

## COMMISSION B4

## RADIO ASTRONOMY

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**Commission B4 WG**

**Historical Radio Astronomy**

## TRIENNIAL REPORT 2015-2018

### 1. Introduction

The new IAU Commission B4: Radio Astronomy (CB4), started its activity in 2015. It is a natural continuation of the previous IAU Commission 40 for Radio Astronomy, which was established in 1948 and which has been extremely successful at supporting the Radio Astronomy community. CB4 currently has 457 Members.

The primary purpose of this Commission is the coordination of the unique role of Radio Astronomy as part of our global multi-wavelength capability in astronomy, taking into consideration the long-term development in this field at the international level. The importance of results obtained in the radio-band (e.g. magnetic fields, atomic and molecular spectral lines) and this multi-wavelength approach implies that Radio Astronomy needs to be adequately represented in global multi-wavelength astronomy, including at the IAU.

### 2. Activities within the past triennium

After the establishment of Commission B4 a long-standing activity was started to implement its new structure, governance, including the appointment of a Secretary, discussions on Working Groups, and its relationship and fruitful interaction with URSI.

- In the first year CB4 considered the creation of Working Groups and discussed rules and suggestions to propose/confirm WGs. A Working Group on Historic Radio Astronomy was confirmed and it has been active since then.

- According to the primary purpose of CB4 the Organizing Committee promoted coordination among Commission members to organize International meetings in particular IAU Symposia dedicated to developments in Radio Astronomy and its role in multi-wavelength astronomy. For this a multi-phase approach was adopted by the OC:

a) We urged CB4 members to propose IAU Symposia (and Focus Meetings at the GA) and tried to coordinate their efforts;

b) We discussed **all** LoIs submitted to the IAU, and suggested to respective chairs of relevant meetings to ask our Commission for a support and to coordinate with us. This included support in the choice of Invited speakers and SOC members;

c) When requested we provided support letters with detailed comments.

Among the **IAU Symposia** selected for 2018 we supported:  
 IAUS 342 Perseus in Sicily: from black hole to cluster outskirts  
 IAUS 345 Origins: From the Protosun to the First Steps of Life  
 and the following **Focus Meetings**:

FM3 Radio Galaxies: Resolving the AGN phenomenon; FM4 Magnetic fields along the star-formation sequence; FM8 New Insights in Extragalactic Magnetic Fields.

We supported 4 IAU Symposia proposed for 2019, whose selection is in progress.

- CB4 organized a scientific and business meeting at the XXX IAU General Assembly. The meeting will review recent results in the field of radio astronomy and briefly discuss the aims and organization of Commission B4 Radio Astronomy.

Scientific Topics include: Cosmic Microwave Background; Epoch of Reionization; Fast radio bursts and transients; Interstellar processes; Pulsars; Radio surveys continuum and line; Star and planet formation; and new and upcoming facilities

Moreover the CB4 Working Group on Historic Radio Astronomy organized a discussion on **The history of large single dish projects and lessons learned**.

- A survey of major advances in Radio Astronomy and most important results was done and relevant points have been included among Radio Astronomy Highlights in 2016, and presented on the Commission home page.

These years have been characterized by:

**A)** major advances in radio surveys, which are playing an increasingly important role in radio astronomy. A short, not exhaustive, list could include: 1) the ALMA survey of the Hubble Ultra Deep Field Universe which revealed a previously unknown abundance of star-forming gas; 2) the completed Galactic and Extragalactic All-sky MWA survey (GLEAM); 3) the GMRT 150 MHz all-sky radio survey with 1/2 million radio sources; 4) the LOFAR Two-meter Sky Survey (LoTSS); 5) the Sky Survey for the enhanced VLA in the 2-4 GHz band (VLASS).

**B)** a large improvement in the scientific instrumentation available. First light has been detected with the new band 5 (163 – 211 GHz) receivers installed at ALMA; the call for 1-mm Very Long Baseline Interferometry (VLBI) proposals to use phased ALMA at Band 6 (211 – 275 GHz) in Cycle 4, have been released in collaboration with the Event Horizon Telescope Consortium (EHTC); first light was detected from the worlds largest single-aperture radio telescope (FAST); a first light radio image with the MeerKAT array in South Africa has revealed the existence of many distant radio galaxies.

### 3. Closing remarks

In the near future a task for the OC will be to try to involve a larger number of IAU members in our Commission activity. An important point will be to solicit interest in establishing new Working Groups. To initiate the process, a survey will be circulated a survey to provide the OC with useful information.

### 4. Commission Working Group

Richard Wielebinski and Richard T. Schilizzi are the Chair and CO-Chair of the Historical Radio Astronomy Working Group.

#### 4.1. Purpose of the WG

The WG was first established in 2003 as an IAU WG, but since the URSI GASS in Beijing in 2014 it is a joint WG of the IAU and URSI. Its aims are to i) maintain an ongoing bibliography of publications relevant to the history of radio astronomy, ii)

document and preserve surviving historically-significant radio telescopes and associated instrumentation, and iii) document the careers of deceased radio astronomers in biographical memoirs.

The WG has 41 members at the moment, amongst whom are 14 national reporters responsible for keeping track of developments of relevance to the WG in their respective countries or regions.

#### 4.2. *Publications and research*

Nine books dealing with the history of radio astronomy have been published since 2015:

Orchiston - *Exploring the History of New Zealand Astronomy: Trials, Tribulations, Telescopes and Transits*

Schwartz & Zensus - *History of MPIfR* (in German)

Elbers - *The Rise of Radio Astronomy in the Netherlands*

Goss, Morris, Sheshadri - *Radio Astronomers at Sea*

Robertson - *John Bolton & a New Window on the Universe*

Baars & Karcher - *Radio Telescope Reflectors Historical Development of Design and Construction*

Nakamura & Orchiston - *The Emergence of Astrophysics in Asia: Opening a New Window on the Universe*

Frater, Goss, & Wendt - *Four Pillars of Radio Astronomy*

V.M. Berezanskaya, M.A. Lukichev, and N.M. Shaul'skaya - *A book-album celebrating the 100th anniversary of the birth of Vitalii Lazarevich Ginzburg (in Russian)* More

than twenty-five papers have been published since the last General Assembly in Journal of Astronomical History and Heritage, Bulletin of the Astronomical Society of India, Nancius Hambugenisis, Bibliographical Encyclopedia of Astronomers, the URSI Bulletin, and more. Moreover, presentations on historical topics were given in eighteen conferences from 2015 to 2017.

#### 4.3. *Preservation of historical radio-astronomical equipment*

In 2006, ASTRON in the Netherlands made the Dwingeloo 25-meter dish available to the Foundation CAMRAS for use by radio amateurs. CAMRAS amateurs upgraded the telescope and brought it back into regular operation; they also used it for regular demonstrations to the general public. In 2009, the telescope was recognized by a Government office as an item of "National Cultural Inheritance". In 2012-14 the telescope was thoroughly renovated. It is now in regular use by radio amateurs and amateur astronomers. It is also used to demonstrate radio astronomy to high-school students, and to interest them in science as a possible career. The telescope has been successfully used by groups of young amateur astronomers to map atomic hydrogen in our Galaxy.

#### 4.4. *WGHA Website*

The WG website <http://rahist.nrao.edu/> is a repository of a considerable amount of historical material including contributions to the IAU Triennial Reports for 2006, 2009, 2012, and 2015; the presentations on the history of radio interferometers at URSI GASS 2017; the report on WG activities at the Commission J business session at URSI GASS 2017; a list of Grote Reber Medalists; biographical memoirs of deceased radio astronomers; related resources; and access to the NRAO/AUI archives (<http://jump2.nrao.edu/dbtw-wpd/textbase/archivesearch.htm>).

Sadly, twenty-one of our colleagues have passed away since the General Assembly in 2015

4.5. *Future Activities*

A 3-hour session on Historical Radio Astronomy is planned on 27 August 2018 during the Division B days at IAU GA in Vienna. The topic will be Single dishes: history and lessons learnt. A session will be requested at the next URSI General Assembly in Rome in 2020 on a topic to be determined. Activity will continue on the Jansky site restoration and historical landmark. The website will be kept up to date and will include a compilation of papers published in the field of historical radio astronomy.

A number of books are in preparation including

Orchiston, Sullivan and Robertson *The Foundations of Australian Radio Astronomy* (to be published in 2018)

Goss, Ekers, Hooker *From the Sun to the Cosmos*, J. L. Pawsey

Kellermann, Bouton, Brandt *Open Skies* Jarrell, Wall, Griffin, Robishaw *The history of Canadian Radio Astronomy*

Schwartz, Zensus *History of MPIfR* (English translation)

Schilizzi, Ekers, Hall *History of the Square Kilometre Array 1993-2012*

Dickman, Vanden Bout *Construction of the Atacama Large Millimeter - Submillimeter Array*

Van der Kruit *Jan Oort*

Gabriele Giovannini  
*President of the Commission*