Noto Station Status Report

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Abstract

This brief report summarizes the main activities of the Observatory of Noto in 2009.

1. Antenna, Receivers and Microwave Technology

In the second half of the year, the antenna driving system was damaged, and the operations were stopped for about three months. The motor drivers and encoders were replaced, and normal observing resumed. This problem had appeared at other times, and the cause could possibly be related to the ground potential level between the antenna area and the drive cabinet. Further analysis is necessary, and a specialized electrical company will be contacted as soon as dedicated funds become available.

The 86 GHz receiver was repaired at MPI in Bonn, and now some modifications to the mechanical structure are going ahead. The receiver will be tested in the antenna during the first months of 2010.

2. Acquisition Terminal

A complete DBBC system that will be used with an additional Mark 5C/B+ in both modes is available. Regular observations will be performed in 2010 in parallel with the analog terminal in order to have a soft migration between the two systems. As soon as the digital terminal becomes fully operational, the Mark 5A will be converted to a Mark 5B, and a second DBBC will be installed at the station.

The Mark 5C is supported in the DBBC by the Fila10G interface and the Glapper board that converts the stream coming in optical fiber from the Fila10G in the copper CX4. Figure 1 shows an image of the Fila10G; Figure 2 shows the Glapper board; and Figure 3 shows the new Mark 5C at Noto.

3. DBBC Status Report

The DBBC hardware stack can handle the Tunable and Multi-Equi-Spaced Channel configurations because of its programmability and its flexibility in the number of elements it can adopt. Two types of sampler boards are available with a total bandwidth of 512 or 1024 MHz, and they can be selected in a maximum number of four aggregate IFs for a group of processing boards. A single Core2 processing board is able to produce either four tunable BBCs or fifteen equi-spaced 16 MHz channels.

Two operation modes are possible at present:

The Digital-Down-Converter configuration generates 16 x 1-16 MHz wide tunable bands. The implementation emulates an analog VLBI down-converter system, with independent channels in bandwidth and tuning base. Each Core2 board is able to produce four BBCs.

The Multichannel Equi-spaced configuration generates 16 x 32 MHz wide bands. The implementation is realized by adopting the intrinsic capability of a highly efficient DFT processor to

down-convert in base band contiguous slices of band. The single DFT operation presents poor frequency rejection between adjacent channels, so a preliminary filter is adopted to greatly improve the separation performance.

A continuous program is underway to develop possible upgrades. This mainly involves:

- 10G connections with the FILA10G and Glapper boards;
- A 2 GHz bandwidth sampler with the ADB3 aggregate module;
- Digital pre-processing and very high performance capabilities with the Core3 board;
- Development of the DBBC2010, a DBBC version designed to fulfill the VLBI2010 demand for a backend in terms of number of IFs and observational capability.

The spin-off company HAT-Lab has been fully operational since September 2009, and several systems are under construction. The time frame for the delivery of the first batch of seven units is February/March 2010. A second batch will be started in April. The collaboration between HAT-Lab, IRA and MPI for realizing the DBBC is ongoing.

4. Geodetic Observations in 2009

During 2009, the Noto station participated in six geodetic experiments: EURO97, T2060, EURO98, T2062, IYA09, and EURO102.

Figure 1. Fila10G interface

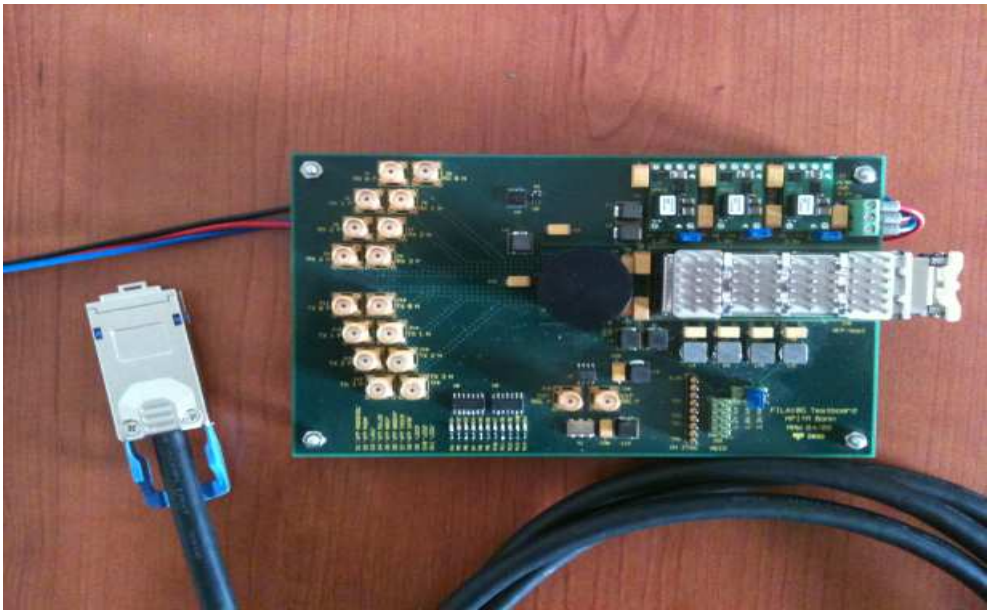

Figure 2. Glapper board

Figure 3. Mark 5C