

OAN - Yebes station report: 06/2015 → 02/2016

VLBI Equipment

Currently there are **2 Mark5B+** and **1 Mark5C** on loan from JIVE to be returned soon. There are also **2 DBBC2** units with 4 IFs, 4 ADB2 and 4 CORE2s each. Both DBBCs are equipped with an internal Fila10G unit.

One Mark5B+ and DBBC#2 are used for operations with the 40 m, and the other Mark5B+ and DBBC#3 is used with the 13.2 m geodetic antenna. One Mark5B+ and DBBC#1 are in Santa María, in the Azores islands.

Both Mark5B+ units can be transformed into Mark5C if required. We have all the hardware for this operation.

The Mark5C is regularly used for transferring geodetic, astronomy and radioastron experiments to the correlators. Radioastron experiments are extracted using fuseMk5 and sent to a local server where they are grabbed from the correlator. Geodetic experiments are retrieved using fuseMk5 and tsunamid.

All Mark5B+ and the Mark5C are running Debian Wheezy (7.8) and SDK 9.4. All observations are performed with jive5ab 2.7.0 version. Disk conditioning and scan copying are also managed with tools provided with jive5ab since may 2014.

The old **Harrobox** has been upgraded and is running now Debian Jessie (8.2). It will be used as a proxy between the FS and the DBBC allowing the JIVE correlator to control the flow of data from the Fila10G when doing eVLBI from the DBBC. This host is in the public LAN but allows connections from the private LAN. See Figure 1.

Two Mark6s have been acquired: one will be used for geodetic VLBI with the 13.2m antenna and the second one may be used either for geodetic observations or for astronomy observations. 12 packs 32 TB each are available, mostly for geodetic observations. Only one Mark6 has been installed at the telescope.

Two Flexbuffs have also been acquired. Each flexbuff has a storage capacity of 144 TB. One will be shipped to JIVE and the other one has already been installed in the backends room. It is running Debian Jessie and at the moment of this report the software installation has not been completed yet.

Field System

We are running two computers with Field System version 9.11.8 on Debian Squeeze hosts. One FS manages DBBC#2 and the 40m antenna and the other DBBC#3 and the 13.2 m antenna.

The connection method between the FS and the control computer of both the 40 m and the 13.2 m radiotelescopes is done via sockets and has been

designed to allow the control of a twin telescope from a single Field System computer. The system works reliably since 9 months ago.

We have also modified our station code to be able to run a time counter for the cable measurement using an Ethernet to GPIB converter.

VLBI EVN observations

We regularly run several VLBI programs at Yebes: EVN, IVS (geodetic observations), GMVA (Global millimeter VLBI) and Radioastron observations. Since June 2011 the telescope is managed by operators during 80% of the time. The rest of the time operations are done in an unattended and automatic way.

EVN session 2015-3:

Observations: 14 (2 at X band and 12 at C and M band)

C band observations: no known problems

X band observations: no known problems.

Continuous calibration mode (80 Hz applied to a noise diode) in C and X band. See next item.

Out of session:

Taken part in FR024, FR026, FR027, FR028 and FR029.

Taken part in 1 OoS and 1 eVLBI observations.

Continuous calibration

The system was tested and works correctly. The 80 Hz signal from the DBBC is sent to the calibration diode in each receiver. The on-off diode behavior is reverted with respect to the reference signal and the DBBC gives negative Tsys. FS version 9.11.8 allows to choose the correct polarity.

We have also made some modifications in the preob procedure to guarantee that the FS knows when to use continuous calibration or traditional calibration. This is achieved by triggering an external Python script that looks into the procedure and finds out if cont_cal is on or off.

Disk purchases

In April 2015 Yebes purchases 1 diskpack and populated it with 32 Tb disk. In August 2015 two more diskpacks 32 Tb each were populated. A total of 96 TB have been purchased this year.

Spares

The VLBA terminal was dismantled by the end of 2014. We sent the old VSI

formatter to Haystack. 14 BBCs are available. 3 of them are faulty.

Gigabit connection

Yebes is connected to Rediris, the spanish NREN using a 10 Gb/s dark fiber since May 2012.

40m radiotelescope

Two new 22 GHz and 45 GHz receivers have been installed at the receiver cabin of the 40m radiotelescope. The receiver temperature of the 22 GHz receiver is ~ 30 K and that for the 45 GHz is ~ 40 K. The best T_{sys} achieved at 45 GHz is ~ 85 K.

Both receivers can observe simultaneously. The installation was part of an agreement between the KVN and Yebes. The 22 and 45 GHz receivers have been developed at Yebes Observatory. The 45 GHz receiver is equipped with amplifiers designed and built at Yebes. The receivers are mounted on a tilted table in a Nasmyth focus of the antenna. The table, a hot load and two reflecting mirrors plus a dichroic mirror were built and delivered by the KVN. The installation was done in December 2014 and January 2015. Observation tests were performed in January 2015 and the pointing difference between both frequency bands was found to be below 4 arcsecs. For the whole elevation range.

KVN observations

We have taken part in a VLBI observations with the KVN and VERA at 22 and 45 GHz with both polarizations and simultaneously. We used firmware v105E, 32 MHz / channel and USB and LSB at both frequencies.

No results are available yet.

13m radiotelescope

The 13.2m radiotelescope is regularly used, once per week in IVS observations. SEFD at X and S band is approximately 1200 Jy. The telescope has been used in FAST observations (higher bandwidth and shorter scans ~ 20 seconds)

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