Monthly Newsletter of International URSI Commission J – Radio Astronomy

May 2019

Officers

Chair: Richard Bradley

Vice-Chair: Douglas Bock

ECRs: Stefan Wijnholds

Jacki Gilmore

Prepared by R. Bradley, Chair, Commission J, rbradley@nrao.edu

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News Items

Greetings Commission J Members!

Planning for the 2020 URSI General Assembly and Scientific Symposium is in full swing. The latest version of the Commission J program is given below along with the confirmed conveners. We are still in search of conveners so please contact me as soon as possible to volunteer.

A new technical journal owned and operated by URSI has been announced. The URSI Radio Science Letters (RSL) is an electronic journal – its purpose is to rapidly publish original and previously unpublished scientific research work in all areas of radio science, in the form of short contributions that are rigorously reviewed. For additional information, please see the announcement included in this Newsletter.

The March issue of the Radio Science Bulletin is now available. A synopsis of its content is given below.

Our Spotlight this month is on the Westerbork Synthesis Array. Arnold van Ardenne shares his thoughts on the making of the new book that covers the scientific and instrumental achievements of Westerbork Observatory and a glimpse in the next phase of its life. Thank you, Arnold, for this nice article.

I kindly request your ideas, articles, news, photos, etc. for upcoming editions of Newsletter. Let's keep it interesting and informative! I thank all of you who have already contributed.

Submitted by R. Bradley

2020 URSI General Assembly and Scientific Symposium (2020 URSI GASS)

Rome, Italy 29 August - 5 September 2020

We are now actively planning for the next URSI General Assembly and Scientific Symposium.

***** Program for Commission J – GASS 2020 *****

Sessions:

New Telescopes on the Frontier
Conveners: Nipanjana Patra

Recent and Future Space Missions
Conveners: Joseph Lazio, Heino Falcke, and Yuri Kovalev

Single Dish Instruments

Very Long Baseline Interferometry

Millimeter/Submillimeter Arrays

Receivers and Radiometers: Design and Calibration
Convener: Jacki Gilmore, Douglas Hayman

Digital Signal Processing: Algorithms and Platforms
Conveners: Grant Hamspon

Big data: Algorithms and Platforms
Conveners: Stefan Wijnholds, Maxim Voronkov

Short-Duration Transients, FRBs, and Pulsars: Observations, Techniques, and Instrumentation
Conveners: Jason Hessels

Historical Radio Astronomy
Conveners: Richard Schilizzi

Latest News and Observatory Reports
Conveners: Rich Bradley and Douglas Bock

Power spectrum observations

Shared Sessions

Mutual benefit between radio astronomy and ionospheric science (Commissions JG)
Conveners: Claudio Cesaroni (G), Maaijke Mevius (J)

Characterization and Mitigation of Radio Frequency Interference (Commissions JEFGH)

Some aspects of radio science in space weather (Commissions GHJ)
Conveners: Richard Fallows (J), Patricia Doherty (G), Mauro Messerotti (H/J), Baptiste Cecconi (J), Vivianne Pierard (H), Janos Lichtenberger (H), Willem Baan (J)

Spectrum Management (Commissions ECJ)
Conveners: Tasso Tzioumis

Solar, Planetary, and Heliospheric Radio Emissions (Commissions HJ)
Conveners: Pietro Zucca,

The polar Environment and Geospace (Commissions GHJ)
Conveners: Lucilla Alfonsi (G), Nicolas Bergeot (G), Mark Cliverd (H), Stefan Lotz (H)

A New URSI Journal - URSI Radio Science Letters

URSI Radio Science Letters (RSL) is a new electronic journal owned and operated by URSI. Its purpose is to rapidly publish original and previously unpublished scientific research work in all areas of radio science, in the form of short contributions that are rigorously reviewed. The journal is open access and will be published only in electronic format, one volume per calendar year. Each accepted contribution will be identified by volume number, year of publication, page numbers, and DOI. Each reviewed and accepted paper will be published as soon as full editing is completed. The URSI Board has appointed Prof. Piergiorgio L. E. Uslenghi as the first Editor-in-Chief (EIC) of the RSL.

Contributions to the RSL must be in the form of manuscripts in English, not exceeding four published pages in length. A template and instructions to prospective authors are provided on the journal's Web site. Initial submissions must be in PDF. Final submissions will be accepted in either Word or LaTeX. The PeerTrack manuscript management system of Allen Press is used to handle the submissions and the review and publishing process.

The RSL is intended to be a very rapid publication journal. The EIC will promptly notify the corresponding author of the anonymous reviews and the Associate Editor's comments, and of the consequent disposition of the manuscript. If minor revisions are required, a revised manuscript must be submitted within thirty days of the EIC's recommendation. Any delayed resubmission will be considered as a new submission. Only minor changes are acceptable. If major changes are required, the manuscript will be rejected with or without a suggestion to resubmit a revised version. Plagiarism, as well as duplicate submission and publication, will result in rejection of the submission.

Authors of accepted manuscripts are expected to sign the URSI Publication Agreement as a precondition to publication. Submissions to the RSL will be accepted, shortly. Please send your manuscripts to:

https://www.editorialmanager.com/RSL

An article processing charge of 150 USD per published page or fraction thereof for URSI members (175 USD for URSI nonmembers) is to be paid prior to the posting of an accepted contribution. Any payment delinquency will result in the removal of the contribution from the RSL Website.

Radio Science Bulletin – March 2019 Issue (No. 368) is Available Here

The cover figure for this issue shows the near-zone electromagnetic field power density in the vicinity of a two-layer frequency-selective surface made from unit cells that have U-shaped elements. Frequency-selective surfaces are interesting both because of their physical (electromagnetic scattering) properties and because of their computational modeling properties. They depend on resonant structures to operate, and those very resonances produce fascinating electromagnetic and computational properties. These are explored in Özgür Ergül's Solution Box contribution by Özgür Eriş, Hande İbili, and Özgür Ergül. They considered three such structures, having three different arrangements of U-shaped unit cells. As an example of their results from an electromagnetic scattering standpoint, they showed that two different structures made from layers with identical unit cells but arranged in different orientations had significantly different scattering properties. In particular, one version of the structure had very similar responses to both left-hand and right-hand circularly polarized waves, whereas the other did not. From a computational standpoint, the most challenging frequencies for analysis in terms of number of iterations required for convergence of the solution were not the same as the frequencies at which element resonances occurred. All of this makes for quite interesting reading

Giuseppe Pelosi has brought us a beautiful and intriguing Historical Corner. The article, by Giuseppe Pelosi and Stefano Selleri, traces some introductory steps to the Finite-Element Method. These involved a problem know as the Brachistochrone, which was a deceptively simple shortest-path problem proposed in 1696. There were several other related problems that also played a role. What makes this article so enjoyable to read is not just the history of computational science it tells: it is the accompanying original figures and photos, and the stories of the people involved, all carefully researched and referenced. You will enjoy this.

Tayfun Akgul has brought us his usual wry perspective on a couple of aspects of radio science in his Et Cetera column. It appears that our erstwhile professor is very rapidly gaining a new perspective on one of the hottest new areas of research.

Do you know where the phrase "to show your true colors" came from? Amy Shockley and Randy Haupt explain this and explore the associated ethical implications in their Ethically Speaking column.

In her Women in Radio Science column, Asta Pellinen-Wannberg brings us the story of Tuija Pulkkinen, Professor and Chair of the Department of Climate and Space Sciences and Engineering at the University of Michigan. This is a very intriguing story of a career in space research, with valuable insights into what led to the career and life choices made.

Contributed by Ross Stone

Activities Spotlight

Westerbork Observatory

Arnold van Ardenne

This contribution is not entirely anecdotical and as with earlier contributions, it strikes a serious note and perhaps a message of pride and justice.

In this case, it is about finding a way to celebrate and commemorate at the same time. Let me clarify and expand on this. Around 2014 Ger de Bruyn at the time probably being one of ASTRON's most dedicated and continuous users of the Westerbork Synthesis Array, chaired a small group of selected individuals. This group was keen to "celebrate" the almost 50 years lifetime of the array given its important contribution to science, instrumentation and deep polarimetric synthesis imaging techniques. To start with, around 1996, the book "The Westerbork Observatory, Continuing Adventure in Radio Astronomy", a Kluwer Astrophysics and Space Science Library book still on sale, effectively constituted the 25 years lifetime book using 1971 when the WSRT delivered user science as starting date. Being a good and solid book, it almost exclusively emphasised the earliest and somewhat newer science done with WSRT including an early outlook to the SKA. The thinking of the small Ger-team with newer and older persons connected to the Westerbork-enterprise-at-large went on for some time from 2014 along obvious questions: Should we make a new or updated or e-book, For whom, How many pages and Contributions and Who will contribute etc. etc. Of course, all this with limited reflection at that point on the bill by default assumed to be picked up by ASTRON someway/anyway.

It was remarkable that while some started writing examples of how contributions might look implying that a book was the preferred choice of the historical reflections, others including me took their time contemplating still on the question that it might be of great help if a draft Table of Content could be created. Such book by the way, might also give some reading pleasure and perhaps even some useful background to the younger ones interested and newer in our field.

Then early 2017 misfortune struck when Ger was diagnosed to be incurably ill. Midyear, we were shocked with his passing away and as a result, lead the book-effort to a grinding hold. It was only in January 2018 in planning for the grant opening of a newly born Westerbork array equipped with the wide fielding Apertif focal plane arrays, that a request was bestowed on me to renew the effort. This could not be done given the very short timescales of less than 6 month without the help of all potential contributors and on the short term not without a small team of dedicated co-editors. In this case, Richard Strom in any case interested in the history of radio astronomy and very well informed through his personal engagements with Westerbork and Steve Torschinksky from the Obervatoire de Paris. Steve I knew for many years and was excellent in critical questions required for a good book! He also had previous experience in book editing e.g. for the SKADS-book. Very quickly, the 50 years lifetime festivity now using the full delivery of the telescopes in 1968 as reference date was approaching and even more so because now we wished the book to reflect the role of all involved in this 50 years journey or at least to the extent practically possible.

After many intense weeks and with help of over sixty contributors, the book finally covered scientific and instrumental achievements, technological evolutions and walks an insightful and a sometimes-anecdotical memory lane in 342 pages of advancing radio astronomy. In short, the book shows the broad human endeavour needed to arrive at the next phase of life of the Westerbork Observatory while in the meantime developing LOFAR. This next phase emphasizes wide field astronomy using Focal Plane Arrays at 12 out of the 14 dishes, the other two dishes remaining for VLBI and other purposes.

Apertif as the receiving system part of the new observing system comprises the 37 beam array receivers including all beamforming and processing in the 12 telescopes now ably covering an observing field of 3.5x3.5degrees at the sky. This is over 10 times as much observing space! To deal with all this in full polarimetric imaging and at the same time capable of doing pulsar observations and time varying other phenomena, the “ARTS” Apertif Radio Transient System was build. This FPGA-GPU system produces 468 simultaneous tied array beams within the Apertif field of view and uses deep learning algorithms to sift the candidate transient data. See www.astron.nl for more background.

Obviously, this new phase in life warranted a grand opening at the same time celebration the book to be finished on time! The picture tells it all with a little more explanation:

Carole Jackson, ASTRON DG handing over the book to the Deputy-Kings Commissioner Mr. Cees Bijl (bottom left), ASTRON’s Lodie Voute and Jan Noordam looking for their respective book contribution in print (top left), The Westerbork array equipped with the Apertif frontends (middle), Looking into Apertif array receiver (top right), the ARTS GPU supercomputer (bottom right)

Contributed by Arnold van Ardenne

Photos from the Field

The Westerbork telescope is also a great place to teach students interferometry;

Michiel Brentjes explaining the details at the 2013 European Radio Interferometry School

(from the WSRT 50yrs book)

A.G. (Ger) de Bruyn
13 July 1948 – 9 July 2017
An excellent astronomer, teacher, WSRT user and friend

(from the WSRT 50 yrs book)

If you have an interesting photograph that you wouldn't mind sharing with others in the public domain I encourage you to send a copy to me along with a brief caption and the person's name or organization to whom I should credit.