# Bonn DiFX correlator report June 2012

### **DiFX** Correlator status and operations

In Bonn all VLBI observations are now processed using the **DiFX software correlator**.

The DiFX releases being used presently are 2.1 from May 2012 for production correlation and the development version "trunk".

A modification of DiFX which will allow to correlate Radioastron data has been mostly finished. Fringes were found and the residuals compared to the Russian correlator with good agreement. (see plots below)

Quick summary:

- 14 Mark 5s can be used for playback from disk modules. In addition data can be played back from presently 5 big RAID systems (~100 TB). In theory this setup allows correlation of significantly more than 20 stations in parallel. The maximum correlated so far was a geodetic observation with 20 stations and an astronomical observation with 14 antennas.
- All Mark 5s can playback all flavours of Mark 5 data (A/B/C).
- All Mark 5 systems have been upgraded to SDK 9 and some to SDK 9.1 which allows the usage of bigger disks. SDK9.1 for the field is available from Haystack but depends on upgrades at JIVE which have to be done first.
- An Infiniband 20 Gb/s connection between the Mark 5s and the cluster has been installed. Maximum data rates of about 1.5 Mb/s have been observed (This is a limit of the Streamstor RAID card into the host computer). The stability of the correlation process has been increased significantly by this.
- Data is archived on the new MPIfR archive server in raw format, FITS, and MK IV (if desired). FITS (default) or MK IV formatted data is made available to the PIs. (HOPS software for handling MK IV format can now be installed "at home".)
- The new database for storing experiment and module information is operational. It might be extended to worldwide tracking of modules.

### Capabilities

The **Bonn DiFX implementation** is significantly more powerful and flexible than the previous MK IV hardware correlator. The capabilities of the DiFX software correlator can be found at <u>http://www.mpifrbonn.mpg.de/div/vlbicor/correlator e.html</u>

### Operations

Correlation is much faster with the DiFX correlator compared to the MK IV so that student shifts on weekends and in the night will be stopped this summer. Disk turnaround is typically between two sessions.

Astronomical EVN observations waiting for correlation are:

June 2011

• ER027 - correlated (200 phase centres, about 7.5 TB of output data), waiting for PI feedback Feb/Mar2012

• EY013D - correlating

and Radioastron observations:

• EG060A, EG060B, EK032A, EK032B, EK032C

The data of the Radioastron observations were copied at Bonn to 3TB USB disks by a Russian colleague sent from Moscow for 2 weeks. A single Mark 5 unit was used in the process.

The above Radioastron observations will be correlated also at Bonn with the DiFX correlator.

## Disks

MPIfR bought disks for 7000  $\in$  ( $\triangleq$  32 TB) in 2011 as agreed by the CBD in 2011.



Lower two plots show analysis of Radioastron data in AIPS. Left: Delay, right cross spectrum with phase(top, blue) and amplitude (bottom, green).