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 2009 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 until 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 that is 32 m in diameter, and a secondary mirror, called the subreflector, which is 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, in collaboration with Andrea Orlati, Software Engineer, he 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

A new FS computer was installed in 2009, and the latest Debian release (FS8-Lenny) and the 9.10.4 version of the Field System are running on it.

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

As for receivers, a multifeed system was mounted on the 32 m in 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. The feed system was designed to have the best performance in terms of cross-polarization 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 the sampling rate down to 1 msec.

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

5. Geodetic VLBI Observations

In 2009 Medicina took part in 24 (24 hour) routine geodetic sessions (namely 2 IVS-T2, 13 IVS-R4, 4 IVS-R1, 3 EUROPE, and 2 R&D experiments).