

The Medicina Station Status Report

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Abstract

General information about the Medicina Radio Astronomy Station, the 32 m antenna status, and the staff in charge of VLBI observations are provided. In 2008 the data from geodetic VLBI observations were acquired using the Mark 5A recording system with good results. Updates of the hardware have been performed and are briefly described.

1. The Medicina 32 m Antenna. General Information

The Medicina 32 m antenna is located at the Medicina Radio Astronomy Station. The Station is run by the Istituto di Radioastronomia and is located about 33 km east of Bologna. The Consiglio Nazionale delle Ricerche was the funding agency of the Istituto di Radioastronomia till the end of 2004. Since January 1, 2005 the funding agency has been the Istituto Nazionale di Astrofisica (INAF).

The antenna, inaugurated in 1983, has regularly taken part in IVS observations since 1985 and is an element of the European VLBI network. A permanent GPS station, which is part of the IGS network, is installed in the vicinity. Another GPS system is installed near the VLBI telescope (MSEL) and is part of the EUREF network.

2. Antenna Description

The Medicina antenna has Cassegrain optics, consisting of a primary mirror of 32 m in diameter, and a secondary mirror, called the subreflector, of convex shape and about 3 m in diameter. The subreflector, mounted on a quadrupode, is placed opposite the primary mirror and focuses the radio waves at its center, where the receiver system is located. For some observing frequencies, a simplified optical system is enough. The subreflector is therefore shifted from its normal position, and the receiving system is placed at the primary focus. This is the case for the S-X observations. The antenna can operate in the range between 327 MHz and 22 GHz.

The receivers are cooled with cryogenic techniques to improve the system sensitivity. The antenna's operative receiver is easily changed; only a few minutes are needed to change the observing frequency. A recent picture of the antenna is shown in Figure 1.

3. The Staff

Many scientists and technicians take care of the observations. However, a limited number are dedicated to maintaining and improving the reliability of the antenna during the observations: Alessandro Orfei is the Chief Engineer, expert in microwave receivers; Giuseppe Maccaferri is the Technician in charge of the telescope's backend; and Andrea Orlati is the Software Engineer who takes care of the observing schedules and regularly implements SKED, DRUDG and the Field System.



Figure 1. View of the Medicina 32 m dish taken during geodetic VLBI observations. Note that the subreflector is shifted to allow the use of the S/X receiver located in the primary focus of the radio telescope.

4. Current Status and Activities

During 2008 a Mark 5B+ was bought but not connected to the formatter. Some preliminary tests (TVG recording) were done.

At present, 33 TB of disk space is available for geodetic observations.

The 9.9.0 version of the Field System is now running. We plan to upgrade our control PC to the Field System Linux 7 in the near future.

As for receivers, the multifeed system was mounted on the 32m in March 2008. Since then optics alignment has been done, and a pointing model is available. This receiver is intended for SRT, but it will be used on the Medicina antenna until the new telescope will be ready. First testing shows that the central horn, which will be used for VLBI, shows a T_{sys} of about 75K at 45 degrees of elevation with a τ equal to 0.1. The antenna gain is about 0.1K/Jy. The feed system was designed to have the best performance in terms of crosspolarization in the VLBI band. VLBI observations were made, and fringes were detected. The multifeed, 14 outputs each 2 GHz wide, is now equipped with a total power back-end able to detect 28 GHz bandwidth with sampling rate down to 1 msec.

4.1. Optic Fiber Link

Medicina routinely performs e-VLBI observations at about 1 Gbps.

5. Geodetic VLBI Observations

In 2008 Medicina took part in 23 (24 hour) routine geodetic sessions (namely 4 IVS-T2, 14 IVS-R4, 2 EUROPE, and 3 R&D experiments) plus a special session (CONT08) in August lasting 15 days.