

IUCAF 5th School on Spectrum Management for Radio Astronomy

South African Radio Astronomy Observatory (SARAO)

2-6 March 2020

Co-sponsored by:

IUCAF

SARAO

CRAF

RadioNet

CORF

National Science Foundation RAFCAP

Rationale

The 5th IUCAF School on Spectrum Management offers a comprehensive view of both technical and regulatory issues related to radio astronomers' use of the spectrum. Spectrum management is a task of rapidly growing importance, for radio astronomy as well as for other radio services; however, it is not part of any academic curriculum; radio astronomers have to learn it by doing it. The IUCAF School in Spectrum Management will be an opportunity to profit from the experience of colleagues.

The expected audience would be members of the radio astronomy and related radio engineering community, who are becoming active in this area at the local, national or international level, and regulators whose task is to protect passive services and science services. These skills have critical application to science, commerce and government.

IUCAF spectrum management schools were previously held in 2002 (Green Bank, USA), 2005 (Castel San Pietro Terme, Italy), 2010 (Mitaka, Japan) and 2014 (Santiago, Chile) and were important milestones in radio astronomy's efforts to preserve access to the radio spectrum. (See links in the main [IUCAF website](#)).

Purpose

The School will train the next generation of Scientists, Engineers and Administrators in the skills enabling discoveries via observations using the radio spectrum.

Over 80 years have passed since K. G. Jansky first detected radio emission from the Galaxy, while searching for the origin of the weak static that was causing interference to communications. Since then, radio astronomy has revolutionized our view of the Universe through the discovery of quasars, pulsars, the Cosmic Microwave Background, surveys of our Galaxy in the 21-cm hydrogen line, molecular lines, and many other phenomena. The radio window was the first non-optical window in the electromagnetic spectrum explored by astronomers, and radio techniques continue to be a prime tool in the exploration of the Universe. At the same time, radio astronomy retains close ties to the world of radio communications, adopting some of its leading technologies, and sometimes giving rise to technologies of its own adopted by radio engineers for commercial applications.

During the 20th century, radio astronomers enjoyed relatively easy and interference free access to large portions of the spectrum, by locating telescopes far from potential sources of man-made noise. A small number of specialists took care of regulatory issues that arose in national and international fora that rarely required attention from the broader astronomy community. This state of affairs has been changing rapidly in the 21st century, as demands on the spectrum increase due to huge increases in the demand and availability of wireless applications (mobile phones, Wireless LANs, and many others), communication satellites and marketing of new technologies, such as ultra-wide band systems, power line telecommunication systems, cognitive radio systems and dynamic spectrum access (DSA). The development and health of radio astronomy depend critically on astronomers' continued access to the radio spectrum, and this in turn demands that astronomers and particularly radio observatories pay closer attention to the technical and regulatory issues that arise in relation to managing the radio spectrum, particularly as they relate to radio astronomy.

Spectrum management is critical for the future of radio astronomy. It is also interesting and even challenging, as it requires a combination of scientific motivation, technical background, legal knowledge and diplomatic skills. These skills are normally not taught as part of science curricula.

The IUCAF Spectrum Management School provides an introduction to a unique combination of technology, science and international diplomacy by experts in this field. At this school, special emphasis will be given to spectrum issues related to new instruments such as the SKA and its precursors (MeerKat, ASKAP, MWA, LOFAR?, ...)

Due to limited capacity at the venue, participation in the IUCAF school may be limited to 50 persons. Preference will be given to younger radio astronomers and engineers, who are or expect to be involved in spectrum management activities.

Topics

Topics to be Discussed will include:

Radio Astronomy Techniques and Observations
Earth Remote Sensing & Space RA Observations
Spectrum: Frequency Allocation, Bands and Uses
International Telecommunication Union (ITU) and other Regulatory Agencies
* Recommendations, Reports and Notification
Radio Science & Technology
* Antennas, Propagation, Receivers, Backends
Interference to Radio Astronomy
* Interference to RA and mitigation techniques
International, National and Regional Regulatory Structure
Coordination with other Radio Services
RFI from New Technologies and Unlicensed Devices
New Frontiers in Spectrum Management
* The submm/Terahertz regime, Radio Quiet Zones and SKA
Units and working with the Numbers

** A detailed program will be published closer to the date of the school.

Invited Speakers

A number of experts including from areas outside radio astronomy have been invited to present at the school. These include:

- * Sandra Cruz-Pol (NSF) - University course in Spectrum management
- * Andrew Clegg (Google) - An industry perspective (see also previous schools)
- * Vadim Nozdrin (ITU-R) - the ITU perspective
- * John Zuzek (NASA) and SG 7 chair
- * Paulette Woody (NRAO) - RQZ expert

Reference Textbook

Sandra has developed a university level course on [RF Spectrum management](#), which has been published in a book available [through Amazon](#).

We propose to make this book the unofficial resource and reference textbook and purchase enough copies for all student participants (cost to be included in the registration fee).

School Location and Venue

The school is hosted by the [South African Radio Astronomy Observatory \(SARAO\)](#).

The venue of the school will be at:

[STIAS](#)

**10 Marais Road,
Stellenbosch, South Africa**

Uber is probably the best transport option for people who need to move around, and they are very accessible.

Trip from airport to Stellenbosch is between R270 and R350 (US\$18-24).

Accommodation

Block bookings have been made in a number of hotels in the Stellenbosch area and more arrangements are in progress.

See [the latest hotel list and details](#).

Registration

Participation at the workshop may be limited to ~50 people due to logistics issues.

Participants should **register** directly via the [web registration form](#).

Visa Requirements

A visa may be required for nationals of some countries, please check at your local South African consulate.

See some general visa information at the [South African Department of Home Affairs](#).

Should a visa be needed, the LOC will assist participants as much as possible.

If a letter of invitation is needed please let the LOC know as soon as possible. Ms Dineo Mahabo is the contact person to request a letter of invitation and the email address is dmahabo@ska.ac.za. It should be sufficient to have Rob Adam, as Managing Director, issue the invitation. Attendees should provide a copy of their passport page so that we can confirm the details etc.

Important Dates

13 October 2019	Initial announcement and and "keep-the-date"
Mid December 2019	Final arrangements. 2nd announcement.
Late December 2019	Registration and hotel bookings open.
30 January 2020	Hotel block bookings close. Confirm attendance.
14th February 2020	Registration closes.

Sunday March 1, 2020	Arrival
Monday March 2, 2020	Morning registration; Start of school
March 2-6, 2020	SCHOOL
Wednesday March 4, 2020	Possible MeerKAT visit; School Dinner
Saturday March 7, 2020	Departures

Visit to the MeerKAT telescope

An optional visit to the MeerKAT Telescope is under consideration for school participants. The visit requires flying via chartered aircraft (only 8 passengers) and it will require additional logistics and costs (TBD; \$500/person??). It will only be feasible if it fits the MeerKAT schedule.

The LOC will facilitate arrangements for the visit, but no financial support will be provided for this purpose to participants.

Please indicate in the registration form if you plan to participate in the MeerKAT visit and the number of visitors in your party.

NB: Number of participants will be restricted due to the logistics.

Detailed arrangements and costs will be published as soon as practicable.

Fees, payments; Conference Dinner

A registration fee of US \$150?? or its equivalent in South African Rand will be charged to participants. This fee includes all coffee breaks and lunches during the week of the school. (Alternatives for lunches outside the venue are limited and time consuming.)

It will also include a copy of the reference textbook.

There will be an official Dinner organised for all participants, either at STIAS or a nearby winery. Time, place and cost TBD.

The cost will be US\$50?? per person, to be paid at registration.

Please indicate in your registration form if you will be attending the dinner and how many persons are in your group.

Financial assistance

Limited financial support may be available. If you need support please get in touch directly with the organisers.

Support will be available for EU participants from RadioNet, to be administered via CRAF. Again, please let the CRAF contacts or the organisers know.

IUCAF may also offer limited support, especially for students.

Committees

SCIENTIFIC ORGANIZING COMMITTEE:

Harvey Liszt (USA) -- **co-Chair** --- **IUCAF contact**

Tasso Tzioumis (Australia) -- **co-Chair**

Masatoshi Ohishi (Japan)

Michael Lindqvist (Sweden) -- **CRAF/RadioNet contact**

Pietro Bolli (Italy) -- **CRAF/RadioNet contact**

Wim Van Driel (France)

Haiyan Zhang (China)

Ashley Zauderer (USA)

Federico Di Vruno (SKAO)

Waleed Madkour (CRAF)

Balt Indermuehle (Australia)

LOCAL ORGANIZING COMMITTEE:

Adrian Tiplady -- **Chair**

Dineo Mahabe

Braam Otto

(Tania Engel - Transport and accommodation)

Acknowledgements

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<https://www.radionet-org.eu/radionet/RadioNet>
