

Medicina Station Status Report

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Abstract General information about the Medicina Radioastronomical Station, the 32-m antenna status, and the VLBI observations is provided. Updates to hardware and software infrastructure have been made and are briefly described.

1 The Medicina Gavril Grueff Radio Telescope: General Information

The 32-m Medicina antenna, dedicated to the memory of Gavril Grueff in 2023 on the occasion of the 40th anniversary of its inauguration, is located at the Medicina Radioastronomical Station. The station is managed by the Institute of Radio Astronomy and is about 33 km east of Bologna, Italy. The National Research Council was the funding agency of the Institute of Radio Astronomy until the end of 2004. Since 1 January 2005, the funding institution has been the National Institute for Astrophysics (INAF).

The antenna, inaugurated in 1983, has regularly taken part in IVS observations since 1987 and is a member of the European VLBI Network.

A permanent GNSS station (MEDI) is installed nearby, which is part of the IGS network. Another GNSS system (MSEL) is installed near the VLBI telescope and is part of the EUREF network. The observatory is therefore a co-location geodetic site, contributing to the realization of the ITRF.

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2 Current Status and Activities

- **Antenna** - An active surface system for the primary mirror of Medicina was funded, and these works are in progress:
 - The new aluminum panels have been delivered, showing a manufacturing accuracy < 65 microns.
 - A new subreflector is in progress; its manufacturing accuracy is foreseen to be < 50 microns.
 - All of the parts for constructing the 244 electromechanical actuators have been delivered, and assembly is expected to be completed in spring 2025.

Once the work on the dish is completed, the existing receivers will be reassembled, and it is estimated to have the geo observations resume in the summer of 2025. Furthermore, Medicina will be able to observe at high frequencies up to 115 GHz with good overall efficiency.

- **Receivers** - In 2019 INAF was awarded a call (PON, National Operational Program) issued by the Ministry of Research. As part of this funding, our institute requested the installation on the Medicina radio telescope of a simultaneous three-band receiver (18-26, 34-50, and 80-115 GHz). The receiver was delivered in summer 2022, and it will be installed by the end of 2025. A cryogenic radio astronomical receiver able to simultaneously operate at the frequencies 4.2 to 9.0 GHz (C-X) has been acquired thanks to a project funded by the Next Generation EU program (CTA+PNRR).
- **VLBI back-end** - With the installed Flexbuffer we can record up to 24 Gbps.



Fig. 1 The Medicina Gavril Grueff Radio Telescope.

- **Field System** - a) On the FSL10 Debian machine, we are running the FS 10.2.0. b) The Continuous_cal system is working for the Cassegrain receivers (6, 5, and 1.3 cm) and from session 2/2019 is available also for primary focus receivers, 3.6 and 18/21 cm.

3 Geodetic VLBI Observations

In 2023 and 2024 Medicina participated in 43 routine geodetic sessions, respectively 29 and 14: 18 IVS-R1, 14 IVS-R4, 2 IVS-T2P, 1 IVS-CRF, and 8 R&D experiments.