



Report from the event supported by RadioNet

TITLE *DETECTION AND MEASUREMENT OF RFI IN RADIO ASTRONOMY*

DATE: *8TH – 9TH JUNE, 2017*

LOCATION: *YEBES, SPAIN*

MEETING WEBPAGE: *<http://www.oan.es/rfi2017/>*

HOST INSTITUTE: *YEBES OBSERVATORY, CDT, IGN.*

**RADIONET
BENEFICIARY / NO:** *UAH / 12*

Report:

1. SCIENTIFIC SUMMARY

The workshop on RFI detection and measurement has given the opportunity to many scientists and engineers to show their work in the field of RFI analysis, its detection and measurement and hardware and software solutions to minimize their unwanted effects on high sensitivity radio astronomy receivers, which are equipped with state-of-the-art components to carry out top-level scientific observations and measurements.

Important results have been shown in the field of high-temperature superconducting filters (HTS) (Fig. 1). These are very low loss filters that can be installed in front of the low-noise amplifiers. The penalty of a little increment in receiver noise produced by these filters is largely compensated with the benefits that they produce, as they allow the operation of amplifiers in the linear regime in the presence of RFI signals.

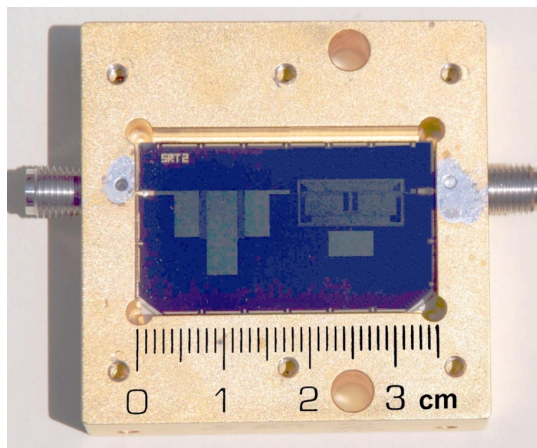


Figure 1: Example of HTS filter (Credit: S. Mariotti, IRA/INAF).

The attendees have learned how other observatories are facing RFI issues, so they have got new ideas on how to start or improve their work in this field. In addition, the workshop has been a good starting point for some collaboration among institutes/observatories. What's more, some of the works presented in this workshop could be considered to be implemented in current RadioNet work packages like BRAND.

The speakers have shown that RFI is a very common problem to all observatories so efforts against spectrum pollution have to be joined through the Committee on Radio Astronomy Frequencies (CRAF), whose frequency manager (Ms. Hezareh) gave a interesting talk about CRAF activities and future telecommunication services with impact on radio astronomy.

After the meeting, a tutorial was given to show attendees how to use the portable RFI equipment available at Yebes Observatory. It will allow other observatories without this instrumentation to carry out RFI measurements on their own with Yebes equipment, which can be borrowed.

The workshop web page is available at: <http://www.oan.es/rfi2017/>

The presentations are available at: http://www.oan.es/rfi2017/show_presentations.shtml

2. AGENDA OF THE EVENT

Day 8-June-2017

- 8:30 Bus departure from Guadalajara to Yebes Observatory.
- 9:00 Arrival and registration.
- 9:30 Workshop Opening and Logistics.
José A. López-Pérez (IGN).
- 9:40 Welcome and Yebes Observatory introduction.
José A. López-Fernández (Yebes Observatory Director, IGN).

Session 1 : Local RFI environments (Chairman: Reinhard Keller.)

- 10:00 The INAF RFI group: recent results in spectrum management & monitoring.
Pietro Bolli (INAF, Arcetri Observatory, Italy).
- 10:30 RFI measurements at the 65m Tianma Telescope.
Bin Li (Shanghai Astronomical Observatory, China).
- 11:00 Coffee Break.
- 11:30 RFI measurements in the framework of BRAND-EVN project.
José A. López-Pérez (Yebes Observatory, Spain).
- 12:00 RFI Survey for the Thai 40-m Radio Telescope.
Phrudth Jaroenjittichai (NARIT, Thailand).
- 12:30 RFI Measurements at the Argentine Institute of Radioastronomy I.A.R.
Guillermo Gancio (IAR, Argentina).
- 13:00 Lunch Break.

Session 2: RFI surveys and mitigation (Chairman: Jose A. López-Pérez)

- 14:00 An evaluation of local interferences in the 0-3 GHz band. A case study in Meco (Spain).
Pablo Lopez-Espí (UAH, Spain).
- 14:30 Radio Environment of NSRT and RFI Mitigation.
Qi Liu (Xinjiang Astronomical Observatory, China).
- 15:00 Wideband RFI mitigation.
Jan-Willem W. Steeb (Stellenbosch University, South Africa).
- 15:30 Coffee Break.
- 16:00 ESAC RFI Survey in the SMOS 1400–1427MHz Passive Band.
Ekhi Uranga (ESAC, ESA, Spain).
- 16:30 RFI measurements with Yebes VGOS broad-band receiver
Pablo García (Yebes Observatory, Spain).
- 17:00 Visit to the 40-meter radio telescope.
- 18:30 Bus departure to Guadalajara.
- 20:15 Meeting point for social dinner.
Hotel Alcarria, C/ Toledo 39, Guadalajara.
- 20:30 Social dinner at restaurant.

Day 9-June-2017

- 8:30 Bus departure from Guadalajara to Yebes Observatory.

Session 3: RFI management (Chairman: Pietro Bolli)

- 9:00 Spectrum management for Radio astronomy in Europe and beyond.
Talayeh Hezareh (CRAF, Germany).
- 9:30 RFI Protection Activities in IAA RAS.
Aleksy Tsaruk (Institute of Applied Astronomy, Russia).
- 10:00 An RFI Mitigation Project at the Italian Radio Telescopes
Giampaolo Serra (INAF, Astronomical Observatory of Cagliari, Italy).
- 10:30 RFI mitigation tests conducted at GGAO.
Lawrence M. Hilliard (NASA, USA).
- 11:00 Coffee Break.

11:30 High Temperature Superconductor microwave filters for the Sardinia Radio Telescope.
Sergio Mariotti (INAF-IRA, Bologna Observatory, Italy).

Session 4: Hardware for RFI detection (Chairman: Jose A. López-Pérez)

12:00 Effective solutions for detection and measurement of RF & μ W spectrum using Real-time Spectrum analyzer solution.
Andrew Benn (Keysight Technologies).
12:30 Industry solutions for RFI monitoring, detection and location.
Thomas Krenz (Rohde-Schwarz).
13:00 Lunch Break.

Session 5: Yebes RFI portable equipment tutorial (Speaker: José A. López-Pérez)

14:00 RFI equipment tutorial. RFI measurement demo.
16:00 Coffee Break.
16:30 Workshop closure.
17:00 Bus departure to Guadalajara.

3. PARTICIPANTS

Forty-one attendees from several countries came to the workshop, mainly from Europe (80.5% from Germany, Italy, Spain, Sweden, Latvia, Russia and Poland), but also from Asia (12.2% from China and Thailand), America (4.9% from USA and Argentina) and Africa (2.4% from South Africa).

In relation to the gender of the attendees, the fraction of women attending the workshop was 19.5%, and 22% were young researchers and students.

Invited experts gave very interesting talks about RFI detection and measurement (Pietro Bolli), HTS filters development (Sergio Mariotti) and frequency management (Talayeh Hezareh).

The global feeling of the attendees about the workshop was very good as it was a great opportunity to meet with experts in this field.

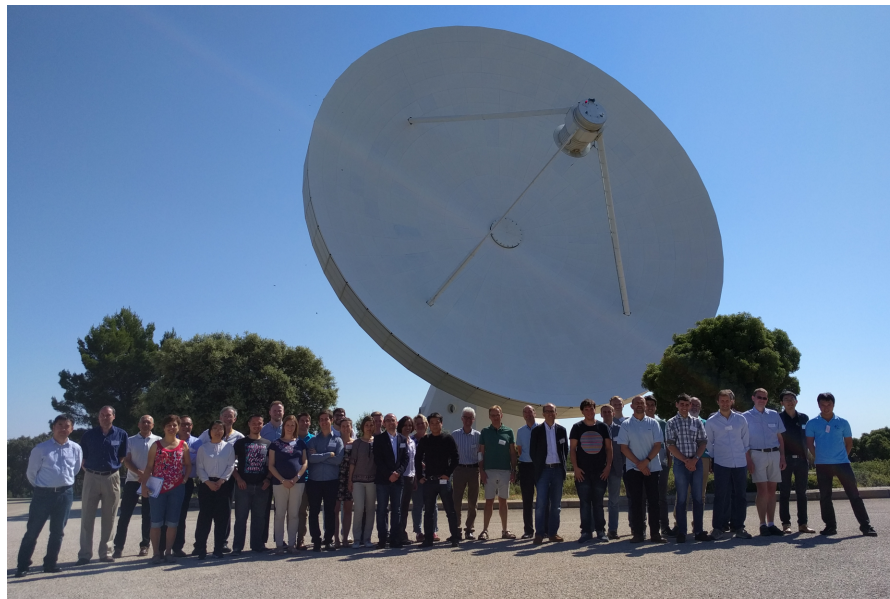


Figure 2: Yebes RFI workshop attendees.



4. RADIONET FINANCIAL CONTRIBUTION

A portion of 1500€ RadioNet funds were devoted to support the travel expenses of one expert (300€).

The financial support will be distributed according to the following table:

Cost description	Allocated amount
Funding applicant #1	300 €
Two-day coffee break costs	300 €
Two-day lunch costs	900 €
Total Cost	1.500 €

5. PUBLICATIONS

The workshop presentations have been uploaded to the workshop home page at:

http://www.oan.es/rfi2017/show_presentations.shtml