

OAN - Yebes station report: 10/2014 → 06/2015

VLBI Equipment

Currently there are 2 Mark5B+ and 1 Mark5C on loan from JIVE. 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+ + DBBC#2 is used for operations with the 40 m, and the other Mark5B+ + DBBC#3 is used with the 13.2 m geodetic antenna. One Mark5B+ + DBBC#1 has been sent to 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.

SDK 9.2 is installed in all Mark5B+s and in the Mark5C on loan. All observations are performed with jive5ab (latest stable version). Disk conditioning and scan copying are also managed with tools provided with jive5ab since may 2014.

We plan to buy two Flexbuffs (144 TB each) and one Mark6 by the end of 2015. A DBBC3 will also be ordered by that time.

Field System

We are running two computers with Field System version 9.11.7 and 9.11.8 beta version on Debian Squeeze hosts. The FS computer with the newest version runs DBBC#2 and the 40m antenna. The other computer, with FS version 9.11.7 manages the 13.2 m antenna and DBBC #3.

We have modified the connection method between the FS and the control computer of both the 40 m and the 13.2 m radiotelescopes. The connection is now done via sockets and has been designed to allow the control of a twin telescope from a single Field System computer. This modification has allowed to completely decouple both systems. The system works reliably since 3 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 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 2014-3:

Observations: 21 (4 at M band, 10 at C band, 5 at X band, 2 at Q band)

The Q band receiver has an offset of 0.29 Hz, discovered by the correlator.

X band: Wrong patching in LCP first scans of ER030G

EVN session 2015-1:

Observations: 17 (9 at C band and 16 at M band)

Taken part in FR022: 2 Gbps operations with v105E DDC firmware at C band

C band: LO failure during N15C1. The LO was replaced. EG085 affected by a problem with the cryostat.

EVN session 2015-2:

Observations: 21 (3 at X band, 9 at Q band, 10 at C band)

Issues with Mark5B and a 32 TB disk. Commented checkmk5 to avoid time syncs since EH030A

The Q band receiver has an offset of 0.29 Hz, discovered by the correlator. We plan to replace the LO by a new one this summer. Wrong patching in some experiments. Corrected at all of them except GA032C and EL050C first 5 scans.

The C band receiver has given some problems. The cryostat seems to be unstable. Lack of fringes in the first scans of the NME due to an unknown reason. Tsys was also unstable: changed from 42 to 21 K (diode attenuation issue?). The cryostat stopped working. Affected partially EM115A & EB056.

X band observations: no known problems.

We have implemented the continuous calibration mode (80 Hz applied to a noise diode) in C and X band. See next item.

Out of session:

Taken part in FR020 & FR021: 2 Gbps operations with v105E DDC firmware at C band

Taken part in 4 OoS 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 behaviour is

reverted with respect to the reference signal and the DBBC gives negative Tsys. We have corrected this problem patching the FS (clib/tpi_dbbc.c). The continuous cal is also available at 22 GHz but it has not been tested since no observation at this frequency was scheduled for this session.

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 December 2014 Yebes purchased 4 diskpacs and populated them with 16 Tb disks each.

In April 2015 Yebes purchases 1 diskpack and populated it with 32 Tb disk. We plan to populate 3 more diskpacs with 32 Tb each in the next months.

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 Tsys 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 two VLBI observations with the KVN at 22 and 45 GHz with both polarizations and simultaneously. We used firmware v105E, 32 MHz / channel and USB and LSB at both frequencies. Fringes were found at all channels (both frequencies, USB/LSB and RCP & LCP) but we discovered that the channel mapping done by sched is incorrect. Some channels had to be reassigned by hand. New observations have been performed on June 12th and June 18th. 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. For the first time fringes at 30 GHz were achieved with Wetzell, Badary and Zelenchukskaya.

We have also observed together with Robledo but no results are known yet.

Pablo de Vicente