SRT station report

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This report covers the period between December ‘23 - June ‘24

Antenna

SRT was offered in shared-risk mode during INAF semester 2024A (1st January - 30th June 2024) and it has been offered for INAF semester 2024B (1st July - 31st December).
The commissioning of the radio telescope started in September 2023 and it is still ongoing. According to the official guidelines that were drawn up, concerning commissioning of the new receivers, **Sr is operational with the new receiver at C-band (4.2 GHz - 5.6 GHz) since November 2023 and with the previous receiver at K-band since February 2024**. Regarding the other receivers previously available at Sr, **the M-band is operative again since June 2024**, while the P- and L- receivers are planned to be operational by the end of 2024. By the end of 2024, we also plan to start the scientific validation of the triple-band receiver in VLBI mode. New updates to the schedule will be presented in the next TOG reports.

Receivers

C-, M- and K- band receivers are all available, while the **P- and L- receivers cannot be considered operational till December 2024**. The hardware required to implement continuous calibration (80Hz) is installed at L-, M-, K-, and C-band. However, more tests are necessary to confirm the regular use of it during the next EVN sessions. We remind you that we already used the continuous calibration regularly at M-band, L-band, and K-band from session 01/2021 until the suspension of the observations in July 2021.

We remind that the Sardinia Radio Telescope was awarded of one of the grants announced by the Italian Ministry of Education, Universities and Research (MIUR) aimed to enhance research infrastructures, pursuant to Action II.1 of the National Operative Programme (PON)– Research and Innovation 2014-2020. Thanks to this grant Sr has been equipped with new high-frequency receivers and backends. The new installed receivers are a simultaneous microwave compact triple-band receiving system **(K/Q/W)**, a multi-beam cryogenic receiver in **W Band (70 – 116 GHz)**, a multi-beam cryogenic receiver in **Q Band (33 – 50 GHz)**, and a **millimeter camera (80 – 116 GHz)**. In addition, a metrology system has been installed to allow high efficiency performances at the highest operating frequencies.
The other receiver under construction is the dual pol, 5 feeds, S band receiver.

After the NME N24C2 and the experiments session at C-band of session 02/2024, we noticed a 10 dB difference between the LCP and RCP signals. This was due to a malfunction of one of the

downconversion boards (that one for the LCP signal), which might also be responsible for the absence of fringes in all the scans but one during the NME. We are planning to substitute it with a new one coming from Bologna on the 18th June 2024, unfortunately not on time to participate in the e-VLBI run on 18th-19th June 2024.

We had some problems with one of the four ADB2 boards of the DBBC2 (named D) after the resumption of activities. After several attempts, we decided to solve the problem by using 3 ADB2 (A, B, C) and 4 cores, so we started to use a **hybrid DBBC2 version** starting from the EVN session 01/2024. The changes showed a good improvement, especially during the EVN sessions 02/2024 when the backend was properly installed back in the rack. Indeed, during the EVN session 01/2024 we registered extremely high Tsys in BBCs 1-4 (RCP) and 9-16 (LCP).

The **DBBC3** was delivered at Sr at the beginning of October 2021 and **currently is being configured** to make the first tests by June 2024, as required by the commissioning plan of the TOG. Nevertheless, we plan to get it operational as soon as possible in order to substitute the DBBC2, which is starting to show some aging problems that at the moment are not preventing the participation of the antenna to the network.

VLBI sessions

Sr took part in all the experiments at **C-band** and partially in those at **K-band of the EVN session 01/2024**. Due to a problem with the subreflector three experiments at K-band, including the NME, were canceled. Sr also participated in the EVN session 02/2024 at C- and K-band.
Sr did participate in the **e-VLBI sessions on 16th-17th January 2024 (C-band), 6th-7th February 2024 (C-band), 19th-20th March 2024 (C-band)**. However, due to some planned maintenance the antenna could not participate in the e-VLBI session on 14th-15th May 2024 (C-band) and it will not participate in the e-VLBI session on 18th-19th June 2024 (C-band) for the aforementioned planned works on the receiver.

VLBI terminal and Field System

Firmware and softwares:
Field System: 10.1.1 at 64 bit
DBBC: DDC (v108), PFB (16)
Fila10G: v4.1_231118
Jive5ab: 3.1.0
Antabfs: antabfs.py

Fiber link

The 10 Gbps fiber link works perfectly.
The GARR Consortium is going to upgrade the SRT uplink from 10Gbps to 100Gbps. The project is financed by the Italian Governance (https://www.terabit-project.it/). We will have more news in a few months.