



## Monthly Newsletter of International URSI Commission J – Radio Astronomy

### AT-RASC SUPPLEMENT

January 10, 2018

#### Officers

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### IMPORTANT ANNOUNCEMENT

The abstract submission deadline for the 2018 URSI Atlantic Radio Science Conference (2018 AT-RASC) has been extended to **January 30**. We encourage you to present your research findings or project updates at the AT-RASC in May. A limited amount of travel support is available for students and Young Scientists. If you have questions or concerns regarding a particular session please feel free to contact the session convener. Information on the sessions is listed below.

#### 2018 URSI Atlantic Radio Science Conference (2018 AT-RASC)

28 May – 1 June 2018, ExpoMeloneras Convention Centre, Gran Canaria

**Submission deadline: January 30, 2018**

<http://mailchi.mp/intec/submission-for-at-rasc-2018-is-now-open-pprh9v00w2?e=6dc54cab9b>

#### J.1 *Software Enabled Radio Astronomy*

Richard Prestage, Cedric Viou, Alessandra Zanichelli

The worldwide astronomy community is pushing forward on an unprecedented scale to create large aperture and dense low frequency arrays. Single-dish telescopes are being equipped with phased array feeds, ultra-wideband receivers, real-time fast radio burst detectors, and other advanced digital instrumentation. This new generation of telescopes and instrumentation share the need for exceptionally sophisticated signal processing algorithms, and we are entering the era of “software enabled radio astronomy”. This session will focus on the research challenges and latest approaches in the field of heterogeneous FPGA / CPU / GPU software development, including algorithms for array calibration, beamforming, imaging, and radio frequency interference mitigation.

#### J.2 *Large N Aperture Arrays*

Eloy de Lera Acedo, Kris Zarb Adami

This session will cover different aspects on the design and operation of large N arrays for modern radio astronomy in the era of SKA (eg. SKA1-LOW, HERA, MWA, LOFAR, etc). The session will cover aspects of both the antenna arrays, RF chains, digital beam forming, science data processing and science goals of these instruments.

### J.3 *Pattern Recognition Applications in Radio Astronomy*

Abhi Datta, David Rapetti

With the advent of next generation radio telescopes like the Hydrogen Epoch of Reionization Array (HERA), the Square Kilometer Array (SKA) and the next generation Very Large Array (ngVLA), we expect the radio sky to be surveyed at unprecedented sensitivity. While observations with these telescopes should bring in a paradigm shift in our knowledge of the radio sky, this also comes with unprecedented data volume. For example, the SKA is expected to produce more than tens of terabytes of data per second at its fullest capability. Manual processing of this amount of data is not feasible. Hence, automation in data processing and the use of pattern recognition and machine learning techniques to extract the wealth of scientific information from such a Big Data set are critical. Machine learning algorithms such as support vector machines (SVM), K-nearest neighbors (KNN), decision trees, neural networks and deep neural networks are already in use in radio astronomy. This session will focus on the recent advances, challenges and future prospects of this field of research.

### J.4 *Novel Instrument Concepts and Observational Challenges*

Douglas Bock, Richard Bradley

This session is designed to capture new work that may NOT fit into other sessions. Novel ideas that can be applied to instruments, signal processing, or observational strategies that have the potential for improving measurements are welcome, including requests for specialized instrumentation or techniques that could solve a challenging astronomical measurement requirement.

### J.5 *Detecting Hydrogen Near and Far*

Jackie Hewitt, Eloy de Lera Acedo

The first detection of radio emission from neutral hydrogen in an astronomical source, in this case our Galaxy, was accomplished through the pioneering work of Ewen and Purcell in 1951. Since then, the 1.4 GHz line of neutral hydrogen has served as a tracer of astronomical phenomena on many scales. With the recent development of large low frequency radio arrays, there is renewed interest in using this technique to explore a variety of topics at a wide range cosmological redshifts, including for example detecting the first generation of stars and characterizing dark energy. This session will focus on the design and construction of instrumentation aimed at neutral hydrogen studies in the modern cosmological context.

### J.6 *Instruments for Education*

Glen Langston, Kevin Bandura

Progress in radio communications and radio astronomy depends on education of the next generation of engineers and scientists. This session is focused on new and existing instruments enabling students to study the universe with radio techniques. Emphasis is placed on simple instrument designs the students can build. Presenters will describe groups operating these instruments, providing strong connections between technology development and scientific discoveries. The session covers topics of hardware design, curricula for education, student motivation, observing plans and large-scale research projects enabled by distributed groups of researchers.

### J.7 *Mm wave / sub-mm Wave Science and Technology*

Pepe Cernicharo, Juan Daniel Gallego, Rolf Gusten

### **Special Sessions:**

#### *S-JACEFG – Applications for pattern recognition methodologies*

This special interdisciplinary session, dedicated to an important new area of study, is designed to share ideas and experiences among the URSI Commissions. We would like to have one or two presentations from each of the participating Commissions that provide an overview or tutorial on how pattern recognition methodologies are being used or the types of problems for which it might be applied to areas of research within the Commission.

#### *S-EACFJ - Spectrum Management and Utilization*

### **Workshops:**

- JB - *Polarimetry of advanced antenna systems in radio astronomy*
- JG - *3-D ionospheric models for radio interferometric calibration*
- GJEFH - *Space Weather*

The AT-RASC will also include a Young Scientist Program and Student Paper Competition. Please see <http://www.atrasc.com/homepage.php> for additional information.

