EUROPEAN VLBI NETWORK – TECHNICAL & OPERATIONS GROUP

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Report on VLBI Operations for Jodrell Bank Observatory

This report covers the period from November 2007 to September 2008 and includes the VLBI observing sessions carried out in February 2008 and May 2008.

2. February 2008 Session

This session comprised 9 experiments at 18cm, 4 at 1.3cm, 6 at 6cm, and 6 at 5cm. At 6cm, the Lovell telescope was scheduled for 12 hours and only 0.01% data loss at the telescope was reported. The Mk2 was scheduled for 14 hours and Cambridge for 19 hours at 6cm, with no data loss reported. At L-band, the Lovell telescope was scheduled for 97 hours and reported 0.22% data loss whilst Cambridge was scheduled for 65 hours and reported 0.1% data loss. At 6cm and 18cm, data loss was caused by sporadic elevation encoder faults on both the Lovell and Cambridge. At 5cm, both the Mk2 and Cambridge were scheduled for 80.5 hours. Cambridge suffered 0.04% data loss, again due to an elevation encoder fault. The most substantial data loss occurred for the Mk2 (experiment eh020) since the primary LO was incorrectly set. The problem was not spotted during the fringe test experiment since the results of the correlation from JIVE were delayed by 24 hours. The problem did not affect the Cambridge data for the same experiment since the secondary LO accounted for the frequency offset. The data loss for eh020 was 9.25 hours. At 6cm, 1 of the 4 experiments (12 hours, ek025) were joint MERLIN observations which involved both the Lovell and Cambridge telescopes. Two of the 18cm experiments (es057a and em063) and 6 of the 5cm experiments were joint MERLIN observations. In conclusion, a total of 368 hours of observations were performed, with a data loss at the telescope of only 9 hours 34 minutes (2.6%), i.e. a success rate of 97.4%.

3. May 2008 Session

The May 2008 VLBI session comprised 4 experiments at 1.3cm, 12 at 18cm, 6 at 6cm and 7 at 5cm. Six of the 18cm experiments and two of the 6cm experiments were joint MERLIN observations. At 1.3cm, the Mk2 and Cambridge telescopes were each scheduled for 34 hours of observations. 1.5% of time was lost for Cambridge due to recorder problems. At 18cm, the Lovell telescope was scheduled for 90 hours of observations and lost less than 1% of time, whilst Cambridge was scheduled for 64 hours of observations and lost 5.5% of time, both because of recorder problems. One joint MERLIN experiment, ea038 lasting 10 hours, used the Mk2 telescope instead of the Lovell and in addition used MERLIN antennas Darnhall, Knockin and Defford, each for 10 hours. Data from the for MERLIN outstations was successfully recorded on a single disk pack. There was no apparent data loss during this experiment. At 6cm, the Lovell telescope was scheduled for 34.5 hours of observations, the Mk2 telescope for 14 hours and the Cambridge telescope for 18 hours. There was no data loss for the Lovell or Mk2 but an entire Cambridge data set was lost (6 hours for joint MERLIN experiment ep061h) due to MERLIN setting an incorrect synthesiser value. Finally, at 5cm, the Mk2 and Cambridge telescopes were each scheduled for 70 hours of observations. Cambridge reported 2.5% data loss due to recorder problems. In conclusion, a total of 468.5 hours of telescope time was scheduled, with a data loss at the telescope of 12.5 hours (2.7%), i.e. a success rate of 97.3%.

4. Technical Developments

Both our FS PC's have now been upgraded to 'FS Linux 6', based on Debian Sarge, giving access to newer system tools. Extensive changes to the local FS software now enables more than one antenna to be controlled from the FS, thus allowing multi-telescope recording. The Mark5 machines have also had an OS upgrade, also to Debian Sarg but will remain at Mark5a specification. An upgrade of one recorder to Mark5b specification will probably take place over the summer. An I/O board in one of the Mark5 recorders was replaced and appears to have rectified recent 'throttling' problems with that recorder. During the February/March 2008 observing session it was discovered that a relay enabling the calibration noise signal for the Lovell telescope was being used in the wrong position by the operators during joint MERLIN observations. This resulted in

meaningless TPI measurements during those joint experiments involving the Lovell telescope which will make proper calibration difficult. The problem has been rectified. Further investigations of the calibration scheme for the Cambridge antenna have been made and progress is being made. JBO telescopes took part briefly in tests with Effelsberg on 1st April 2008 and fringes were obtained at 512 and ~1Gbps. The RP009 eVLBI experiment in mid-April 2008 demonstrated the almost-routine nature of real-time experiments currently available. The system started up quickly and there are less problems now that JIVE has better re-starting algorithms. An image was produced within 48 hours. Monthly e-VLBI tests have also been going well. In February 2008 we tested the recording of three MERLIN telescopes on a single diskpack, as a preliminary test of procedures to obtain SKA beam-forming test datasets. The data were successfully correlated at MIT Haystack. A further set of observations will probably be undertaken during the summer. The Fabric/Expres 10Gbps hardware is currently being commissioned. Hardware has been bought for testing. The link currently goes to London but not yet to JIVE. One iBob has been briefly tested with the Fujitsu 10G net switch.

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