

# The Medicina Station Status Report

*Alessandro Orfei, Andrea Orlati, Giuseppe Maccaferri*

## Abstract

General information about the Medicina Radio Astronomy Station, the 32-m antenna status, and the staff in charge of VLBI observations is provided. In 2011 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 (MEDI), 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; and Andrea Orlati, Software Engineer, takes care of the observing schedules and regularly implements SKED, DRUDG, and the Field System. At the end of 2010 Giuseppe Maccaferri took a one-year sabbatical period. Marco Bartolini and Simona Righini have been temporarily included in the staff helping Andrea Orlati for the VLBI preparation and observation.



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

The board to upgrade our version of Mark 5 to Mark 5C has been purchased. At the same time an order has been placed to buy a DBBC equipped with ADB2 and CORE2 boards. An added FILA10G Ethernet interface will allow the use of it with Mark 5C.

The antenna will be provided with a new Helium pipeline and cryo compressors. The cold head will be substituted in the receivers.

A plan for heavy and extraordinary maintenance is in progress. The first step is to provide materials and contracts. The H-Maser is near the end of its life; it has been decided to buy a new one.

The upgrade to 10 Gb/s is still in progress, as is the creation of a 10 Gb/s POP center at Bologna Headquarters.

#### 5. Geodetic VLBI Observations

In 2011 Medicina took part in 23 (24-hour) routine geodetic sessions (namely 2 IVS-T2, 18 IVS-R4, 2 EUROPE, and 1 R&D experiments).