EUROPEAN VLBI NETWORK

European VLBI Network Newsletter
Number 28
January 2011

Contents

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1. Message from the EVN Chairman

Dear Readers,

The latest EVN Newsletter provides you with updates on EVN activities, technological development and on the most interesting scientific results. On behalf of EVN CBD I.d like to give some details concerning decisions taken by EVN Directors.

First I would like to express our gratitude to Prof. Andrei Finkelstein and the IAA team for excellent organization of EVN CBD at St. Petersburg in October 2010 and for the visit to Svetloe 32m telescope - Kvazar station. The Russian Kvazar Network incorporated into EVN in November 2009 provides since stream of valuable data including the once of real time operation of e-EVN mode.

The next CBD will be hosted by the TCfA at Torun in the beginning of May. We hope that this time no more volcanoes and other disruptive events would strike us.

Special thanks and congratulations are forwarded to Simon Garrington and the LOC for organization of EVN Symposium 2010. The meeting was highly successful, and the EVN science played a central role in it. Among the 70 oral presentations and 40 posters, most were based on EVN observations. The organizers got a support from Radionet, which allowed them to get a full coverage for conference fee for younger participants. Another important meeting - YERAC 2010 was held in Alcala near Madrid in July. The meeting was successful, there were more than 40 young participants representing European Institutes. Special thanks go to Paco Colomer and Rafael Bachiller for their excellent organization (look at the attached photo of happy participants !).

All the EVN services function normally. We notice steady progress in Network operation, the technical development and scientific results. The European VLBI Network seems to be at good condition however, the future of VLBI may not look so bright in general especially in the era of ALMA and SKA. The VLBA has already encountered problem to get sufficient NSF support but surely it will continue its operation, perhaps in some sort of closer liaison with the EVN. The e-EVN takes the lead among other SKA pathfinders as the most advanced e-network in the world. It needs though a new generation correlator to fulfill the future expectations and to remain in its present position. A new organization structure and possibly new legal entity will be required for JIVE in order to secure its scientific and technology centre position. JIVE considers transition to ERIC (European Research Infrastructure Consortium).

New stations aspire to enter the EVN. Simeiz Crimean Astrophysical Observatory with 22m high precision antenna has already expressed interest to join the Network, and the Radio Astronomy Institute of Ukrainian Academy of Sciences with 70m antenna at Evpatoria considers forwarding its application. With the coming commissioning of SRT this year and the final inclusion of 32m at Venspils, the strength of EVN will make the network an outstanding facility. Quality of science projects and a wide range of observational options will reinforce the Network as the world leading instrument for high angular resolution astrophysics. It also should remain its strong position in time of ALMA and SKA operation.

The recent highlights both in the science and technology development are gathered by the editor and presented in the newsletter. I will just draw your attention to some of them. An interesting identification of AGN in IR double galaxy Arp 299 and a presence of close SNR is reported here by Miguel A. Perez-Torres et. al. The important results of VLBI studies on a sample of low luminosity compact objects are described by Kunert-Bajraszewska, she presents conclusions on evolutionary tracks (GPS-CSS-FR) for low luminosity radio galaxies. Marecki and Swoboda announce their EVN findings on B0847+548 quasar and bring up an evidence that the quasar, which was radio-loud earlier, switched recently to the radio-quiet state.

An important development on the SFXC JIVE correlator in pulsar mode is described by Bob Campbell and collaborators. The correlation results obtained for two projects (EVN18A, EY011) to observe pulsars were very successful. This test shows new capabilities of EVN for precise astrometry with pulsars. Congratulations to JIVE correlator staff . Preparation for RADIOASTRON mission data handling and processing is described by Chuprikov et al. A conversion data formats is working fine and the correlator of Astro Space Centre in Russia demonstrates its capabilities to support future data stream processing.

A new and extremely important for the EVN future is the current development of MeerKAT system in South Africa. Roy Booth gives detailed description of the work including operation of MeerKAT in phased mode as the EVN single element sites as well as presents a proposal to build African VLBI Network based on existing (up to 10) communication antennas located on African continent. If this project is realized it would bring fantastic improvement on the performance of combined EVN+AVA networks for low DEC sources and sensitivity.

On behalf of EVN CBD I attach very special greeting for the New Year with the wish that it proves to be happy, prosperous and successful. Let the 2011 create many good reasons and opportunities to meet together, to discuss scientific achievements and to celebrate EVN founded friendship.

Andrzej Kus, Chairman of the EVN Board of Directors.

2. Call for EVN Proposals - Deadline February 1st 2011

ALL EVN, GLOBAL, and e-VLBI PROPOSALS must now be submitted

with the ONLINE PROPOSAL SUBMISSION tool Northstar.

Email submission is no longer accepted

Detailed Call for Proposals

(This text is also available on the web at http://www.ira.inaf.it/evn_doc/call.txt)

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 observations may be conducted with disk recording (standard EVN) or in real-time (e-VLBI).

The EVN is open to all astronomers. **Use of the Network by astronomers not specialized 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.

Future Standard EVN Observing Sessions (disk recording)

2011 Session 2	May 26 - Jun 16	18/21cm, 6cm ...
2011 Session 3	Oct 20 - Nov 10	18/21cm, 6cm ...

Proposals received by 1st February 2011 will be considered for scheduling in Session 2, 2011 or later. Finalisation of the planned observing wavelengths will depend on proposal pressure.

Future e-EVN Observing Sessions (real-time correlation)

2011 Mar 22 - Mar 23 (start at 13 UTC)	18/21cm, 6cm, 5cm or 1.3cm
2011 Apr 12 - Apr 13 (start at 13 UTC)	18/21cm, 6cm, 5cm or 1.3cm
2011 May 17 - May 18 (start at 13 UTC)	18/21cm, 6cm, 5cm or 1.3cm

Please consult the e-EVN web page at http://www.evlbi.org/evlbi/e-vlbi_status.html to check for possible updates, and for the available array.

e-VLBI proposals submitted by the February 1st deadline will be considered for scheduling in the above sessions starting from March 22nd.

Note that only one wavelength will be run in each session, depending on proposal priorities. See http://www.ira.inaf.it/evn_doc/guidelines.html for details concerning the e-VLBI observation classes and the observing modes.

Features for the next regular EVN and e-VLBI sessions

- From April 2011 due to e-MERLIN commissioning, VLBI at e-MERLIN out-stations will not be possible, and JB1 will be the only homestation available. After commissioning, only separate EVN and e-MERLIN observations will initially be scheduled. For updated information please consult the web at http://www.e-merlin.ac.uk/vlbi Proposals requesting EVN + e-MERLIN should indicate clearly whether separate EVN and e-MERLIN observations are sufficient, or whether scheduling should await simultaneous VLBI at e-MERLIN outstations. Simultaneous wide-bandwidth VLBI and e-MERLIN operations at e-MERLIN outstations are planned for 2012.
- Please consult http://www.evlbi.org/evlbi/e-vlbi_status.html and the EVN User Guide (http://www.evlbi.org/user_guide/user_guide.html" for updates on the current EVN and e-EVN array; availability of different stations per observing band and for the dates of the e-EVN observing sessions.

Global proposals

Please note that NRAO has moved from a trimester system to a semester system with proposal deadlines of February 1st and August 1st. The first semester-based deadline will be 2011 February 1 (see http://www.nrao.edu/admin/do/vlba-gvlbi.shtml). PIs wishing to apply for Global VLBI time should continue to submit their proposals at the EVN deadlines using the Northstar on-line proposal submission tool.

Large EVN projects

Most proposals request 12-48 hrs 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

All EVN, Global and e-VLBI proposals (except ToO proposals) must be submitted using the on-line proposal submission tool Northstar. Global proposals will be forwarded to NRAO automatically and do not need to be submitted to NRAO separately.

New proposers should register at http://proposal.jive.nl The SCIENTIFIC JUSTIFICATION MUST BE LIMITED to 2 pages in length. Up to 2 additional pages with diagrams may be included. The deadline for submission is 23:59:59 UTC on 1 February 2011.

Additional information

Further information on Global VLBI, EVN+MERLIN and e-VLBI observations, and guidelines for proposal submission are available at: http://www.ira.inaf.it/evn_doc/guidelines.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 current antenna capabilities can be found in the status tables. For the standard EVN see http://www.evlbi.org/user_guide/EVNstatus.txt. For the e-VLBI array see http://www.evlbi.org/evlbi/e-vlbi_status.html

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

Tiziana Venturi - Chairperson of the EVN Program Committee

3. EVN Scientific Highlights

Serendipitous discovery of the long-sought AGN in Arp 299-A

Within the constellation of Ursa Major, at a distance of 44 Mpc lies the luminous infrared galaxy Arp 299, which is the result of the merging of two galaxies, IC 694 (also known as Arp 299-A) and NGC 3690 (=Arp 299-B1). The large far-infrared luminosity of Arp 299-A, which accounts for about 50% of the total in Arp 299, should result in about 1 SN/yr if standard relations between far-infrared luminosity and core-collapse supernova (CCSN) rates hold.

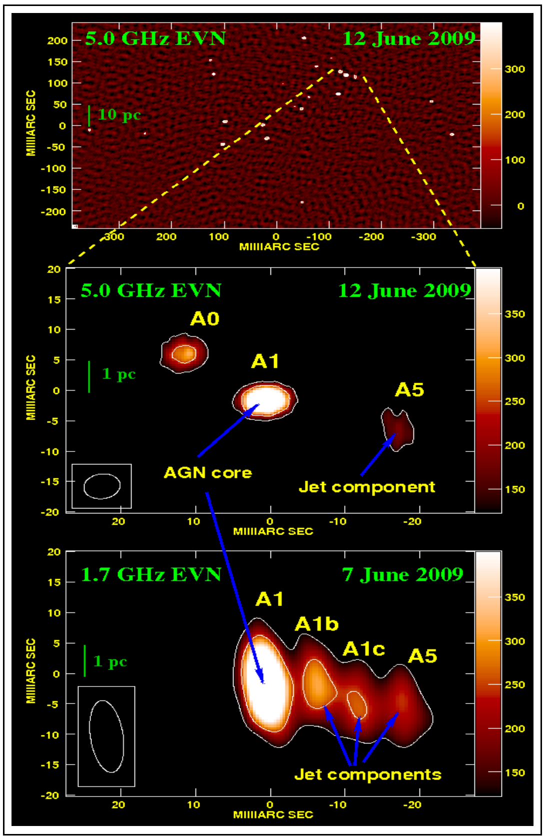
We observed Arp 299-A with the eEVN in 2008, and found indeed a large number of compact sources in its inner 150 pc, most likely young CCSNe and supernova remnants (SNRs) (see EVN Newsletter No. 25 and Perez-Torres et al. 2009, A&A, 507, L17). We therefore requested further observations, this time using the full-EVN at 1.7 and 5.0 GHz, to characterize the nature of all these compact sources and with the final aim of determining the core-collapse supernova rate for this galaxy after a three-year long monitoring.

Fig. 1 shows an "spin-off" result from these observations. The top panel shows the inner 150 pc region of Arp 299-A as imaged with the full EVN at 5.0 GHz, with all the white blobs being the compact sources we wanted to characterize. What caught our interest was the line of objects toward the top right of this image (the A1-A5 region). This was not a chance alignment, but could either be a chain of supernovae and SNRs in a super star cluster approximately 500 years old, or a core and jet of a hidden AGN. The chances that the objects belong to such superstar cluster are less than 3 in a million, and therefore we ruled out this possibility. On the other hand, the morphology, radio luminosity, spectral index and ratio of radio-to-X-ray emission of the A1~VA5 region are consistent with a low-luminosity AGN (LLAGN). We therefore identified the A1~VA5 region with the long-sought AGN in Arp 299-A.

Interestingly, the object labelled A0 is not part of the AGN. Actually, it is a supernova discovered in 2004 by Neff and collaborators. At a mere projected distance of less than 2 pc from the AGN, it is one of the closest to a central supermassive black hole ever detected. And we hypothesize that this vicinity of massive stars could be the reason why Arp 299-A AGN is so weak ~V nearby massive stars heating their surroundings and dispelling the material that it would normally accrete.

Full details can be found in A&A (Perez-Torres et al. 2010, A&A, 519, L5), where our Figure is one of the three highlights for the Vol. 519 of the September 2010 issue.

Authors: Miguel A. Perez-Torres, Antonio Alberdi, Cristina Romero-Canizales (IAA-CSIC,Granada, Spain), and Marco Bondi (IRA-INAF, Bologna, Italy)



A survey of Low Luminosity Compact (LLC) sources - Results

We present a radio and optical analysis of a sample of Low Luminosity Compact (LLC) objects, selected from FIRST survey and observed with MERLIN at L-band and C-band. About 70% of the observed LLC sources are galaxies and all of them are nearby objects with redshifts z in the range 0.04 - 0.9. Most of them have been resolved and about 30% of them have weak extended emission and disturbed structures when compared with the observations of higher luminosity CSS sources.We suggest that some of the sources with the breaking up structures or one-sided morphology are candidates for compact faders (Fig.1a). We studied correlation between radio power and linear size, and redshift with a larger sample that included also published samples of compact objects and large scale FRIIs and FRIs (see Kunert-Bajraszewska et al,2010a for details). The Luminosity-Size diagram (Fig.1b) shows an evolutionary scheme of radio-loud AGNs.The selection criteria used for the new sample resulted in approximately one third of the LLC sources having a value of the 1.4 GHz radio luminosity comparable to FRIs. Their luminosities are definitely lower than CSS sources from last existing samples (Fanti et al.2001 and Marecki et al.2003). **We suggest that many of them might be short-lived objects, and their radio emission may be disrupted several times before becoming FRIIs.**

The optical analysis of the LLC sources were made based on the available SDSS images and spectra (Kunert-Bajraszewska et al., 2010b). We have classified the sources as high and low excitation galaxies (HEG and LEG, respectively). We have compared the [OIII] luminosity with the radio properties for LLC sources, and expanded the sample with other CSS, GPS sources and FRI and FRII objects. The whole sample shows that, for a given size or radio luminosity, HEG sources are brighter than LEG in the [OIII] line by a factor of 10. The LLC objects follow the same correlation between [OIII] luminosity and radio power, as the rest of the sample, although the LLC objects have lower values of [OIII] luminosity than the more powerful CSS sources. Based on the analysis above, we propose a scenario where the differences in the nature of LEG and HEG (accretion mode or black hole spin) are already visible in the CSS phase of AGN evolution and determine the evolution of the source: i.e. CSS_{LEG} evolve to FR_{LEG}, CSS_{HEG} evolve to FR_{HEG}. The main evolution scenario (GPS-CSS-FRII) was proposed years ago. However, once the HEG/LEG division is included, these sources seem to evolve in parallel (Fig.1c): **GPS_{LEG}-CSS_{LEG}-FR_{LEG} and GPS_{HEG}-CSS_{HEG}-FR_{HEG}**. Concerning LEG, it is still not clear if CSS_{LEG} would evolve directly to FRI_{LEG} or go through a $FRII_{LEG}$ phase before the FRI_{LEG}. As discussed in Kunert-Bajraszewska et al., 2010a, there should also exist a group of short-lived CSS objects with lower radio luminosities. These short-lived CSSs could probably show the low [OIII] luminosities seen in FRIs.

The above results have been published in Kunert-Bajraszewska et al.(2010a), MNRAS, 408, 2261 and Kunert-Bajraszewska et al.(2010b), MNRAS, 408, 2279

Authors: M. Kunert-Bajraszewska (TCfA), A. Labiano (ESAC), M. Gawronski (TCfA), A.Siemiginowska (SAO)

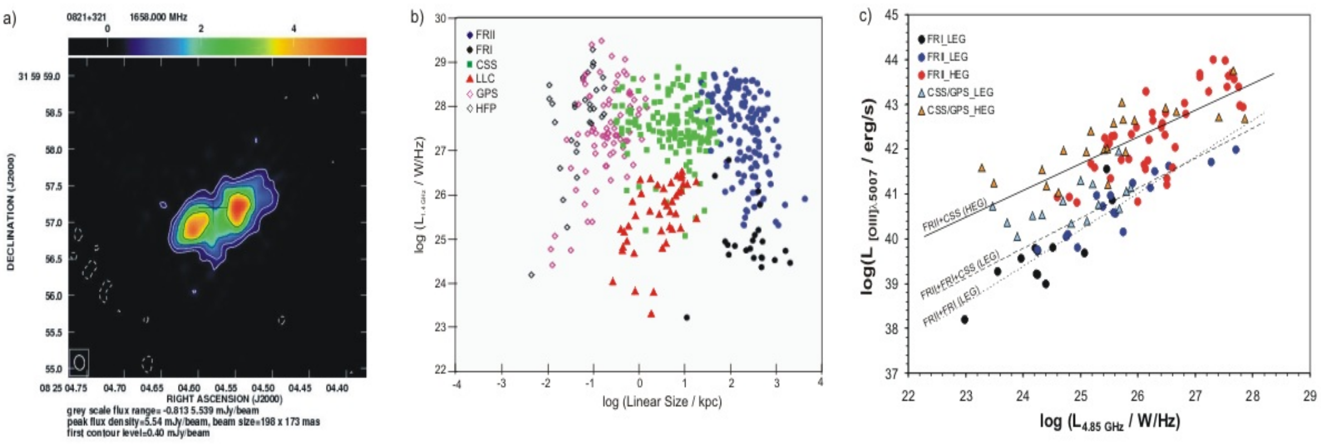


Fig.1: *a) 0821+321 - a candidate for a compact fader, b) Luminosity-size diagram for AGNs; c) [OIII] luminosity - radio luminosity diagram for AGNs classified as HEG and LEG. Squares indicate CSS sources from samples of Labiano et al.(2007), Laing et al.(1983), Willott et al.(1999), Fanti et al.(2001) and Marecki et al.(2003). The diamonds indicate GPS and HFP objects from sample Labiano et al.(2007). The circles indicate FRI and FRII objects from samples of Laing et al.(1983), Buttiglione et al.(2009a,b, 2010) and Willot et al.(1999). The triangles indicate the current sample of LLC sources.*

When a radio-loud quasar goes radio-quiet

We investigated three quasars with large-scale radio lobes that are clearly asymmetric - one lobe is of Fanaroff-Riley II type, while the other one is a diffuse relic devoid of a hotspot. The FIRST image of one of our targets is shown in Fig.1. We hypothesized that the prime cause of the asymmetry of these radio sources is that the nuclei of their host galaxies currently produce no jets. To prove that, we observed them with the e-EVN to check if they are similar to those in radio-quiet quasars. The observations carried out with 11 stations including Sh and Ur at 18 cm (project EM078) - see Fig.2 for the example - revealed that the nuclei of the quasars under investigation are not of a core-jet type that is characteristic for radio-loud quasars, either core- or lobe-dominated. It follows that the lobes are no longer fuelled and that their apparent asymmetry results from the orientation, which causes a time lag of the order of 10^6 years between their images: the lobe perceived as a relic is nearer than the lobe with a hotspot and so it is observed in a later stage of the decay. We concluded that the quasars under investigation were radio-loud earlier, but now they have switched to the radio-quiet state.

Reference: Marecki & Swoboda, 2011, A&A, 525, A6

Authors: Andrzej Marecki & Bartlomiej Swoboda (TCfA)

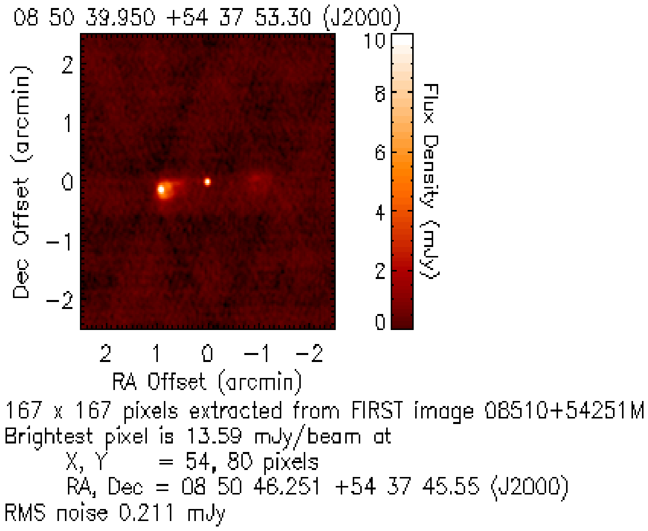


Fig.1: *FIRST image of a quasar B0847+548 with asymmetric large-scale structure: the eastern lobe is FRII-like while the western one is a relic. We claim that the central engine no longer produces jets, although, due to a light-travel time lag, the far-side eastern lobe still looks normal.*

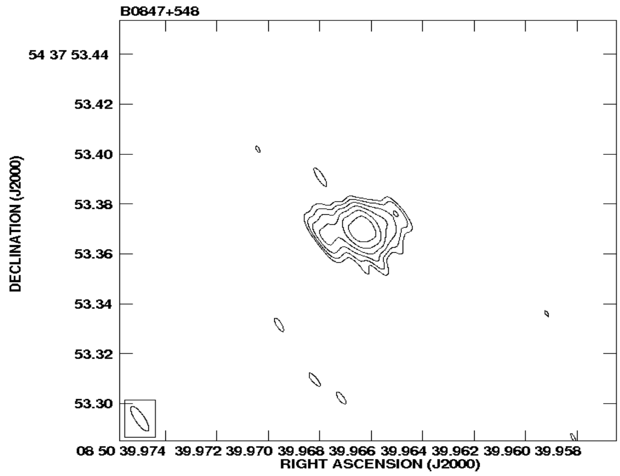


Fig.2: *e-EVN image of the core of B0847+548. It is weak, diffuse and not of core-jet type as normally in radio-loud quasars. Instead, cores of this kind used to be identified with radio-quiet quasars.*

4. EVN Technical Development and Operations

Gated/Binned Pulsar Correlation on the SFXC correlator at JIVE

VLBI astrometry of pulsars can yield the positions, proper-motions, and trigonometric parallaxes of the pulsars. Such results combined with other data can be used in general to provide constraints on the Galactic electron-density distribution (parallax + dispersion measure), to place bounds on the pulsars' birthplaces and supernova physics (parallax + proper motion + age estimate), to investigate turbulence in the ISM (parallax + scattering-disk angular diameters), and to contribute towards a tie between the ICRF and dynamic reference frames (ms-PSRs + time-of-arrival data). Pulsar kinematics can also inform a variety of source-specific investigations.

The SNR of pulsar scans can be increased by use of gating, in which only samples within a specified time interval each pulsar period (i.e., on pulse) are accumulated during correlation. The sensitivity and array composition of VLBI pulsar astrometry using gated correlation has improved markedly with evolving technologies -- from 3-station, 4 Mbps Mark II observations (Gwinn et al. 1986) to 6-station, 112 Mbps Mark IIIA observations (Campbell et al. 1996) to the series of VLBA and LBA observations at up to 512 Mbps (e.g., Brisken et al. 2002, Chatterjee et al. 2009, Deller et al. 2009) -- with corresponding improvements in the astrometric solutions. The EVN MarkIV correlator made some initial pulsar-gating developments (e.g., Campbell 2001) to open up Gbps pulsar observations, but these never came to fruition operationally.

In the May 2010 EVN newsletter, Moldon et al. (2010) reported the gated correlation of their experiment EM080A (Gbps, L-band) on the DiFX software correlator in Bonn, the first EVN user-experiment gated pulsar correlation take place in Europe since the days of the Mark IIIA (GC021B, Nov'98). In the January 2010 EVN newsletter, Keimpema & Kettenis (2010) reported progress in establishing pulsar gating on the new SFXC software correlator at JIVE, and an update was provided during the 2010 EVN Symposium in Jodrell Bank (Campbell 2011). SFXC can provide an arbitrary number of equally-spaced bins within a specified gate, with each bin resulting in an independent correlator output. Traditional pulsar gating as a means to boost SNR of pulsar scans would correspond to one bin. The top panel of figure 1 shows a reconstruction of the 1.4 GHz pulse profile of PSR B0329+54 comprising 100 bins over a 0.1-period gate centered on the pulse. This compares well to the pulse profile from Sieber et al. (1975) shown in the panel below. The gating is driven by polyco files from the pulsar timing software tempo. The ability to reconstruct the pulse profile via bins simplifies checking the gating and setting an optimal gate width (if the pulsar itself is detectable on its own), compared to the situation that pertained in the Mark IIIA correlator.

Availability of gated correlation at JIVE was announced in the June EVN Call for Proposals. We have completed correlation of our first two pulsar user experiments: one from session 2/2010 of 3 normal pulsars (EV018A; Gbps, C-band) and one from session 3/2010 of an P=2.3ms ms-PSR that is very bright in X-rays (EY011; 512 Mbps, L-band). In EV018A, the raw correlator phases per integration clearly showed that each pulsar was detected after gating (i.e., even prior to fringing or phase-referencing); the added sensitivity of the EVN Gbps opens up the astrometric advantages of higher frequency observations (e.g., smaller beam, reduced ionospheric influence). Improved uncertainties will allow tighter constraints on Monte Carlo pulsar orbits traced back through the Galactic potential, leading to more reliable tests of hypothesized associations with other neutron or run-away stars at their births. Figure 2 is an EVN pipeline calibrated and phase-referenced image of the ms-PSR from EY011, showing a detection at ~0.7 mJy/beam. The image origin reflects the position inferred from timing observations, including timing-derived proper motion. Here, inclusion of VLBI kinematics with the timing solutions will help reduce the latter's input covariances; a possible application could be a network of X-ray pulsars with good astrometric and timing solutions serving as beacons for navigation of deep-space satellites carrying small X-ray detectors.

Bob Campbell, Aard Keimpema, Mark Kettenis, Jun Yang (JIVE), Wouter Vlemmings (Argelander Institute for Astronomy, U. Bonn), Ding Chen (National Time Service Center, P.R. China)

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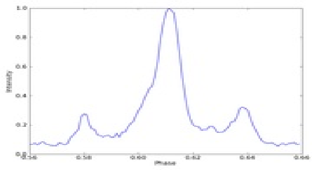
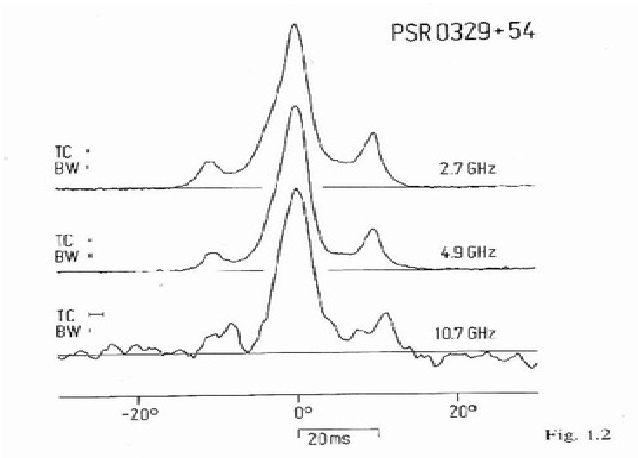



Figure 1

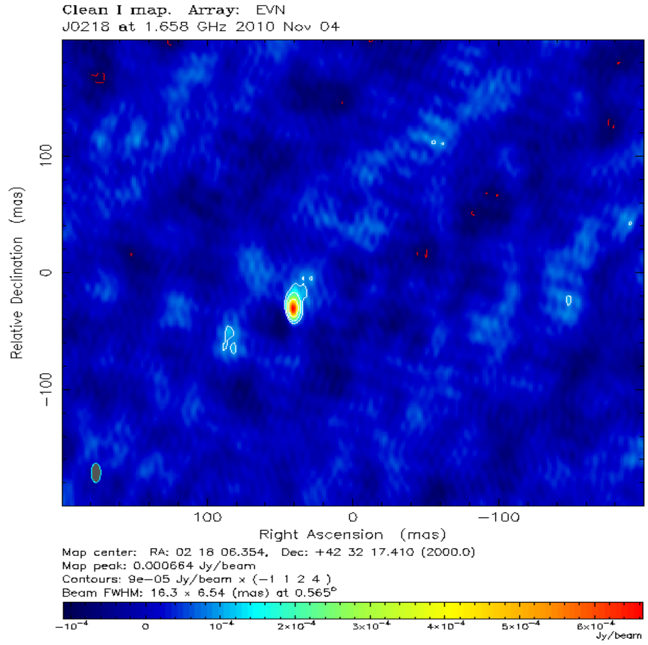


Figure 2

4. EVN Technical Development and Operations

3C84, BL Lac. Earth based VLBI test for the RADIOASTRON project

Results of processing of data of a VLBI experiment titled RAPL01 are presented. These VLBI observations were made on 4th February, 2010 at 6.28 cm between the 100-m antenna of the Max Planck Institute (Effelsberg, Germany), Puschino 22-m antenna (Astro Space Center (ASC), Russia), and two 32-m antennas of the Istituto di Radioastronomia di Bologna (Bologna, Italy) in Noto and Medicina. 2 well-known sources, 3C84 (0316+413), and BL Lac (2200+420) were included in the schedule of observations. Each of them was observed during 1 hour at all the stations. The Mark-5A registration system was used at 3 European antennae. The alternative registration system known as RDR (RADIOASTRON Data Recorder) was used in Puschino. The Puschino data were recorded in format RDF (RADIOASTRON Data Format). Two standard recording modes designed as 128-4-1 (one bit), and 256-4-2 (two bit) were used in the experiment. All the Mark-5A data from European antennae were successfully converted into the RDF format. Then, the correlation function was estimated at the ASC software correlator. A similar correlation function also was estimated at the Bonn correlator. The Bonn correlator reads Mark5A data, the RDF format was converted into Mark5B format before correlation. The goal of the experiment was to check the functioning and data analysis of the ground based radio telescopes for the RADIOASTRON SVLBI mission}

The correlator estimates the visibility as a function of time and frequency. A phase of this complex function is shown in Figures 1, and 2. If a fringe rate (or fringe frequency) is still not compensated, there is a considerable phase slope. This may be due to several effects. For instance, it could be considerable if there is some instability of heterodyne at any antenna of a baseline. A slope restricts the coherence time which is equal to time interval corresponding to the phase drift of 180 degrees.

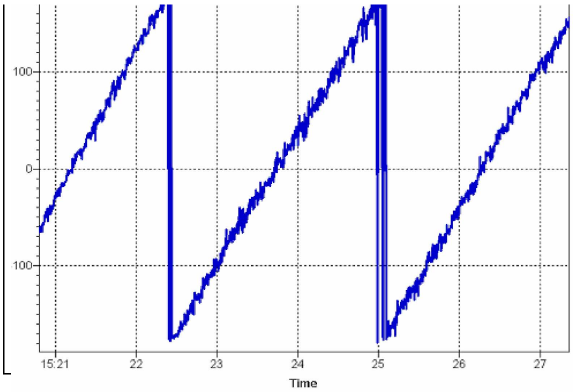


Fig.1 *Visibility phase vs time for the Effelsberg-Medicina baseline. Scan no. 3 (2200+420). The maximum integration time is 2 minutes.*

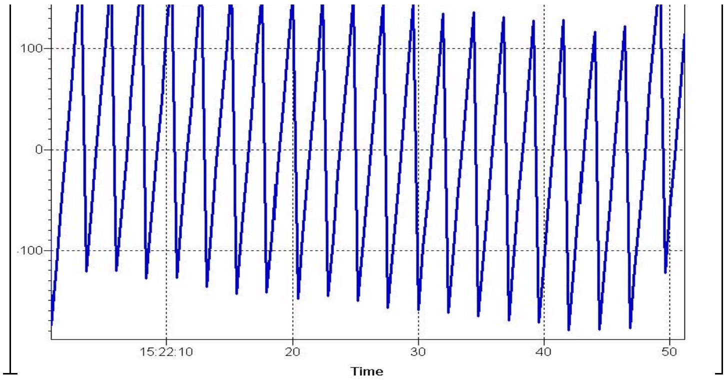


Fig.2 *Visibility phase vs time for the Effelsberg-Puschino baseline. Scan no. 3 (2200+420). The maximum integration time is 0.3 seconds.*

The correlator of ASC uses the special software module titled ARIADNA for estimation of delay for any interferometer baseline and any interval of observational time. Then, there is a possibility to compensate the residual delay as well as the residual fringe rate at the input of the correlator.

Values of residuals with respect to the reference antenna in Effelsberg were the following :
Residual delay values are:
21.100 +/- 0.050 mcs for the Puschino antenna
-42.810 +/- 0.007 mcs for the Medicina antenna
12.520 +/- 0.005 mcs for the Noto antenna

Residual rate values are:
0.412 +/- 0.0005 Hz for the Puschino antenna
0.007 +/- 0.0006 Hz for the Medicina antenna
-0.002 +/- 0.0005 Hz for the Noto antenna

Values of residual delay and fringe rate were almost constant in time for each antenna during the observations. Thus, they could be compensated very easily inside the correlator. For example, the dependence of visibility phase on time for the second scan (source is 2200+420, lower frequency band, RR-polarization) is shown in the Figure 3.

It is clear from Figure 3 that visibility phase values are between -280 and -140 degrees after the compensation. Such the residual phase oscillations are reliable and can be corrected during the secondary data processing. The value of residual fringe rate can be easily estimated from the phase slope value (148.54795 degrees per second). Then, the residual fringe rate value is equal to 0.4137. This is close to the value mentioned above (0.412).

The Signal-to-Noise Ratio (SNR) was measured for each baseline. The dependence of the Signal to RMS multiplied by 6 value on integration time for the data of scan no. 8 from the Effelsberg-Noto baseline and RR polarization is shown in Figure 4.

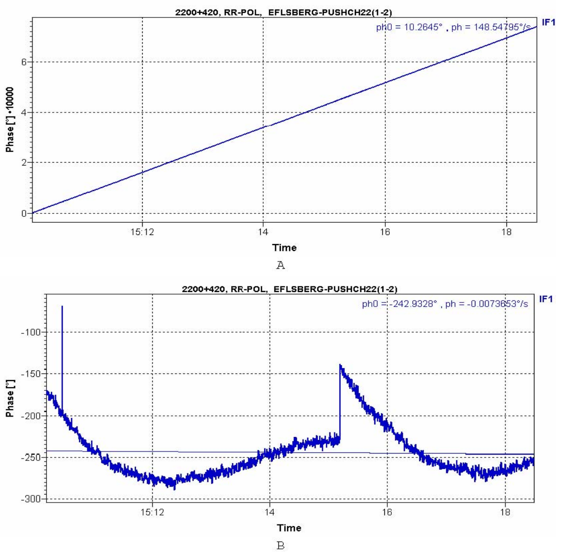


Fig.3 *Visibility phase vs time for the Effelsberg-Puschino baseline BEFORE (A) and AFTER (B) the residual fringe rate compensation.*

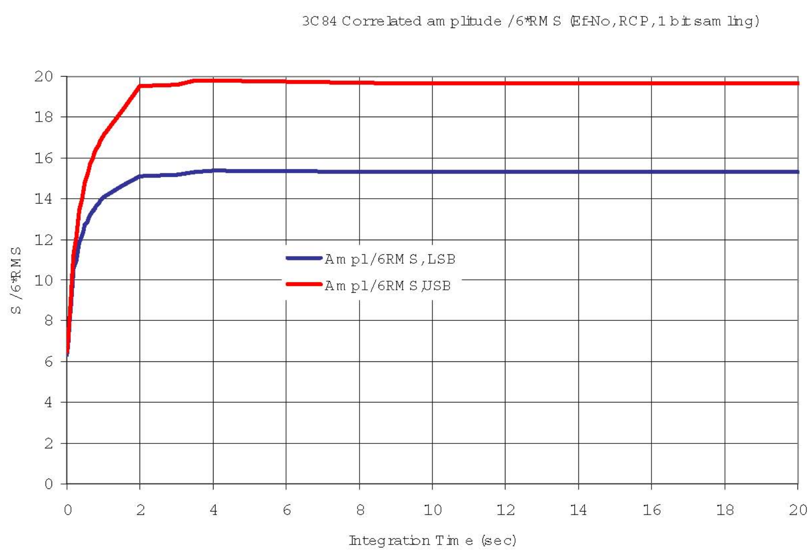
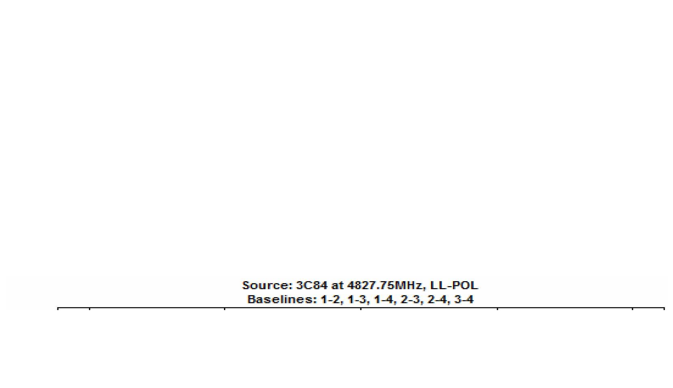


Fig.4 *Signal-to-Noise ratio (SNR) vs the integration time.*

It is clear from this figure, that the saturation of SNR takes place when the integration time is more than 2 seconds. Thus, there is the serious restriction for this parameter value even for European baselines, and its optimum value is about 0.3 second as mentioned above. There were observational data for the source titled 0316+413 (3C84) for all 4 antennae. A (u, v)-plane coverage (Figure 5) does not allow to reconstruct the source map.

Estimation of the visible angular sizes of 3C84 gives the value of about 11 mas (Figure 6). This is in consistent with the 3C84 properties available in literature (Asada, 2000, 2006).



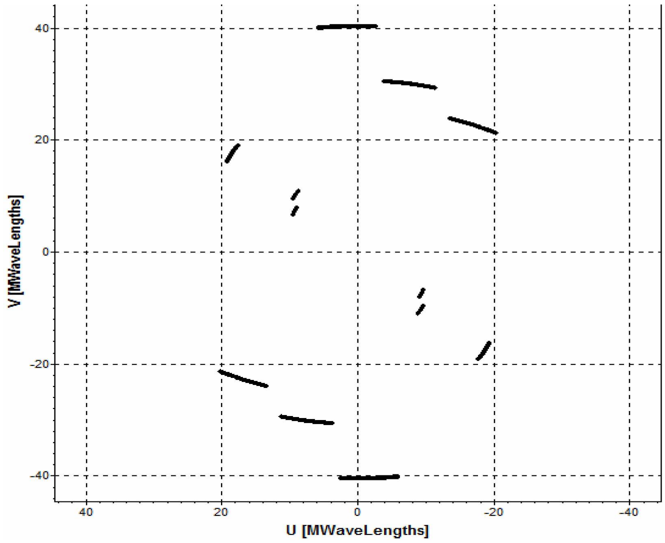


Fig.5 *(u, v)-plane coverage for 3C84.*

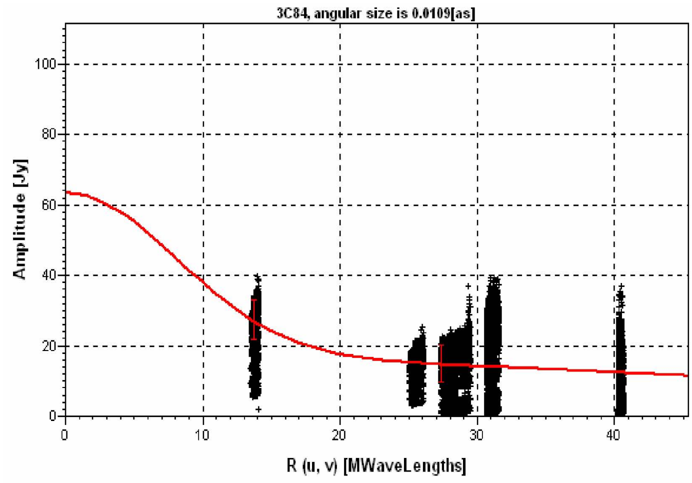


Fig.6 *Visibility amplitude vs (u, v)-radius for 3C84.*

Thus, we could make the following conclusions:

a. The experiment RAPL01 demonstrates the possibility to convert the Mark-5A data into RDF data. Antennae with different registration systems could be successfully used for the RADIOASTRON mission

b. The integration time value is restricted by 1 second due to a high rate offset at Puschino antenna. The successful estimation of the correlation function demonstrates the possibilities of the ASC software correlator to compensate correctly the abnormally high values of residual delays and fringe rates

c. The data at the end of the ASC software correlator are relevant for the secondary processing

d. The calibration procedures of the software known as Astro Space Locator allow reconstructing the visibility function

e. The (u, v)-plane coverage for the 3C84 is not sufficient to perform the source imaging. The value of estimated source angular size is 11 mas. This value is consisted with the 3C84 properties available in literature

All the results presented in this paper are preliminary. Procedures and techologies used during the VLBA data processing also could be very useful for processing of data of future Space VLBI mission titled RADIOASTRON.

A. Chuprikov (achupr@asc.rssi.ru), I. Guirin, A. Chibisov, V. Kostenko, Y. Kovalev (Astro Space Center of P.N. Lebedev Physical Institute of Russian Academy of Sciences, Profsoyuznaya 84 / 32, 117997, Moscow, Russia); D. Graham, A. Lobanov (MPI, Bonn; G. Giovannini (IRA-INAF)

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K. Asada, 2006, PASJ, 58, 261

VLBI with MeerKAT - and a potential African VLBI array

MeerKAT
The MeerKAT call for Large Survey Projects produced 21 proposals, of which the Time Allocation Committee selected 10 to go forward. The total time allocated to these projects is close to 5 years!

Among the proposals was the request that the use of MeerKAT for VLBI should be considered in the array design and that it should be engineered to facilitate the phasing of the inner antennas for use as a single VLBI element (the total collecting area of MeerKAT is more than 100m). Many well-known VLBI astronomers from the EVN were part of this proposal, which was led by Michael Bietenholz, who holds joint positions at HartRAO and York Univ. in Canada. The TAC supported this proposal and the MeerKAT Director, Bernie Fanaroff, has agreed to the request*.

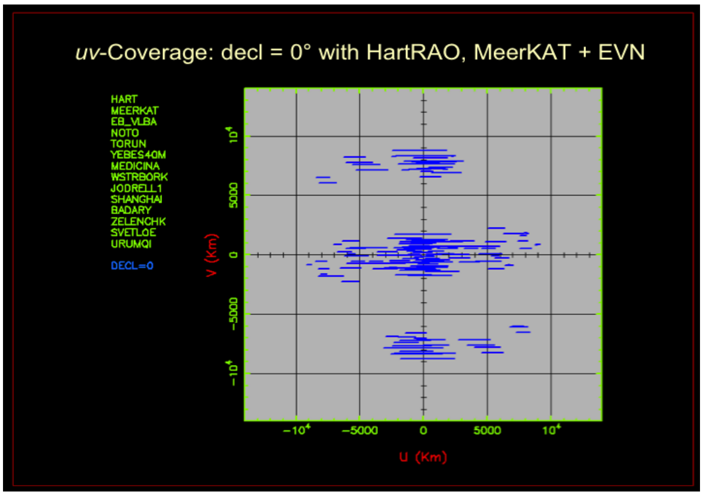
This an exciting proposition because MeerKAT will improve the sensitivity of the long N-S base-line to RSA by and order of magnitude. However, another major improvement is currently under consideration in Africa.

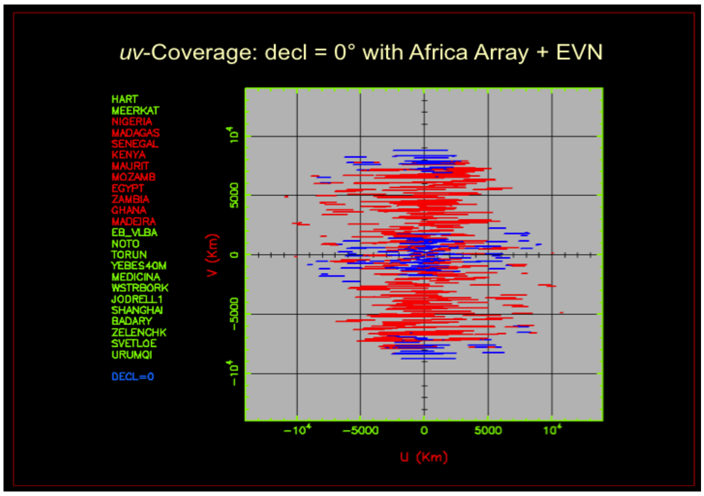
An African Array
No group is more aware of the rapid advance of fibre connections between continents than the users of the EVN, and the EVN has been quick to exploit new connectivity e.g. HartRAO is now available on a regular basis for eVLBI and ToO observations with up to GBit/s bandwidths via its new fibre links to Europe and elsewhere. The new wideband fibre optic cables running around the African coast and connecting it to other continents also mean that three 32m antennas near the Hartebeesthoek observatory are soon likely to become redundant as satellite communication dishes, and at least one of them will almost certainly be taken over by the observatory for radio astronomy.

This story is being repeated elsewhere in Africa and the possibility of an Africa VLBI Array for use with the other world networks is now considered. It is hoped that the appropriate Ministers of the interested African Countries will be persuaded to subscribe to this idea and that communications dishes, continent-wide, will be made available for Radio Astronomy and eVLBI, in particular. What better way for Africa to exploit its geographic advantage and join the international scientific research community! For an African Array can enhance all the existing VLBI Arrays by improving their UV-coverages and hence the imaging properties of those arrays. As an example, I attach below the plots of the UV coverage between the EVN + a hypothetical African Array, compared with the coverage of the EVN + HartRAO and MeerKAT. (Michael Bietenholz produced the diagrams).

*(As if to underline the Director's decision, we can report that fringes were obtained recently between HartRAO and KAT-7, the seven element MeerKAT prototype array).

Roy Booth (HartRAO)





EVN Scheduler's Report

SESSIONS SCHEDULED SINCE NEWSLETTER 26

1) **2010 SESSION 2**: 27 May - 16 June, **Wavelengths**: 6, 5, 18 cm

This was the first EVN session which included both disk recording and a number of e-VLBI observations, to make efficient use of the available time and disk resources. The first (disk) part contained 22 user observations: 6cm (8), 5cm (3) and 18cm (11). There were 3 global observations. Arecibo was scheduled for 1 observation and MERLIN for 5. The EVN correlator at JIVE was used for 15 observations, the VLBA (DiFX) software correlator for 1, the Bonn (DiFX) software correlator for 4 and the JIVE software correlator for 1. The 2 KVAZAR Network telescopes Zelenchukskaya and Badary were used for the first time for 5 user observations, following their successful participation in network monitoring observations in Session 1. The Noto telescope was unavailable, due to an azimuth bearing failure.

Following the last disk observation at 18cm, a switchover to e-VLBI (6 observations) took place on 9th June, starting with a 5.5h test run, followed by a ToO observation (V407 Cygni), an e-VLBI short observation and 2 normal e-VLBI observations. After the weekend the e-VLBI section continued at 6cm, with a second ToO observation of V407 Cygni, and a project proposed for disk observing but whose goals were judged (by the PC Chair, Scheduler and PI) to be achievable with e-VLBI. All e-VLBI observations were run at 1024 Mbps where possible.

2) **2010 SESSION 3**: 21 October - 11 November, **Wavelengths**: 5, 6, 1.3, 18, 13/3.6 cm

The Chinese telescopes at Seshan (Sh) and Nanshan (Ur) were not able to participate in this session as they were required for observing a new Lunar space mission. This restricted the number of projects which could be scheduled, since the long E-W baselines of the EVN are in high demand. The Noto telescope was also not yet repaired and so unavailable for this session. The good news is that the Hartebeesthoek telescope came back in operation and was scheduled for observations at 6 and 13/3.6 cm.

This session contained a total of 22 user observations: 5cm (3), 6cm (1), 1.3cm (4), 18cm (11) and 13/3.6cm (3). There were 4 global observations; the EVN correlator at JIVE was scheduled for 16 observations, the JIVE software correlator for 2, the Bonn software correlator for 1 and the VLBA software correlator for 3. Arecibo was scheduled for 1 observation and the DSN 70m at Robledo for 2. All 3 KVAZAR Network telescopes were scheduled for 1 observation at 6cm and 9 at 18cm; participation of these telescopes allowed a number of observations to be scheduled despite the lack of the Chinese telescopes.

3) e-VLBI SESSIONS

Date	l	Duration	

18MAY10	6cm	24h	+ 1 s.obs + 2 ToO + 1 trigger proposal (not triggered)
08SEP10	6cm	12h	1 normal + 1 trigger proposal (not triggered)
29SEP10	18cm	17h	1 normal + 1 s.obs
04OCT10	6cm	5h	+ 1 ToO + 1 trigger proposal TRIGGERED
23NOV10	6cm	23h	2 normal + 2 ToO + 1 trigger proposal (not triggered)
15DEC10	6cm	22h	2 normal + 1 s.obs + 1 trigger proposal (not triggered)

6. Meeting Point

Some EVN meetings - summary

EVN Symposium 2010 was held in Manchester in the period 20-24 September 2010. There were more than 100 participants. Among the 70 oral presentations and 40 posters, most were based on EVN observations. The next edition of the EVN Symposium will be organized at Bordeaux Observatory (France).

The 40th edition of the Young European Radio Astronomers Conference (YERAC) was hosted by the National Astronomical Observatory of Spain in Alcalá de Henares, during July 5-8 2010. A total of 43 young researchers, from many European VLBI Network institutes, attended the conference and presented their work in the fields of solar system studies, star formation and interstellar medium, pulsars, galaxies and clusters, AGNs, high-z and cosmology, and of course instrumentation and technological developments. The next edition will be organized at the Jodrell Bank Observatory.

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