

## Effelsberg Station Report

### General Status

Effelsberg has participated in all three EVN sessions since the last report, namely Session 3 2014, Session 1 2015 and Session 2 2015. Most of the observations were successful. The few losses were usually due to bad weather, i.e. strong wind, snow or thunderstorms. Only the Q-band receiver was broken in 2014 and therefore no fringes were found. The receiver was repaired early 2015 and Effelsberg had good fringes in Session 2 2015. The first amplifier of the LCP channel is still broken and cannot be repaired. Nevertheless, also the broken LCP channel produced fringes, but at a lower SNR than RCP.

### Receivers

Developments for a new Q-band receiver are ongoing and the installation is planned for early 2016. The new K-band receiver is now used for VLBI observations with RadioAstron and for future EVN sessions. A new C/X receiver was installed recently in the secondary focus cabin which provides a continuous band width between 4 GHz to 8 GHz or 5.3 GHz to 9.3 GHz, depending on the configuration. The receiver has two linear polarizations and will be primarily used for a continuum and spectral line survey of the Galactic plane. If it is also suitable for VLBI observations will depend on the future capabilities to convert the linear into circular polarization.

### New Hardware and Software

A Mark6 recorder was installed in the middle of May 2015. It will be mainly used as a raid with fixed disk modules that stay at Effelsberg and that are not being shipped. The Mark6 was installed and tested following the documentation that is provided on the Haystacks Mark6 web page using the dplane and cplane software. Later jive5ab was used to start and stop recordings from the Field System (see TOG Wiki pages for more details).

The data for the Mark6 is coming from a Fila10G SA that is connected to the DBBC. The Fila10G has an internal GPS receiver that is connected to an antenna on the roof of the observatory. The GPS time is used to sync the Fila10G.

Just before Session 2 2015 new releases of DBBC and Fila10G firmware were tested and installed. This was driven by the use of VDIF formatted data on the new recording systems Mark6 and FlexBuff at several stations. A preliminary version of the next Field System release, FS-9.11.8, already supports the new firmwares and the features that they provide.

The new software (FS-9.11.8) and firmware (DBBC DDC V105, Fila10G v3.3.2\_1) was used at Effelsberg to record the whole session in parallel on two recorders. The DBBC was connected to the Fila10G that sends a copy of the incoming VSI data to the Mark5B+ recorder and a VDIF data stream via Ethernet to the Mark6 recorder. The Fila10G was synced to the GPS at the beginning of the session and, as long as no new firmware was loaded to the DBBC, it stayed in sync for two weeks. Only the V105E firmware testing and change for EO013 required the Fila10G to be synced again.

To set up the Fila10G from the Field System all schedules were drudged using the DBBC/Fila10G combination as a backend. The Mark5B+ was chosen as the standard recorder and was commanded directly from the Field System.

A script from Simon Casey was used to insert commands for the FlexBuff/Mark6 into the prc- and snp-files after DRUDG to configure, start and stop recordings on the Mark6.

Beside some hick-ups due to tests of scan\_check? on the Mark6 in N15C2 no recordings were lost and the whole session of about 100 TB of data was recorded on both the Mark5B+ and the Mark6. Mark6 VDIF data from N15X1 has been e-transferred to JIVE for a full correlation.

The RDBEs PFB, DDC and synthesizer firmware was upgraded. The new releases resolve some internal timing issues and allow an easier and faster setting of the ADC power level. The Effelsberg RDBE Field System station code was modified accordingly and the 3mm GVMA session was successfully observed with the new firmware.

## **Future Plans**

Following the successful tests with the Mark6 as a FlexBuff, we plan to buy a raid for JIVE to allow the e-transfer of the Mark6 data for a whole session and stop disk shipping. Depending on the financial situation this should happen in Autumn 2015 or early 2016. For August this year, the installation of a DBBC3 is planned. It will be capable to process a full 4 GHz wide IF in dual polarization to be recorded on one or two Mark6 recorders at a rate of 16 Gbps each.