects of EMC Compliance.
 - 1.1. Measurement reliability.
 - 1.2. Sampling (of production) procedure and statistic inference.
2. Measurement techniques by methods.
 - 2.1. Available experimental methods.
 - 2.2. New or recently introduced techniques.
3. Measurement techniques by products.
 - 3.1. Products requiring ad hoc methods.

3.2. On site measurement techniques.

F07: Remote Sensing of the Atmosphere: Temperature, Humidity and Non-precipitating Clouds

Friday 15/08/2008 13:40 – 17:20 / Oral Session / 10 Papers Room: Columbus EF

Conveners: S. Reising, <steven.reising@colostate.edu>
E. Westwater, ed.westwater@colorado.edu

Summary: In many areas of geophysics, including numerical weather forecasting, aircraft icing, climate and radiative transfer research, there exists a growing need for accurate measurements of atmospheric 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.

G05b: Radar Studies

Friday 15/08/2008 13:40 – 17:20 / Oral Session / 10 Papers Room: Grand E

Conveners: W. Swartz, <wes@ece.cornell.edu>
M. Lester, <mle@ion.le.ac.uk>
J. Chau, <chau@geo.igp.gob.pe>

Summary: Papers on a broad range of radar topics related to the study of the upper atmosphere and ionosphere and the resulting scientific results will be welcomed. We expect this session to include new technique driven approaches to incoherent scatter and coherent scatter radars and to meteor radars, such as the use of two and three dimensional imaging, pulse coding and decoding, interferometry, passive radar, plus the use of new on-line and off-line analysis approaches. Papers will also be welcomed that address the science resulting from the radar data - including the microphysics of the aurora, small scale structures and processes at all latitudes and the general aeronomy of the ionosphere. Papers on simulations that relate to the radar results or the implications of the radar results upon the underlying physics are also appropriate for this session.

HGE: Seismo-electromagnetics

Friday 15/08/2008 13:40 – 17:20 / Oral Session / 10 Papers Room: Grand F

Conveners: M. Parrot, <mparrot@cnrs-orleans.fr>
S. Pulinets, <pulse@geofisica.unam.mx>
O. Molchanov, <oleg@molchanov.org>

Summary: Observations of electromagnetic phenomena associated with seismic and volcanic activities have been reported for many years. Perturbations occur not only in the lithosphere but also in the atmosphere and ionosphere, leading to the generation of a new science field, lithosphere-atmosphere-ionosphere coupling. This session will accept papers dealing with new observational findings on the seismic effects in different regions and also those dealing with theoretical works on the mechanisms of the seismogenic effects and of the lithosphere-atmosphere-ionosphere coupling.

J06: Signal Processing, Calibration and Imaging in Radio Astronomy

(in memory of Ronald Bracewell)

Friday 15/08/2008 13:40 – 17:20 / Oral Session / 10 Papers Room: Grand A

Convener: T. Cornwell, <tim.cornwell@csiro.au>

Summary: The new generation of radio telescopes such as ALMA, SKA, LOFAR, EVLA, and M:IRANdA are triggering a renewed interest in all stages in processing of radio astronomical signals into scientific results. The topics receiving attention include RFI mitigation, calibration, data flagging, imaging, and the implementation of these on distributed, parallel computers. This session will bring together leading researchers in all these areas to present the latest results, and will also encourage presentations by younger researchers.

KAE: Exposure Assessment & Emerging New Technologies

Friday 15/08/2008 13:40 – 17:20 / Oral Session / 10 Papers Room: Columbus KL

Conveners: G. Neubauer, <georg.neubauer@arcs.ac.at>

A. Faraone, <antonio.faraone@motorola.com>

Summary: In recent years new technologies for broadband wireless communication were brought into the market. Examples are UMTS, WLAN or Bluetooth. WiMAX is in the process of being deployed. Ultra Wide Band (UWB) applications also need to be considered. Many of these new technologies are based on broadband modulations, e.g. UMTS uses 5 MHz broad channels while WiMAX can have channels as broad as 10 MHz. The power regulation of such systems became faster compared to older technologies, and available data rates are continuing to increase. In parallel, the requirements on human exposure assessment procedures are also continuing to augment. New directives and recommendations from international organizations, e.g. the European Union Commission, are implemented through world-wide harmonized standards. This session gives an overview on new technologies and their features and the arising requirements on human exposure assessment procedures.

Business meeting 3 of all Commissions

Friday 15/08/2008 17:20 – 19:00

Saturday 16 August 2008 08:00 – 12:00

A08: Terahertz Technologies

Saturday 16/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus IJ

Conveners: John Davis, <John.F.Davis@jpl.nasa.gov>

Summary: Standards and measurements techniques to support exploitation of the Terahertz region of the EM spectrum.

B06: Transient Fields and Ultrawide-band Antennas

Saturday 16/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Grand B

Conveners: E. Heyman, <heyman@eng.tau.ac.il>

F. Capolino, <capolino@dii.unisi.it>

Summary: True time domain radiation and reception has become important in applications ranging from impulse radar to ultra wideband radio to electronic warfare.

This session will explore the theory that relates these varied applications and the systems that have been built to realize true pulsed radiation. Invited presentations will cover transient radiation and propagation theory and the relationship to frequency domain theory; methods and hardware for true time domain measurements; antennas and systems for UWB radio; impulse radar, target ID, and ground penetrating radar; and timed/UWB arrays, UWB SAR, and time reversal imaging. Papers are encouraged that explore true transient radiation physics, not just time domain numerical modeling.

C11: Communicating Objects

Saturday 16/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus GH

Conveners: A. Sibille, <alain.sibille@ensta.fr>

M. Mickle, <mickle@engr.pitt.edu>

Summary: All sorts of communicating objects have penetrated our daily lives, and many more are to come in the near future. The benefits which these pervasive technologies promise, address the interaction between human beings and their environment, or between non human entities themselves (e.g. the internet of things). The basic building blocks of these objects are generally available, but their integration into an ultra low cost/ultra low consumption device is a challenging task. The efficient design of communicating objects needs a global system approach, wisely marrying energetics, electromagnetics, electronics, programming and networking, completed by sensor or actuator related technologies in some cases. The session addresses these challenges, especially with respect to radio, signal processing and networking aspects of communicating objects.

D09: MEMS and NEMS Components

Saturday 16/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus AB

Conveners: R. Sorrentino, <sorrentino@eumwa.org>

F. Coccetti, <fcoccett@laas.fr>

Summary: The development of information technology is giving rise to a tremendous increase in the volume of wireless communications, which has become a fully pervasive technology. To alleviate the resulting congestion, increasingly stringent specifications are required, such as multiband and multistandard capabilities, terminal reconfigurability, low-power consumption, etc. In this context, Micro-Electro-Mechanical-Systems appears as a strategic technology to overcome the limitations of conventional solid-state devices and to create unprecedented functionalities. Fabricated by low-cost photolithographic IC-compatible batch processes, RF-MEMS or, more in general, Microsystems Technology (MST) enable superior performances in terms of linearity, low power consumption, re-configurability, and thus represent a key technology for future innovative radio frequency communication systems. While sharing most of the advantages of RF-MEMS, RF-NEMS exhibit inherent better performance in addressing critical issues such as miniaturization and power handling. The development of RF-NEMS-based components (e.g. using carbon nano-tubes CNT or nanowires) however introduces a further level of complexity due to the less mature fabrication technology and the higher complexity of analysis and modelling tools. Papers are solicited describing the most recent advances in research and development of RF-MEMS and NEMS, addressing both critical technological issues, such as reliability, power handling and packaging, as

well as the design and optimisation of single components (switches, capacitors, resonators,...) and the implementation of MEMS enhanced RF modules (such as reconfigurable RF front-ends, antennas, etc.).

EK: Interference on Medical Devices

Saturday 16/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus CD

Conveners: A. C. Marvin, <acm@ohm.york.ac.uk>

Q. Balzano, <qbalzano@umd.edu>

Summary: The session will offer an overview of the electromagnetic interference (EMI) from RF sources with medical and personal well-being devices. Today, wireless transmitters with sophisticated digital modulation can be located in proximity to medical devices relying on digital processors to sense and protect delicate human health conditions. The session is opened to contributions on various interference scenarios: hospital settings, home settings, personal health monitoring or maintenance devices and personal well-being devices (e.g. hearing aids and cochlear implants). Of particular interest are experimental data collected with patients connected to a variety of monitors at the time of EMI events. Remedial methods to suppress the EMI are also of interest.

F08: Polarimetric Radar Applications in Tropospheric Propagation and Remote Sensing

Saturday 16/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus EF

Conveners: M. Chandra, <madhu.chandra@infotech.tu-chemnitz.de>

V.N. Bringi, <bringi@engr.colostate.edu>

Summary: The session welcomes contributions reflecting recent developments in the application of multiparameter radar methods and techniques for quantitatively and qualitatively assessing the tropospheric properties. In particular, the papers will relate to aspects of wave propagation and radar remote sensing. In this spirit, contributions reporting on current international projects and campaigns will be specially emphasized.

G06: Improving Radio Systems through Ionospheric Radio Science (Trans- and Sub-ionosphere, Radio Propagation)

Saturday 16/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Grand E

Conveners: M. J. Angling, <mjangling@qinetiq.com>

C. Coleman, <ccoleman@eleceng.adelaide.edu.au>

A. Bourdillon, <alain.bourdillon@univ-rennes1.fr>

Summary: The ionosphere is an important factor in the design and operation of many communications, navigation and radar systems working below about 2GHz. This session will accept papers over a broad range of topics including radio propagation modelling and measurements, and their application to radio systems. Papers may address ionospheric situational awareness; mitigation of ionospheric effects on radio systems; or the exploitation of the ionosphere by radio systems. In particular papers addressing the issue of channel coherency (bandwidth, temporal and spatial) and how this relates to waveform design and signal processing in all bands affected by the ionosphere will be welcomed.

HBDGJK: Solar Power Satellites

Saturday 16/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Grand F

Conveners: K. Hashimoto, <kozo@rsh.kyoto-u.ac.jp>

R. Dhillon, <rsd6@ion.le.ac.uk>

W. van Driel, <wim.vandriel@obspm.fr>

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Summary: Solar power satellite (SPS) research is important for a possible clean power supply for mankind and URSI has published White Paper on SPS Systems. One of the key issues for SPS is safe and efficient microwave power transmission (MPT). Contributions related to SPS from the various commissions are welcome. Session subjects include: MPT and its ground applications, passive and active microwave devices, antennas, rectennas, and rectenna arrays, retrodirective systems, antennas in plasma, self calibration, compatibility with telecommunications and radio astronomy, and the interactions of the microwave beam with the ionosphere and heavy ions ejected from electric spacecraft propulsion systems.

J07: Splinter Meetings

Saturday 16/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Grand A

Convener: W. van Driel, <wim.vandriel@obspm.fr>

Summary: This session will be used for small informational meetings on topics of interest to Commission J membership, eg i) IUCAF (frequency allocations), ii) Global VLBI Working Group (global ground-based VLBI planning), and iii) Space VLBI (future mission planning)

K05: Occupational EMF Safety & Health

Saturday 16/08/2008 08:00 – 10:40 / Oral Session / 7 Papers Room: Columbus KL

Conveners: M. Hietanen, <maila.hietanen@ttl.fi>

V. Anderson, <vitas.anderson@kordia.com.au>

Summary: This session will deal with the many practical problems of ensuring safe RF exposure in the work environment. It will address gaps in knowledge 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 RF safety standards and guidelines. Special problems relating to uncertainties in measured and calculated exposure assessments are also of interest in the session. Papers are also welcome on occupational RF over-exposure incidents and pre-placement assessments of RF workers, particularly relating to the needs of workers with medical implants and pregnant workers.

Public Lecture:

Saturday 16/08/2008 11:00 – 12:00

Topic: (not yet available) *Speaker:*

(not yet available)