



European VLBI Network Newsletter

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1. Report from the Chairman of the Consortium Board of Directors (CBD)

Welcome to a new issue of the EVN Newsletter. These newsletters have appeared sporadically in the past and have always required a tremendous effort on the part of their previous editors. It is our plan to simplify the process and produce a short, electronically-based newsletter to be published prior to each VLBI proposal deadline. The aim of the newsletter is to inform EVN users and potential users of the capabilities of the array, to bring people up to date with recent and planned enhancements and to advertise the excellent science being performed with VLBI. Alastair Gunn from Jodrell Bank Observatory has agreed to act as editor for two years. It is our intention that the editor of the newsletter should change as the Chairman of the CBD rotates and should, where practical, be based at the same institute as the Chairman.

I took over as Chairman of the EVN CBD on July 1, 2001 and will hold the post until June 30, 2003. This period will be an exciting time for the EVN. The significant technological enhancements that have been worked on by many people over the past several years (e.g. MkIV upgrade, EVN correlator at JIVE) are now in place and we are beginning to see the first fruits of this work. There are still challenges facing us, most notably, that of routine, accurate and, from the users' point of view, automatic calibration. Tackling this will be a major part of the work of the EVN's Technical and Operations Group (TOG), currently chaired by Mike Garrett at JIVE.

There are other challenges ahead of us: the principal one, as I see it, is the need to broaden the user base for VLBI. At the recent EVN Directors' meeting at Jodrell Bank Observatory I put forward an outline plan to take this forward. More details will follow in the next newsletter as the plan is developed in more detail. In essence, what we have to do as a community is make every aspect of VLBI more accessible to the non-expert, from proposing to image generation. This will require resources but

these have to be found if VLBI is not to remain a niche area.

The CBD of the EVN meet twice a year. Our most recent meeting was at Jodrell Bank Observatory on November 22. A brief summary of the November meeting is:

1. We welcomed Hartebeesthoek RAO (South Africa) to the EVN as an associate member. George Nicolson (Director, HartRAO) attended the meeting. Users wishing to use HartRAO should add that telescope to the proposal form in the same way as for other telescopes. There is no need to send a special proposal to HartRAO.
2. Rolf Schwartz is stepping down after many years of superb service as the EVN scheduler. I would like to publicly thank Rolf for his tremendous efforts in a difficult job. Richard Porcas (MPIfR) will replace Rolf.
3. The EVN Correlator at JIVE is now working routinely for 16 stations. It is keeping up with the correlation load and observations from recent sessions are being correlated with no significant delay while at the same time new modes of operation are being brought online.
4. The MKIV correlator at MPIfR is also working well with significant hardware, correlator software and post-processing software improvements in recent months.
5. Tests of network performance by Mike Garrett have shown that the thermal noise level was reached at 6cm in a test observation. Similar tests are planned at 18cm. It is hoped that we are understanding some of the factors that limit users from reaching the thermal noise and can overcome them.
6. It was pointed out that amplitude calibration is still a problem in the EVN. Plans are in place to improve this and a workshop on the subject is planned for the next TOG meeting with financial support from RadioNet, the EC-funded Infrastructure Cooperation Network in Radio Astronomy.
7. Engineering work will result in the Lovell Telescope being unavailable from March-September 2002. Work will be performed in the vertex room of the Medicina antenna during the summer of 2002 but should not affect its availability.
8. Discussion on making available an archive of all EVN data (held at JIVE and MPIfR) took place. A working group, chaired by Tiziana Venturi, has been formed and will produce a report.
9. The next EVN Symposium will take place at MPIfR, Bonn from 25-28 June 2002. Please see the webpage at: <http://www.mpifr-bonn.mpg.de/div/vlbi/evn2002/index.html>

Finally, I would like to urge all users of the EVN to communicate their science results to Alastair Gunn (agg@jb.man.ac.uk) to make his job easier in editing this newsletter. It is my hope that we can make the capabilities and the achievements of the EVN more widely known in the near future.

Phil Diamond (pdiamond@jb.man.ac.uk)
Chairman, CBD of the EVN
Jodrell Bank

2. Call for Proposals - Deadline 1 February 2002

Observing proposals are invited for the EVN, a VLBI network of radio telescopes in Europe and Asia operated by an international Consortium of institutes. The

EVN is open to all astronomers, and encourages use of the Network by astronomers not specialised in the VLBI technique. The Joint Institute for VLBI in Europe (JIVE) (<http://www.jive.nl/>) can provide support and advice on project preparation, scheduling, correlation and analysis.

PIs can apply for time by completing a coversheet (www.evlbi.org/proposals/prop.html) and attaching a scientific justification (maximum 2 pages). The detailed call for proposals (www.jb.man.ac.uk/vlbi/EVN/evncall-long-jan2002.html) has further information on Global VLBI, EVN+MERLIN and guidelines for proposal submission. The EVN User Guide is available at www.evlbi.org/user_guide/user_guide.html, the EVN Status table (www.oso.chalmers.se/~vlbi/EVN/EVNstatus) gives current antenna capabilities and the on-line VLBI catalogue (www.ira.bo.cnr.it/~tventuri/cata.html) details sources observed by the EVN and Global VLBI.

EVN Observing Sessions in 2002

2002 Session 1 Feb 08 - Mar 01 18/21cm + MERLIN, 5cm, 3.6cm

2002 Session 2 May 24 - Jun 14 18/21cm, 6cm+MERLIN, + ...

2002 Session 3 Nov 08 - Nov 29 6cm, 18/21cm+MERLIN, 5cm +...

Proposals received by 1 February 2002 will be considered for scheduling in Session 2, 2002 or later. Finalisation of the planned observing wavelengths will depend on proposal pressure.

Special features for Sessions in 2002:

- The new VLBI terminal at Arecibo is installed and fringes have been found to VLBA antennas (see www.naic.edu/menuimag/astronomy.htm)
- GBT available - see full version of the call for proposals for further details
- 512 Mbps recording available at EVN antennas from session 2/2002
- The Shanghai and Urumqi telescopes are now fully operational for MkIV/VLBA recording
- A 5cm receiver is now available at Cambridge
- Hartebeesthoek (South Africa) is now an associate member of the EVN

3. European VLBI Network: Access with Full Financial Support

The EVN is an open facility in which observing time is obtained on the basis of the scientific merit of submitted observing proposals. The use of the Network by astronomers who are unfamiliar with VLBI is particularly encouraged. As part of the EVN's continuing programme to make VLBI a simple and transparent astrophysical tool we are pleased to announce that we have been successful in securing further support from the European Commission's Access to Research Infrastructures Programme (ARI, an action of the EC's Improving Human Potential Programme). The award is designed to facilitate the use of the EVN by users who are not affiliated to the EVN Consortium institutes. The new contract begins on 1 February 2002 and runs for 14 months.

EVN PIs affiliated to an institute located in the European Union or one of the

Associated States (Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia, Iceland, Liechtenstein, Norway, and Israel; Switzerland under negotiation) are eligible to apply for support. Such support is provided automatically for eligible PIs who obtain observing time on the EVN. Support for co-investigators associated with projects led by eligible PIs can also obtain support - including co-Is from non-EU institutes e.g. China, USA, Japan etc.

The support provided by this programme includes (i) full financial support for eligible users who wish to visit JIVE or any other EVN institute in order to schedule or process EVN, EVN+MERLIN or EVN+VLBA data, (ii) assistance from EVN Support Scientists (located at JIVE) at all stages associated with a VLBI experiment - from proposal writing to scheduling, calibration, and data analysis, (iii) absentee processing of the data at JIVE. To apply for time on the EVN please refer to the EVN Call for Proposals, a shortened version of which appears in this newsletter. Further information can also be obtained from the programme committee chairman, Simon Garrington (stg@jb.man.ac.uk). For more information on the EVN's EC ARI programme please contact Mike Garrett.

Mike Garrett (garrett@jive.nl)
JIVE

4. Technical Developments

For the last 6 months most efforts of the Technical Operations Group (TOG) have focussed on the introduction of two-head recording capability and improved reliability more generally.

Two-head operations are now possible at most EVN telescopes, increasing the maximum EVN data rate from 256 Mbits/sec to 512 Mbits/sec. The first successful 2-head tests were made in the last quarter of 2001 and involved the efforts of many individuals and organisations within the EVN and beyond. It is important to note that the **sustained** 512 Mbits/sec data rate is unique to the EVN - the duration of such high data rate experiments being dependent only on tape supply. In this regard the EVN increased its investment to the global tape pool by a further 150 thin tapes in October 2001, bringing our total contribution to ~850 thin tapes. Thin tape operations are now the default within the EVN - this is expected to improve recording performance - already much improved in the last few years. The new high data rate modes are expected to be deployed at high frequency and in other projects that require high sensitivity. The first 2-head user experiments are expected to be scheduled through this year. The increased data rates are particularly attractive to high frequency experiments and projects that require high sensitivity in general.

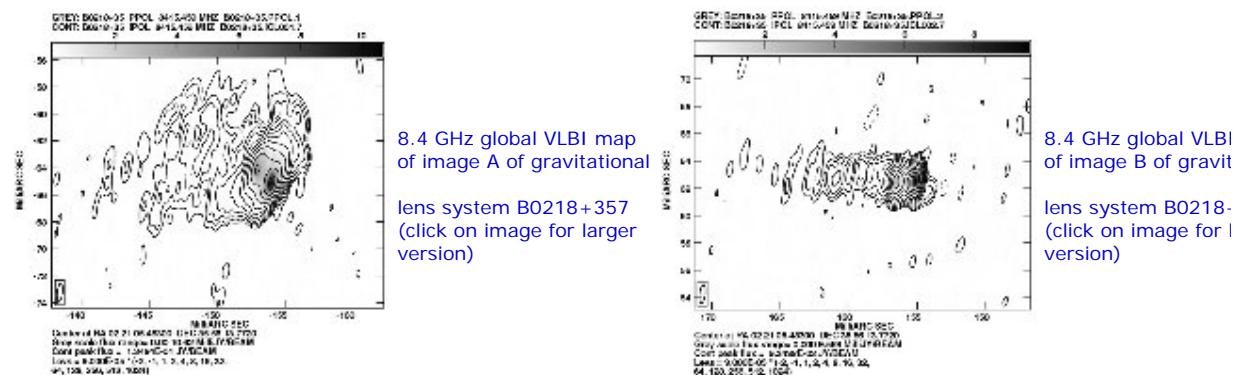
Over the last couple of years the EVN has seen a turn-around in our reliability record. Significant improvements included robust operations at Torun, Cambridge and Westerbork. In China the Shanghai telescope (now upgraded to MkIV) continues to perform with an excellent reliability record. In the last session we also saw good data from Urumqi (also MkIV) in all experiments it participated in. We expect to see both Chinese antennas feature more and more in observing proposals. In short, the indications with respect to reliability are all very positive.

In session 2, 2001 the EVN was also able to demonstrate its superb sensitivity - especially when observing extremely faint mJy and sub-mJy sources (i.e. those not limited by dynamic range effects). One of the network monitoring experiments (NME) was able to demonstrate a thermally limited 30 microJy rms noise level in just a few hours of observing time at 6cm - exactly what we expect from the big telescopes at the 256 Mbit/sec standard observing rate. We hope to investigate the performance at 18cm in session 1/2002 - in principle the collecting area is larger at this frequency but the effects of RFI are also known to be problematic. Observations of faint sources were also greatly improved by the introduction of new station positions for those EVN antennas that do not participate in geodetic observations. In particular, the work of Patrick Charlot (Bordeaux) and Bob Campbell (JIVE) should be acknowledged - some station positions were off by several meters. With the new positions (better than ~20cm) phase-referencing is now routinely possible at 6cm with the EVN. At the same time the TOG is looking towards the future - MkV is on the horizon and like many other VLBI organisations the EVN is contributing and supporting the project. We are also looking at our own PC based system that will be geared to operate with fibre connections (eVLBI).

Mike Garrett (garrett@jive.nl)
JIVE

5. Science Highlight - Global VLBI Observations of B0218+357

In recent weeks analysis of 8.4-GHz global data of the gravitational lens system JVAS B0218+357 has been virtually completed. The array included the 10 VLBA antennas, a 9-antenna phased-up sub-array of the VLA, six EVN antennas plus the DSN stations at Robledo and Goldstone. Uniformly-weighted maps of both the A and B images are shown in the accompanying figures, where contours signify total intensity and greyscales the polarized flux density. B0218+357 is arguably the best lens system to use in determining an accurate value of the Hubble constant using the time delay method. The time delay is well-determined and the lens and lensed object redshifts have been measured. The current error budget is dominated by the uncertainty in the mass distribution of the lensing galaxy and our VLBI observations were designed to reduce this uncertainty.



The project had several aims, one of which was to detect additional substructure in the lensed images. This has been extremely successful. Previously, the only substructures that had been reliably mapped were the two

bright core components, but we have now been able to map jet emission in both the A and B images. Seen most clearly in B, the jet includes a number of knots and in addition bends along its length. Image A by comparison looks rather different, but this is a consequence of the very large tangential stretching (a property of the lens) that greatly distorts this image. We now hope to build on this advance in our knowledge of the VLBI substructure in this system to constrain the lens model using a LensClean algorithm.

We were also hoping with these observations to detect the third image located close to the galaxy centre, but this has not been possible despite achieving an rms noise of 30 microJy/beam. However, this improved limit will enable us to place a tighter constraint on the core radius of the lensing galaxy. Finally, we have also detected polarization in the regions around the central core components, in line with previous observations.

This is an exciting time for those of us working on JVAS B0218+357 as we have recently had accepted a proposal to image the system using the new Advanced Camera for Surveys (ACS) on-board HST. This will give us the best chance yet of pinning down the centre of the lensing galaxy and, in conjunction with our high-resolution radio data, of further constraining the Hubble parameter.

Andy Biggs (JIVE)
Ian Browne (University of Manchester)
Neal Jackson (University of Manchester)
Shude Mao (University of Manchester)
Alok Patnaik (MPIfR)
Richard Porcas (MPIfR)
Peter Wilkinson (University of Manchester)
Olaf Wucknitz (University of Hamburg)

The European VLBI Network (EVN) website (<http://www.evlbi.org/>) is hosted by the Joint Institute for VLBI in Europe (<http://www.jive.nl/>).