

Report from the Short Term Mission – STM

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Report:

1. TOPIC

Yebees Observatory and OSO participate in Radionet BRAND EVN activities. Both groups are in charge of the feed development and they both have started different related developments independently. I'm involved in Yebees feed development (Corrugated feed horns, QRFHs...). I shared my activity research in feed development field and we identified some possible mutual areas of work. In particular, we started to design a new feed that can be cover the whole band (1.5-15.5 GHz) for the illumination of reflector optics antennas with different geometries.

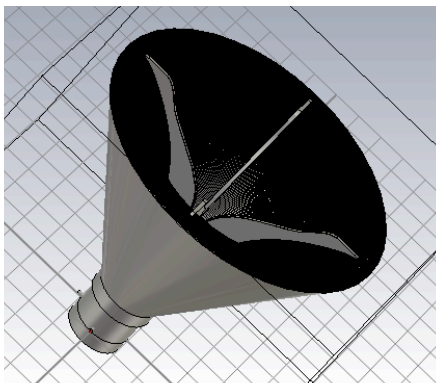
2. PROPOSED AND PERFORMED WORK

The Technological Development Center at National Geographical Institute, and Onsala Space Observatory are world leading radio astronomy observatories with very strong technical groups, developing front-end and back-end equipment for cm and mm wavelength astronomy. They are involved in the BRAND project, part of the EC funded Radio Net H2020, where they are developing broad-band feeds for illumination of reflector optics antennas with different geometries. The visit has been focused on the study of a common approach for data analysis, data formats for exchange of design data and use of the same models for estimating the noise contribution from various sources.

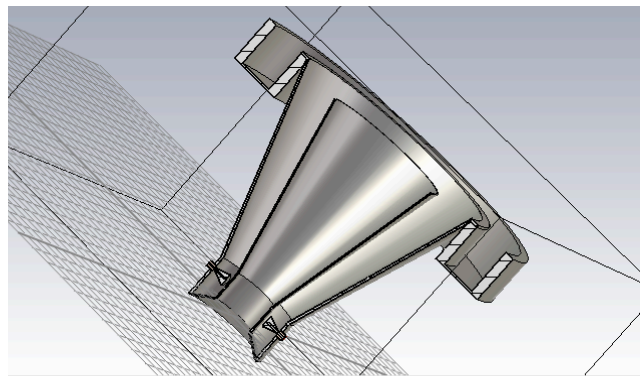
The different techniques that are used to simulate, optimize and characterize the feeds have been analyzed. First, I participated in TINT Workshop where experts of Chalmers University discuss different broadband feeds. Also, I participate in the EVGA 2017 where we discussed about broadband antennas.

A new antenna design has been proposed, so you can combine previous QRFH designs. In this way, we will focus on the low frequency part.

In these two weeks, we have could simulate a model that covers the band (1.5-15 GHz), but we did not reach the optimum level of illumination of reflector optics antennas with the VGOS geometry.



QRFH



New Antenna for low frequency



3. CROSS-DISCIPLINARITY

Both institutions are collaborating in the BRAND project, of the EC funded Radionet H2020 project. The visit of Samuel López Ruiz has been useful for the definition of common exchange data formats, and common models for estimating the noise contribution from various sources, and for collaborating in the development of new broad-band feeds for illumination of reflector optics antennas with different geometries.

OSO and Yebes both have experience in Low noise technological developments. They also have a common interest in BRAND EVN. They are also working in VGOS (VLBI Global Observing System) and they have just built identical 13.2 meter radiotelescopes. A joint effort between both institutes could be of great interest for both and for Astronomical and Geodetical VLBI communities. As the final product is a prototype, industry could have benefits of manufacturing these high precision components.

With my experience in the optimization of Corrugated feed horns and others feeds and the experience of OSO in QRFH design. We could start a line of research.

4. IMPACT

The visit of Samuel López Ruiz to OSO has been used to define common models for estimating the noise contribution from various sources. He has collaborated with OSO in the development of a new broad-band feeds for the illumination of reflector optics antennas with different geometries. The Short Term Mission has been also a good opportunity for Samuel López Ruiz to create contact with word leading companies in the area of radio astronomy in Gothenburg, for example, Low Noise Factory.

The design of broadband antennas is a current problem in radio astronomy. Joining the knowledge of both institutes for the feed design and low noise techniques will have a big impact in the radio astronomical community. The developments result of this collaboration could be use by the whole radio astronomical community. This stay could increase synergies between both groups and could improve the efficiency of our work, as we are participating on the same project and same fields.

5. PUBLICATIONS

No publications have been generated till now. But when optimal levels of illumination are achieved, the developments will be published in EUCAP 2018. London. 08-13 April.