Noto Station Status Report

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Abstract General information about the Noto VLBI Station and the 32-m telescope is provided. The focus is on the current status and on hardware—software upgrades during the last two years of operations.

1 General Information

The 32-m parabolic antenna is located near Noto in Sicily and is operated by the Institute of Radioastronomy of the National Institute for Astrophysics (INAF). The telescope has been active since 1989 in VLBI observations and has regularly participated in geodetic observations, even during the COVID-19 pandemic. In the past, the antenna was also involved in many different projects of radio science and Space VLBI. Currently, the telescope's core commitments are mainly related to both the EVN and IVS networks.

A permanent GNSS station (NOT1) was installed nearby and is part of the IGS network. The observatory is therefore a co-location geodetic site, contributing to the realization of the ITRF.

2 Current Status and Activities

- **Station** – INAF has succeeded in a call for funding under the framework the PNRR (EU fundings). As part of the PNRR, Noto has gone through several major maintenance updates in the last few years. The azimuth rail (including the wheels and bearing), the elevation rack, and the secondary mirror have been replaced. Also the telescope structure coating and the primary mirror painting will be completely refurbished. The work is expected to be completed in 2025, so the antenna will not be operational until then.
- **Antenna** – The 32-m antenna is fully steerable in azimuth, is elevation steerable, and is equipped with an active surface, allowing it to correct gravitational deformations of the primary mirror. The configuration of primary or secondary focus is done automatically by a servo system that moves the secondary mirror and the primary focus receiver box. The servo system, together with several mechanical parts of the actuators, has been replaced and refurbished recently. A new H-maser is being purchased.
- **Receivers** – The primary focus receiver is an L- (1.316–1.745 GHz), S- (2.213–2.389 GHz), and X-band (8.205 – 8.938 GHz) system. Available secondary focus receivers are lower C- (4.62–5.02 GHz), which is under renovation, upper C- (5.1–7.25 GHz), and K-band (21.7–22.2 GHz). All receivers provide double, circular polarization, but only lower C- and K-band are cryogenics systems. Presently upper C- and K-band each have a failure in one of their IF chains (LNA). A simultaneous three-band (K,Q,W) receiver (18–26 GHz, 34–50 GHz, and 80–115 GHz) is now available and has been installed in the secondary focus cabin. The receiver was funded by the National Operational Program (PON) by the Italian Research Ministry. It can output wide IF bandwidths (K-band: 8 GHz, Q-band: 16 GHz, and W-band: 16 + 16 GHz). The final installation and commissioning of the receiver will be done in 2025, after the refurbishment of

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Fig. 1 The Noto antenna in a recent image.

the secondary focus cabin, but the new helium line is completed. 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 backend** – Noto is currently running with a DBBC2 backend using DDC V108 and PFB V16 firmwares and FiLa10g with firmware version 4.1. The recorder is a Flexbuff with 576 TB of storage capacity, and 360 TB are available on a spare Flexbuff unit. Both recorders use jive5ab software version 3.1.0. A new DBBC3 backend with six IFs has been purchased and tested, but it has not been commissioned yet. Field System version 10.1.0 is running.

3 Geodetic VLBI Observations

Noto participated in 31 (13 in 2023 and 18 in 2024) geodetic sessions: 13 IVS-R1, 11 IVS-R4, four IVS-CRF, and three IVS-T2P sessions.