

Medicina Station Report

Allesandro Orfei, Franco Mantovani

1. Introduction

The Medicina 32-m dish is an alt-az antenna run by the Istituto di Radioastronomia di Bologna del Consiglio Nazionale delle Ricerche. The radiotelescope is located about 30 km east of Bologna, Italy. It is part of the European VLBI Network. Details on the telescope characteristics and equipments can be found at the EVN Home Page (<http://www.nfra.nl/evn/>).

In the last couple of years, the main goal at the Medicina Station was to get the telescope agile in changing the observing frequency. Achieving this goal will greatly increase the observational efficiency of the telescope. Moreover it will make the operation of changing the receivers more safe and it makes this task independent of weather conditions.

The first part of the project has been completed and the new subreflector is fully in operation. The increased flexibility in changing frequency, together with the facility of recording both thick and thin tapes implemented at all the European VLBI Network (EVN) stations has immediately produced an increase in the number of geodetic VLBI observations to which the Medicina Station will take part in 1999.

2. Medicina Station Report

In the following we list the main upgrading in both hardware and software done at the Medicina Station.

2.1. Tape Recording

- a) The thin tape capability has been installed at the station with good results.
- b) A problem due to the sliding of thin tapes has been solved by adopting a new capstan with deeper grooves.
- c) The write head has been replaced at the end of 1998, since it wore out. The new one is of the old Metrum type. The read head is also on its way to die. The new ordered head, made by Spin Physics, will have two triple cap heads mounted.

2.2. Computer Control

- a) A new version of the remote control programme for the S/X receiver has been implemented. It allows monitoring of the receiver status (cryogenic temperature, vacuum pressure and so on) in real time.
- b) To serve different types of observational projects, the computers facilities have been reorganized. Three computers are now available:

- A computer runs the Field System. It can be used to prepare schedules and procedures. The Field System version implemented is 9.3. This machine is connected to the server of the computer

centre in Bologna.

- A computer with the Windows NT operating system serves equipment like the polarimetre and the antenna levelmeters. Moreover, it acquires the GPS-Formatter clock offsets data, it keeps under control the receivers and it drives the movements of the secondary mirror.

- A computer with either Linux or Windows 95 operating systems is used as a general purpose machine and for data acquisition during spectroscopic observations making use of the autocorrelator, etc.

2.3. Upgrading of the Telescope

There are two projects for upgrading the telescope. The first is the completion of the frequency agility project. The second aims to a better efficiency at higher frequencies.

a) In order to complete the frequency agility project for the Medicina dish we are planning to place in the secondary focus room a series of receivers which covers the frequencies between 4.3 GHz and 48 GHz. The electromagnetic design of the eight-feed system is ready and the parameters to design the mechanical support for the receivers are now available. The design of the electronics part of the eight receivers is also at a good stage. The priority is to build the 6 cm and the 5 cm receivers first, to fulfill the EVN requirements about the observing bands which should be available at any station.

b) A project is going on for the implementation on the telescope of an active surface to compensate the loss in efficiency due to gravity deformation of the primary mirror of the parabolic antenna. After a series of tests with the prototype of a mechanical actuator, calculations have been made to figure out the parameters for an "actuators network" which will keep under control the full surface of the dish. In the meantime we are looking for a proper electronics to be used and for an engineering phase of the linear actuator. Furthermore, the cost of more accurate panels for the dish and of the actuators itself have been assessed. A system of this kind, together with new panels of enhanced precision surface, will increase very much the antenna efficiency at frequencies up to 43 GHz.

3. Geodetic Observations

The geodetic experiments run by the Medicina Station in **1998** have been 18 (6 EUROPE, 6 CORE and 6 VLBA).

Three experiments "Mars Pathfinder VLBI", designed for the determination of the Martian Precession Constants, of the relativistic precession of the perihelion of Mars to a few parts per thousand, of the Martian Length of Day to about 1 millisecond, were run on the following dates:

07 Jul MARS-15 (04:00 - 16:00 UT)

14 Aug MARS-16 (03:00 - 15:00 UT)

04 Sep MARS-17 (03:00 - 16:00 UT)

Since the Station has fulfilled the requirements to be a 'CORE' (Continuous Observations of the Rotation of the Earth) Station (namely: a) flexible and automatic frequency change; b) Mark IV terminal; c) TAC for station timing system; d) daily GPS acquisition), it will take part in the "CORE" projects. Moreover, during the present year **1999**, the Station will continue to observe the EUROPE and VLBA experiments. The 38 scheduled projects are listed in Table 2. The list

contains 20 experiments more than in 1998, which represents an increase of more than 100% in observing time allowed for geodetic VLBI.

Tab. 2 - List of Geodetic VLBI observations in 1999

DATE	EXPERIMENT	DATE	EXPERIMENT
12-JAN	CORE-A053	29-JUN	CORE-A065
13-JAN	CORE-B401	13-JUL	CORE-A066
26-JAN	CORE-A054	15-JUL	CORE-B404
01-FEB	EUROPE-47	27-JUL	CORE-A067
09-FEB	CORE-A055	02-AUG	VLBA17
08-MAR	VLBA13	10-AUG	CORE-A068
09-MAR	CORE-A057	12-AUG	CORE-B405
23-MAR	CORE-A058	16-AUG	EUROPE-50
24-MAR	CORE-B402	24-AUG	CORE-A069
06-APR	CORE-A059	07-SEP	CORE-A070
15-APR	VLBA14	05-OCT	CORE-A072
20-APR	CORE-A060	11-OCT	EUROPE-51
26-APR	EUROPE-48	19-OCT	CORE-A073
04-MAY	CORE-A061	02-NOV	CORE-A074
05-MAY	CORE-B403	13-DEC	EUROPE-52
10-MAY	VLBA15	14-DEC	CORE-A077
18-MAY	CORE-A062	16-DEC	CORE-B406
21-JUN	VLBA16	20-DEC	VLBA18
28-JUN	EUROPE-49	28-DEC	CORE-A078