European VLBI Network Newsletter
Number 12
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EVN Homepage Publications Meetings User Support Proposals JIVE Homepage Newsletter Archive

Contents

Announcements

1. Call for Proposals - Deadline 1 October 2005

Observing proposals are invited for the EVN, a VLBI network of radio telescopes spread throughout Europe and beyond, operated by an international Consortium of institutes (http://www.evlbi.org/). The EVN is open to all astronomers. Use of the Network by astronomers not specialised in the VLBI technique is encouraged.
The Joint Institute for VLBI in Europe (JIVE) can provide support and advice on project preparation, scheduling, correlation and analysis. See EVN User Support at http://www.jive.nl.

EVN Observing Sessions in 2006

2006 Session 1	Feb 16 - Mar 09	18/21cm, 6cm (+MERLIN), 5cm (+MERLIN), 3.6cm
2006 Session 2	Jun 01 - Jun 20	30cm, 18/21cm, 6cm, +...
2006 Session 3	Oct 19 - Nov 09	18/21cm, 6cm, +...

Proposals received by 1 October 2005 will be considered for scheduling in Session 1, 2006 or later. Finalisation of the planned observing wavelengths will depend on proposal pressure. Other wavelengths which may be scheduled in 2006 are: 90cm, 50cm, 1.3cm, 7mm.

Special features for Sessions in 2006
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* It is anticipated that MERLIN will be available in all sessions.

* Disk schedules (ignoring tape boundaries) now used for EVN-only projects.
* Recording at 1 Gb/s (Mark 5A) available for projects which need it (see http://www.mpifr-bonn.mpg.de/div/vlbicor/evn_tog/EVN_Mark_5_Status.html).
* 0.25s integrations available at EVN MkIV Data Processor at JIVE for wide-field applications.
* EVN Data Analysis pipeline in operation. See http://www.evlbi.org/pipeline/user_expts.html.

Large projects

Most proposals request 12-48hrs observing time. The EVN Program Committee (PC) also encourages larger projects (>48 hrs); these
will be subject to more detailed scrutiny, and the EVN PC may, in some cases, attach conditions on the release of the data.

How to submit

Complete a coversheet and attach a scientific justification (maximum 2 pages). Up to 2 additional pages with diagrams may be included; the
total, including cover sheet, should not exceed 6 pages.

Submit to: Dr. Richard Porcas, EVN Scheduler, MPIfR, Auf dem Huegel 69,
D 53121 BONN, GERMANY or by email to: proposevn@HP.mpifr-bonn.mpg.de.
For further details see http://www.evlbi.org/proposals/prop.html.

Additional information

The detailed "Call for Proposals" has further information on Global VLBI, EVN+MERLIN and guidelines for proposal submission: see http://www.obs.u-bordeaux1.fr/vlbi/EVN/call-long.html.

The EVN User Guide (http://www.evlbi.org/user_guide/user_guide.html) describes the network and provides general information on its capabilities.

The EVN Status Table (http://www.mpifr-bonn.mpg.de/EVN/EVNstatus.txt) gives current antenna capabilities.

The On-line VLBI catalogue (http://db.ira.cnr.it/evn//) lists sources observed by the EVN and Global VLBI.

2. Message from the Chairman

The last meeting of the EVN Directors was held at Hartebeestoek Radio Observatory on Justin Jonas invitation. The partecipants could appreciate the great hospitality of the people there. For most of us it was the first opportunity for a visit to HartRAO. At the same time that was the first chance for many of the observatory staff members to see the faces of people so deeply involved in the EVN activities.

The meeting was also the last one chaired by Willem Baan. As Vice-Chairman of Willem during his term, I would like to thank him on behalf of the Member of the EVN Board for the great job he has done. It was a period of huge changes for the EVN, changes

planned to mantain the observing facility at the state of the art and to make the VLBI observations more user friendly and realiable.

At the meeting in HartRAO, Raphael Baciller was appointed as Vice-Chairman of the EVN with unanimous vote of the Executive members. Raphael and myself are in charge since July 1st and soon we will start to work for the preparation of the next EVN Board meeting which will be hosted by the Max-Planck fuer Radioastronomie, Bonn, on kind invitation of Anton Zensus. The meeting is planned for November 29th in between the RadioNet meeting (November 28th) and the JIVE Board (November 30th).

As a final note, I would like to wish all the best for the future to all the people involved at various level in the EVN activities and to all users of this wonderful observing facility.

Franco Mantovani (EVN Chairman)

3. Report from the EVN TOG

The EVN TOG held a meeting on 1st July 2005 at Onsala Space Observatory, Sweden. Approximately 30 people attended the meeting. The minutes and various reports can be found under

http://www.mpifr-bonn.mpg.de/div/vlbicor/tog_chair/togreps05/togminutes.txt

and

http://www.mpifr-bonn.mpg.de/div/vlbicor/tog_chair/togreps05/index.html

The EVN is working towards full automation within 6 months of "near real-time" fringe checks for recording rates to 1Gbps. The availability of these procedures will allow fringe-finder samples from all observations to be evaluated, giving a nearly continuous monitor on EVN performance.

Following the firmware upgrade to the MkIV decoder, phase cal signals can be used to continuously monitor the LO chain. Scripts are being developed to perform this and other checks, giving a colour-coded performance monitor for station operators.

Network reliability continues to improve, particularly data loss due to human error has decreased. Amplitude calibration has also improved, however the goal of less than 10% scaling at all frequencies has not yet been achieved. More effort will e required, particularly at 22GHz.

Tests of phase-referencing at 22 GHz were successful. The results were summarised in a document by Brunthaler and Paragi available on the EVN webpages. It is expected that phase-referencing at 22 GHz will profit enormously from the ongoing efforts to develop techniques in the framwork of Radionet to measure tropospheric delay and opacity changes.

Due to slewing limitations the Lovell telescope cannot be used for phase-referencing observations at 5 GHz. Garrington and others are developing and testing a scheme using a combination of the Lovell and MK2 telescopes to overcome this limitation. It is expected the a simple observing recipe for the user will be offered in 2006

Automatic flagging works well at nearly all stations except for the Westerbork array, which cannot use standard schemes. At the TOG meeting a flagging scheme for Westerbork was discussed and will probably be implemented soon.

The Mark 5B system is in its final stages of debugging (see report by Alan Whitey). It is expected that the system will become available at the end of 2005.

All 2005 observations are disk-only except for those being sent to the VLBA correlator. It is planned that the EVN will "ramp up" to 1 Gbps recording as the default for continuum observations. The Directors have agreed to purchase the necessary disk space to accommodate this. The Mark 5 system is stable except for some communication problems with the Field System observed in the last session.

The Field System and Sched now fully support disk observations and recording bitrates up to 1024 Mbps. Also features for supporting near-real-time fringe checks and eVLBI are being implemented.

The digital baseband converter project lead by Tuccari(Noto) has been officially approved by the EVN Board. deployment of prototype dBBCs is expected for 2006. Together with the Mark 5B systems this would form a complete VLBI data acquisition system, allow new telescopes to participate in VLBI observations with the EVN.

Walter Alef (TOG Chairman)

4. e-VLBI - "EXPReS" proposal funded!

In March earlier this year, a large funding proposal to support the e-VLBI activities of the EVN was submitted to the Research Infrastructures (Communication Network Development) programme of the EC. The proposal is called EXPR*e*S (Express Production Real-Time *e*-VLBI service) and a few months ago we heard that it had been well rated. In fact of the 43 proposals submitted to this call, EXPR*e*S came out TOP of the entire evaluation process, and as a result will be almost fully funded – to the tune of ~ 4 Million Euro over the next 3 years!

EXPReS will support various aspects of the current e-VLBI programme, including: (i) the upgrade of the EVN correlator at JIVE into a real-time, e-VLBI data processor and an investigation of optimum data transfer protocols and the use of switched light-path technology (led by Dr. Arpad Szomoru, JIVE), (ii) partial support for last-mile connections to radio telescopes in Europe but also China, South Africa, Puerto Rico, Australia and Chile (led by Dr. F. Colomer, OAN), (iii) research into distributed correlation using Grid resources and a study of realising e-VLBI data rates of 10 Gigabits per second (led by Dr. H.J. van Langevelde, JIVE). The overall project coordination will be led by JIVE (Dr. M.A. Garrett)

Mike Garrett (JIVE)

5. Current status of e-VLBI

The last e-VLBI session before this summer was the highly succesfull demo during the EC PR event as reported elsewhere in this newsletter. Although the datarate was modest (5 telescopes at 32 Mbps) the system performed flawlessly.

Until the EXPReS project gets underway, e-VLBI development will focus mainly on improving the stability and reliability of the system. A series of tests has been scheduled for the rest of this year, the first of which was conducted on the 8th of September. Participating stations were Onsala, Torun, Westerbork, Cambridge and Jodrell Bank (MkII).
Fringes were detected on baselines to four telescopes at 128 Mbps. Three telescopes transferred data succesfully at a datarate of
256 Mbps, one telescope (Westerbork) even achieved 512 Mbps. Of the UK telescopes Cambridge was connected to JIVE via a dedicated lightpath (through UKLight and Netherlight) instead of the regular production network. Both connections performed well, without any obvious large differences.

As we are in the process of upgrading the e-VLBI-specific test version of the correlator control software to a production version, quite a large portion of the last test was used for debugging. With this out of the way, we hope in the future to have more time for testing different configuration schemes, to enable the long uninterrupted runs needed for science operations.

Arpad Szomoru (JIVE)

6. Some statistics of scheduled EVN projects

I have recently produced summary tables of scheduled EVN projects, both for the EVN Biennial Report and also to assist in assessing the EVN MK5A disk requirements if we run future continuum projects at a default recording bit-rate of 1 Gb/s. I present here some statistics for the period since I took over EVN session scheduling from Rolf Schwartz in 2002.

Table 1 shows the details for the 10 sessions from May 2002 to June 2005, including the number of hours actually scheduled for VLBI observations, and the amount of time scheduled for telescope radiometry, "CAL", which is used for deriving visibility amplitude calibration values. The generally uneven distribution of project GST interval requirements and the need to schedule time for receiver changes makes the average "scheduling efficiency" around 57% This average rises to 61% if one excludes the catastrophic February 2003 session when a crack was found in the Effelsberg azimuth track just before the start of the session, preventing it taking part.

TABLE 1: SESSION STATISTICS

SESSION	LENGTH (days)	NO. FREQ.	SCHEDULED DAYS VLBI + CAL	SCHEDULING EFFICIENCY
may02	15	3	8.4	56 %
nov02	14	3	8.8 + 0.3	65 %
feb03	17	3	2.4 + 0.3	16 %
may03	21	4	14.1 + 0.6	70 %
oct03	18	3	9.7 + 0.9	59 %
feb04	16	4	6.7 + 0.6	46 %
may04	21	3	10.5 + 0.5	52 %
oct04	22	4	15.2 + 0.9	73 %
feb05	21	4	11.1 + 0.7	56 %
jun05	12	2	8.5 + 0.4	74 %
TOTAL	177	33	95.4 + 5.2	57 %

Tables 2-4 show the total number of scheduled observations, "N-OBS", and the total

amount of EVN time scheduled (given both in hours and days) for various categories of observation. Note that a single proposal may result in several observations if it requires multiple epochs, frequencies or sources. Also, at some observatories (e.g. Shanghai) the amount of time observing may be less than that scheduled, due to the earlier setting of sources.

Table 2 shows the total amount of observing, divided by project type, correlators, and participating telescopes. Note two basic statistics: 78% of all observed projects were processed at the EVN correlator at JIVE and 7.6% of observing time is spent on test observations. Note also the large range in individual telescope participation. This is largely due to the variation in the number of receivers available at the observatories, although Arecibo, Wettzell, Cambridge and Robledo (an EVN "affiliate") all have limited availability. But no telescope was scheduled for all observations.

TABLE 2: EVN OBSERVATIONS

may02-jun05	N-OBS	HOURS	DAYS
TOTAL	210	2290.7	95.4
EVN-only	103	1421.2	59.2
GLOBAL	57	681.0	28.4
Short Obs.	3	13.0	0.5
Tests	47	175.5	7.3
Bonn-Corr.	15	257.0	10.7
EVN-Corr.	164	1688.2	70.3
VLBA-Corr.	31	345.5	14.4
EVN+MERLIN	46	598.5	24.9
Eb	186	2110.7	87.9
Wb	171	1846.2	76.9
Jb	185	1986.7	82.8
Cm	93	998.2	41.6
On	176	1960.2	81.7
Mc	182	2022.2	84.3
Nt	154	1692.7	70.5
Tr	138	1527.2	63.6
Ur	88	936.0	39.0
Sh	77	821.0	34.2
Hh	71	610.0	25.4
Ar	30	86.5	3.6
Yb	3	51.0	2.1
Mh	18	216.0	9.0
Wz	3	72.0	3.0
Ro	19	205.0	8.5

Table 3 shows numbers for user projects only, i.e. excluding test observations. These numbers are also divided into line and continuum projects, and by wavelength. Note that 6cm and 18/21cm are still the most popular wavelengths. One third of all user projects are spectral line observations. Global projects involving the VLBA and/or other NRAO telescopes account for 35% of observations. Under an agreement with JPL the DSN 70m antenna at Robledo is made available for observing together with the EVN for short periods and observed on average 1.5 user projects per session.

TABLE 3: USER OBSERVATIONS

may02-jun05	N-OBS	HOURS	DAYS
TOTAL	163	2115.2	88.1
EVN+MERLIN	40	572.5	23.9
Continuum	109	1454.0	60.6
Spec. Line	54	661.2	27.6
Bonn-Corr.	14	253.0	10.5

EVN-Corr.	118	1516.7	63.2
VLBA-Corr.	31	345.5	14.4
Wavelength:			
1.3 cm	11	176.0	7.3
5 cm	16	181.0	7.5
6 cm	51	652.5	27.2
3.6/13 cm	11	177.5	7.4
18/21 cm	61	804.2	33.5
30 cm	3	35.5	1.5
90 cm	10	88.5	3.7

Some 25% of observations are combined EVN+MERLIN. Table 4 shows a breakdown by line and continuum and by wavelength for these projects. By far the most popular wavelength is 18cm. Some 40% are spectral line projects.

TABLE 4: EVN+MERLIN OBSERVATIONS

	N-OBS	HOURS	DAYS
TOTAL	40	572.5	23.9
1.3 cm	1	13.0	0.5
5 cm	6	91.0	3.8
6 cm	8	120.0	5.0
18/21 cm	25	348.5	14.5
Continuum	24	362.5	15.1
Spec. Line	16	210.0	8.8

Finally, the estimated total quantity of data scheduled for recording for all 10 sessions and all stations was 1558.7 TBytes, or an average of 156 TB per session, corresponding to 264 thin tapes. (In practice more tapes were needed since the required number of tapes per station per experiment is quantized.) The quantity of data is, of course, proportional to the bandwidth used and varies a lot between projects. For continuum projects at wavelengths longer than 18/20 cm the RF bandwidth available for use is severely restricted by interference, and for spectral line projects there is no sensitivity gain by increasing the recorded bandwidth. However, for short-wavelength continuum projects, higher sensitivity could be achieved by observing at the maximum possible recordable EVN bandwidth. However, this has never been the EVN "default" mode since we have been limited by the number of tapes available in each session. The MK5A disk recording system now in use throughout the EVN allows a maximum bit-rate of 1024 Mb/s, typically realized using 2 polarisations, 2 bits/sample recording and 128 MHz bandwidth per polarization. If all short-wavelength continuum projects had been recorded at this bit-rate in the last 10 sessions, the total requirement per session would have been 433 TB, an increase by a factor of 2.8. The EVN is working towards implementing this as a default mode for continuum observations by increasing the quantity of MK5A disk-packs available in each session.

Richard Porcas (EVN scheduler)

7. Medicina: a railorad makes the VLBI pathlength longer

The Regional Council of Emilia-Romagna with the aim to provide wide band network links to all the municipalities in the region, decided

to let the Universities and Scientific Organisations to use such fiber link. The project plans to provide a dark optical fiber link between the POP Garr located in Bologna and the VLBI antenna in Medicina. Ground work to bury the optical fiber started in early 2003, and in May 2005 the fiber link between the town of Medicina and the Antenna (6 km apart) has been completed. Unfortunately, problems related to the planned fiber path which should have crossed a railroad have temporarily stopped the attempt to bring a direct link from Bologna to Medicina following the shortest way (30 km). At the moment we are exploring the possibility to activate a temporary path through Lugo-Faenza-Imola, implying a total length of about 100 km. This new path would require devices for signal amplification, but could be available in a few weeks. As soon as permissions to cross the railroad path is awarded, the much shorter path, as originally planned, will be completed and activated.

Mauro Nanni (IRA-INAF)