

Effelsberg Station Report

General Status

The regular summer maintenance was performed in July/August this year. Some new cables have been installed and the usual anti-corrosion measures were done. The new cables are optical fibres that are needed for the new backend infrastructure which aims to digitize all receiver signals at the frontend part. Another larger project to upgrade the main axis control systems and engines in azimuth and elevation has started. The contract with a company specialized on radio telescopes has been signed and the detailed design study has started. The actual change of the hardware requires an observational stop of several weeks and is currently foreseen for summer 2024. We will try to minimize the downtimes during the regular EVN sessions and the planned eVLBI dates.

Past Sessions

Since the last report Effelsberg has participated in all observations of EVN Session 2 and Session 3, 2023. Effelsberg has also participated in all of the e-EVN sessions and out-of-session observations. Most of the observations were successful. In October 2023 a few have suffered from high wind and EF030C could not be observed because of strong wind. The classical 3.6cm X-band receiver broke shortly before the session start. All 8 GHz observations were observed with the C/X wide band receiver (4-9.3 GHz), which is usually no problem. However, the receiver provides only linear polarization and one observation recorded RCP only, where Effelsberg could provide only one linear polarization. Correlation will show how successful this was.

Effelsberg lost the fibre connection to JIVE shortly before the eVLBI in December 2023. The reason is still unknown. As a short term solution the eVLBI observation was recorded at Effelsberg, JIVE recorded all other stations during the observation, and correlation will be done later. The eVLBI connection was back two days later, also for unknown reasons. Investigations are on going.

Current Equipment Status

Effelsberg uses the DBBC2, Fila10G and a Mark6 recorder for all EVN, global, GMVA, and geodetic VLBI observations. Most of the recorded data is e-transferred to the correlators in JIVE and Bonn. In addition there are two NRAO RDBEs connected to one of the Mark6 recorders that are used for observations with the VLBA and HSA.

During the last month the Field System PC has been upgraded to a more modern operating system and installed with the newest Field System 10.1.0 that allows to program and control the DBBC3. The two Mark6 recorders currently provide about 390 TB of disk space and are mounted as Flexbuff mount points. One slot is currently kept for modules that can be shipped. This is required because data from VLBA+Eb and HSA observations that are being correlated in Socorro are still being shipped.

The Effelsberg Flexbuff storage at JIVE has about 509 TB.

Technical Developments

Effelsberg has started to use the DBBC3 for test observations. A new Field System has been installed that supports DBBC3 operation and a first fringe test during the C-band NME in February 2022 was successful. The full integration is still to be done.

At the same time the project to digitize the direct RF signals of most receivers at the Effelsberg is continued. Until now the general GPU backend can perform polarimetric, spectroscopy, and pulsar measurements. A digital down conversion software for VLBI is in development. As soon as this is realized there will be test to use the general backend for VLBI as well. Currently available receivers

are for L-band and S-band observations, the wide-band 4-9 GHz, and an ultra wide band receiver from 1.4 to 6 GHz.

First tests with the BRAND receiver at the antenna are in preparation. There are still a few technical points that need to be solved, but a test in 2024 might be possible.