

# **CALL FOR PAPERS**

## **IEEE SIGNAL PROCESSING MAGAZINE**

### **Special Issue on Signal Processing for Astronomy and Cosmology**

Signal and image processing techniques are prevalent in Astronomy and Cosmology. In these areas, new applications are arising due to several new large international research and development projects for constructing radio telescopes (SKA, LOFAR) and adaptive optics telescopes (GMT, Gemini, ESO VLT, Keck, Starfire Optical Range, AEOS, the Large Binocular Telescope). In addition, there are new missions to explore the solar environment such as the Solar Terrestrial Relations Observatory (STEREO) and the Solar Dynamics Observatory (SDO), as well as important applications of signal processing for recovering and analyzing the cosmic microwave background emission data from the WMAP and PLANCK space missions. Other applications include imaging and detection of gamma-ray bursts, optical, UV, and IR astronomy, as well as image restoration and reconstruction techniques for optical astronomy. These new instruments will rely heavily on advanced signal processing techniques, many of which are still in the research phase.

The special issue serves as an opportunity to focus the signal processing activity in this field on the most challenging tasks facing the designer of the instruments, as well as the associated data analysis tasks. These new instruments will have a multidisciplinary background and therefore the issue will serve a number of different communities with a common goal.

The aim of this issue is to collect well-written tutorial papers, of a broad nature, on the various aspects of signal processing for astronomy and cosmology.

#### **Scope of topics:**

Topics to be considered are:

- Calibration (e.g. of large phased arrays in the presence of electronic and atmospheric disturbances)
- Deconvolution, imaging and data analysis
- Interference mitigation
- Image restoration and reconstruction
- Source separation; inverse problems
- Data mining and machine learning techniques
- Classification and feature identification
- Bayesian techniques

For areas related to:

- Radio telescopes, e.g. large arrays and focal plane arrays
- Gamma-ray radio astronomy
- Cosmological data, Cosmic Microwave Background (CMB) data
- Optical and IR astronomy; adaptive optics in large telescopes
- Digital image restoration in optical astronomy (including blind, non-blind, single frame, image sequence, and speckle methods)
- Analysis of large astronomical databases
- Stellar imaging and spectroscopy

#### **Submission Procedure:**

Prospective authors should submit white papers to the web submission system at <http://www.ee.columbia.edu/spm/> according to the following timetable. The authors should first submit a white paper that summarizes the motivation, the significance of the topic, key takeaway messages, a brief history (important references if necessary), and an outline of the content. The white paper should be no more than 2 pages in the IEEE single-space double-column format.

#### **Schedule (all deadlines are firm no exceptions)**

White paper due:	January 15, 2009
Invitation notification:	February 1, 2009
Manuscript submission:	May 1, 2009
Notification of acceptance:	August 1, 2009
Final manuscript decision:	September 1, 2009
Publication date:	January, 2010

### Guest Editors:

#### **Amir Leshem**

Bar-Ilan University, Israel  
[leshem.amir1@gmail.com](mailto:leshem.amir1@gmail.com)

#### **Farzad Kamalabadi**

University of Illinois at Urbana-  
Champaign, U.S.A.  
[farzadk@illinois.edu](mailto:farzadk@illinois.edu)

#### **Ercan Kuruoglu**

ISTI-CNR, Pisa, Italy  
[ercankuruoglu@googlemail.com](mailto:ercankuruoglu@googlemail.com)

#### **Alle-Jan van der Veen**

TU Delft, The Netherlands  
[a.j.vanderveen@tudelft.nl](mailto:a.j.vanderveen@tudelft.nl)