

## WORKSHOPS

Workshop	Title	Organizer names & e-mails	Duration
WS1	Pulsed electric fields: a multi-level view from molecular interactions to medical treatments	Caterina Merla, Maura Casciola, caterina.merla@enea.it casciolamaura@gmail.com	Full day
<p><u>Description:</u> This workshop aims to introduce the URSI GASS attendees to the potentialities of the use of pulsed electric fields (PEFs) in the ms, <math>\mu</math>s and ns time scale with high amplitude (from few kV/m to tens of MV/m) for the manipulation of cells and tissues to promote promising biomedical applications. These signals are proved to be biologically effective and their application needs to be supported at research and industrial level. Description of electric (E) pulse interaction at the molecular level will be proposed during the workshop as well as continuum methods to quantify the induced transmembrane potential following the application of exogenous E fields on single cells (microdosimetry) or cell aggregates (mesodosimetry). Biological results demonstrating the role of PEFs in in vitro and in vivo models will be also offered. These outcomes are key aspects for an aware exploitation of pulse technology in medical treatments whose examples will be provided in the field of neuronal stimulation, immune responses, and cancer ablation.</p>			
<p><u>Structure:</u> The workshop, providing a multi-level view of pulsed electric fields (PEFs) research and applications, will embrace the participation of highly qualified speakers. First, presentations oriented on molecular level interactions based on molecular dynamics simulations will be planned as well as single cell or multi-cellular continuum modelling of the physical cascade of events that PEFs induce. Secondly, new ad-hoc technologies for PEFs application in vivo, in vitro and in patients will be presented. These technological advancements increase the efficiency of PEFs delivering and enhance the local effects.</p> <p>Then, in vitro and in vivo studies, dealing with different aspects involving for example cancer stem cells targeting and modulation of calcium signalling will be described. Finally, specific applications for remote targeted stimulation using the so-called cancellation of cancellation (CAN-CAN) paradigm will be presented together with studies on immune-therapy mediated by electric pulses and application of electric pulses for effective cancer ablation. The workshop content and scope will be introduced by the chairs. Common discussions will be promoted by a final round table on the different arguments treated during the workshop.</p> <p>The workshop appears a well-participated event involving high level speakers and potentially a large audience spanning from PhD students to young early career investigators as well as senior researchers. The interactivity will be promoted by the chairs to support networking activity among attendees and new contributions coming from the different URSI commissions to advance in the exciting application of PEFs application in biology and medicine.</p>			

Session	Title	Organizer names & e-mails	Duration
WS2	Characterization and Mitigation of Radio frequency interference	David Kunkee, Amit K. Mishra, David M. Levine, Frank Gronwald, Sami Asmar, Daniele Durante, Takeshi Imamura, Joseph Lazio, Richard Bradley, David.B.Kunkee@aero.org, akmishra@ieee.org , David.M.LeVine@nasa.gov , frank.gronwald@uni-siegen.de, Sami.W.Asmar@jpl.nasa.gov, daniele.durante@uniroma1.it, t_imamura@edu.k.u-tokyo.ac.jp, Joseph.Lazio@jpl.nasa.gov, rbradley@nrao.edu	Full day
<p><u>Description:</u> Radio Frequency Interference (RFI) has become a critical issue for many users of the electromagnetic spectrum. This is especially true for observational sciences such as radio astronomy, microwave remote sensing of the Earth, and Solar and ionospheric studies where highly sensitive measurements are necessary. The move of the observational sciences toward non-traditional (i.e. unprotected) frequencies to increase bandwidth and improve observations, only makes the problem worse. In addition, the advent of new-age telecommunication standards (like 5G and 6G) to enable new applications will make the already scarce bandwidth more scarce.</p> <p>There is for instance a long history of using precise tracking of spacecraft telecommunications signals to make science measurements, dating from the first interplanetary missions (Kliore et al. 1965, "Occultation Experiment: Results of the First Direct Measurement of Mars's Atmosphere and Ionosphere," Science, 149, 1243–1248). The first measurements used the propagation of the spacecraft signals through planetary atmospheres and ionospheres for remote sensing, which helped set the stage for subsequent studies of Earth's atmosphere by the radio occultation technique, such as radio occultations with Global Navigation Satellite Systems (GNSS) signals.</p> <p>Further, the stage is set for at least another decade of radio science from spacecraft telecommunications, with radio science measurements likely for NASA's Europa Clipper mission and ESA's Jupiter Icy Moons Explorer (JUICE), and possible for the Ice Giant Mission concept. The recent success of the Mars Cubesat One (MarCO) spacecraft has also highlighted how small spacecraft might be able to be used at other planets in a manner analogous to how small satellite constellations at Earth can conduct GNSS radio occultation experiments. Fundamental to all of these measurements has been the telecommunications system—both ground and space.</p> <p>In this context, the workshop intends to gather works and issues on the characterization of RFI and on the methodology to operate in an environment with unavoidable RFI.</p>			
<p><u>Structure:</u> The workshop will be composed of papers solicited by the conveners, of duration compatible with the duration of standard sessions (20' including questions). Depending on spontaneous submissions, they will be complemented by additional papers.</p>			

Session	Title	Organizer names & e-mails	Duration
WS3	Radio science in space weather	Iwona Stanislawska, Patricia Doherty, stanis@cbk.waw.pl , Patricia.Doherty@bc.edu	Half day
<p><u>Description:</u> Radio emissions for many years have been operative tools for analysis, interpretation and identification phenomena called generally space weather. More recently, instruments such as LOFAR can give new views at many phenomena and support wider understanding of others. Particularly, radio diagnostic capabilities prove its high efficiency in remote, but as well in-situ planetary exploration. Knowledge of space weather conditions is fundamental for enabling high quality and reliable operation of radio systems within near-Earth environment and beyond. Knowledge of effects imposed by the space weather on current and new generation operational radio systems is necessary. This workshop, jointly organized by URSI Commissions GHJ, is devoted to the novel radio science tools for space weather, radio science in planetary exploration and radio science challenges for space weather services.</p>			
<p><u>Structure:</u> Three Panels of experts, including 3 invited presentations in total, and related open discussion towards the three topics that are:</p> <ul style="list-style-type: none"> <li>• NEW RADIO SCIENCE TOOLS FOR SPACE WEATHER</li> </ul> <p>The aim of this panel is to bring together the scientists using new arrays for space weather purposes (e.g. radio astronomers) and space weather scientists, who may be unfamiliar with the capabilities of these new instruments, to discuss how they can best be used to advance space weather science, and to discuss how these instruments and dedicated space weather instrumentation can best support one another in their respective goals.</p> <ul style="list-style-type: none"> <li>• RADIO SCIENCE CHALLENGES FOR SPACE WEATHER SERVICES</li> </ul> <p>Knowledge of effects imposed by the space weather on current and new generation operational radio systems, the development and implementation of techniques to mitigate the deleterious effects of the space weather on such systems are the primary scientific goals. The main issue to discuss within this panel is the generation of the novel directions for services to approach current and future radio science challenges.</p> <ul style="list-style-type: none"> <li>• RADIO SCIENCE IN PLANETARY EXPLORATION</li> </ul> <p>Since the start of the space venture fifty years ago, the interest of the effects of the space weather on the space missions and human exploration has strongly raised. Among the many diagnostic capabilities, radio experiments have proven to be very efficient both for remote and in-situ exploration. The aim of this panel is thus to bring together researchers from planetary and interplanetary past and future missions as well as engineers from radio domains to discuss the results of recent missions (like Mars Express) and address the results foreseen by the future, Solar Orbiter, Parker Solar Probe or Juice.</p>			