European VLBI Network Newsletter

Number 22

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Contents

1. Message from the EVN Chairman

The EVN started 2009, International Year of Astronomy (IYA), with a very nice event: a very successful e-EVN observation with 17 radio telescopes participating from five continents. The demo, which was presented to the general public and to the press during the opening ceremony of the IYA in Paris on January 15, attracted a lot of interest. With duration of 33 h, this was the first continuous round-the-clock e-VLBI observation. During this observation the EVN was combined with Kashima and Westford for the first time, and Urumqi obtained its first e-fringes. This experiment is indeed a very good illustration of the e-EVN potential. We should congratulate the EXPReS team for their success.

The 9th EVN symposium "The role of VLBI in the Golden Age for Radio Astronomy" which was exemplary organized by our IRA (INAF) colleagues in Bologna last September was a great success. More than 140 participants from 20 different countries attended the conference and presented extremely interesting VLBI results. Such results will surely act as an important catalyst inspiring further research with the EVN. It is a pleasure to thank the excellent work made by the local organizers and the exciting talks and posters presented by the numerous attendants to the meeting.

Some new very interesting scientific results obtained at the EVN are highlighted in this issue, such as the observations of methanol in a massive star forming region in DR21, and the use of such methanol masers in the determination of the size and mass of our Galaxy. Among the many works on extragalactic research, we highlight the EVN observations of two Ultra Luminous Infrared Galaxies (ULIRGs) and those of a sample of 27 Seyfert galaxies.

The EVN CBD met in Arecibo on November 4, 2008. It was a real pleasure to visit one of the more distant EVN stations. The organization of the meeting, which included a visit to the outstanding 305-m radiotelescope, was really excellent. Hot topics of the meeting agenda were the EVN technical roadmap, the relationship of the EVN with the space-VLBI missions VSOP2 and Radioastron, the possible expansion of the EVN by including potential new stations, etc. Long discussions were also devoted to the possible ways to improve the operation of the Network and to compatibility issues.

I send my best wishes to all VLBI friends (in particular to all EVN members and users) in this International Year of the Astronomy !

Rafael Bachiller (OAN, Spain), Chairman of the EVN Board of Directors.

2. Call for EVN Proposals - Deadline February 1st 2009

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.

Standard EVN Observing Sessions in 2009 (disk recording)

2009 Session 2 May 28 – Jun 18 18/21cm, 6cm, 5cm, ...

2009 Session 3 Oct 22 – Nov 12 18/21cm, 6cm, 7mm, …

Proposals received by 1 February 2009 will be considered for scheduling in Session 2, 2009 or later. Finalization of the planned observing wavelengths will depend on proposal pressure. Other wavelengths which may be scheduled in 2009 are 90cm, 50cm, 30cm, 1.3cm, and S/X.

e-VLBI Observing Sessions in 2009 (real-time)

2009 Feb 10 – Feb 11 (start at 13 UTC)	18/21cm, 6cm, 5cm, 1.3cm
2009 Mar 24 – Mar 25 (start at 13 UTC)	18/21cm, 6cm, 5cm, 1.3cm
2009 Apr 21 – Apr 22 (start at 13 UTC)	18/21cm, 6cm, 5cm, 1.3cm
2009 May 19 – May 20 (start at 13 UTC)	18/21cm, 6cm, 5cm, 1.3cm

There are three e-VLBI observation classes: general e-VLBI proposals; triggered e-VLBI proposals; short observations. General and triggered e-VLBI proposals must be submitted by the February 1 deadline to be considered for scheduling in the above e-VLBI sessions starting from March 2009.

Requests for short observations may be submitted up to three weeks prior to any e-VLBI session.

Continuum and spectral line observations can be carried out.

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

- Arecibo and Shanghai are now part of the e-VLBI array. Yebes 40m may also join the array from March 2009. Please consult http://www.evlbi.org/evlbi/e-vlbi_status.html for the current e-VLBI array and for the availability of different eVLBI stations per observing band and for the dates of the e-VLBI observing sessions in 2009.
- Yebes 40-m may join the regular EVN sessions at 1.3cm and at S/X from March 2009, and may be available at 6 and 5cm from Session II on.
- MERLIN is normally available for joint EVN+MERLIN observations in all standard sessions, for any EVN wavelengths which MERLIN supports (18/21cm, 6/5cm, 1.3cm). However, due to the e-MERLIN construction only an incomplete MERLIN array will be available in 2009 due to limited resources. For updated information please consult the web at http://www.merlin.ac.uk//evn+merlin.html.

Large EVN 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

The on-line proposal submission tool Northstar now replaces the old Latex-email way of submission for all EVN and Global proposals; EMAIL PROPOSAL SUBMISSION IS NOT POSSIBLE ANYMORE. Global proposals will be forwarded to NRAO automatically and do not need to be submitted to NRAO separately.

To use Northstar, people should register (at http://proposal.jive.nl, only for the first proposal submission), enter the information about the investigators and the technical specifications of the proposed observations (equivalent to that previously in the coversheet) using the on-line forms, and upload a scientific justification in pdf or ps format. The scientific justification should 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 2009.

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

- **European VLBI Network observations of 6.7-GHz methanol masers in a candidate circumstellar disc**

Observing masers in massive star-forming regions allows us to trace the bulk motions of molecular gas in the vicinity of nascent massive stars. This can give us important information about the infall, outflow and rotational motions associated with massive star formation.
Recent observations of 6.7-GHz methanol masers using the Multi-Element Radio Linked Interferometer Network (MERLIN) in the massive star-forming region DR21(OH)N led to the discovery of a highly unusual maser with a double peaked spectrum (Harvey-Smith et al. 2008). The maser region is elongated in an east-west direction and has an estimated diameter of 60 AU. The resulting position-velocity diagram showed a clear Keplerian rotation profile, suggesting that the methanol masers may be tracing a rotating disc of material falling onto a massive star. The masers coincide with the very young Class I candidate massive star in the infra-red and dust core ERO3 (Marston et al. 2004). This extremely reddened object is at the centre of (and perpendicular to) a possible molecular outflow described by Davis et al. (2007).

In order to test the reliability of this disc interpretation, the 6.7-GHz methanol masers in DR21(OH)N were re-observed using the European VLBI Network at the same spectral resolution but with an angular resolution ten times greater than that of MERLIN (5 mas compared with 50 mas). In doing this, it was possible to verify (or otherwise) the velocity curve of the maser disc.

Observations:
DR21(OH)N was observed at 6.7-GHz using the European VLBI Network. The total observing bandwidth of 0.5 MHz was split into 512 spectral channels, giving a velocity resolution of 0.04 km/s. A total of 238 minutes were spent on the target source, leading to an RMS noise level of 60 mJy/beam.

Results:
The positions of 6.7-GHz methanol maser emission centroids in each spectral channel are shown in Figure 1. A signal-to-noise ratio cutoff of 5 sigma RMS was used. There is a clear correspondence between the shapes of the emission around the two bright peaks, although the EVN maps show the spectral peaks more spatially separated than the MERLIN data. This is probably due to the MERLIN observations being

spatially unresolved and therefore the centroids of one maser peak being slightly offset towards the position of the other `competing' maser (competitive smearing). The weaker flux between the two maser peaks is evidently not seen by the EVN. The cause of this is MERLIN's superior surface brightness sensitivity to extended emission, due to its shorter baselines. The position-velocity diagram of the maser feature is shown in Figure 2, where the impact parameter is plotted in the east-west direction across the disc. The EVN velocity curve (crosses) is qualitatively similar to the MERLIN results (circles) from Harvey-Smith et al. (2008).

Summary & Future Work:

The images of DR21(OH)N made with the EVN show methanol masers at the same position, and with a very similar position-velocity curve, to the results of Harvey-Smith et al. (2008) using MERLIN. This close agreement confirms the existence of a rotating disc of molecular gas at the position of the ERO3 massive protostar. As an extension of this work, a survey is currently being carried out of the Cygnus X molecular cloud towards very young massive protostars that show signatures of outflow in SiO. It is hoped that this survey will allow a statistical determination of the frequency with which massive stars form in the 'disc-outflow' scheme.

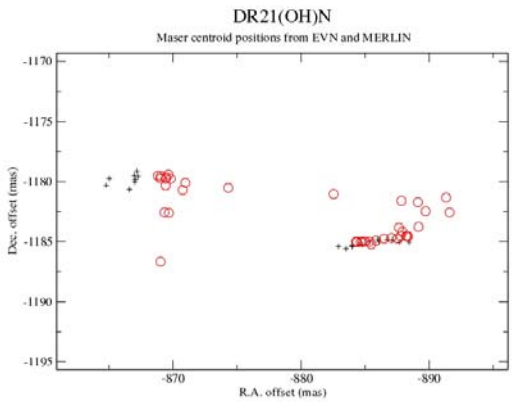


Figure 1: Comparison of the positions of 6.7-GHz methanol maser centroids, observed with the EVN (crosses: this paper) and MERLIN (circles: Harvey-Smith et al. 2008). The maps were registered by aligning the brightest spectral channel in each data set.

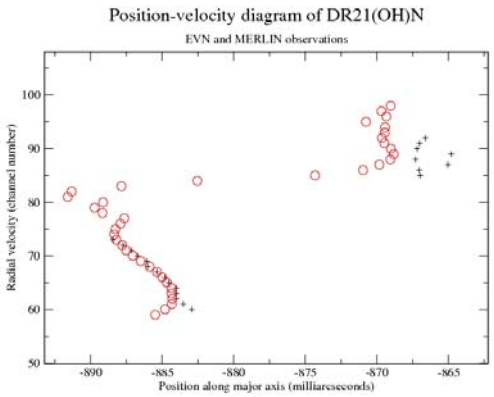


Figure 2: A comparison of the position-velocity plots of the EVN (crosses: this paper) and MERLIN (circles: Harvey-Smith et al. 2008) data in DR21(OH)N, showing the general agreement between the two velocity curves.

Lisa Harvey-Smith (USYD, Australia) and Rebeca Soria (OAN, Spain)

- **Distances to Galactic 6.7 GHz methanol masers**

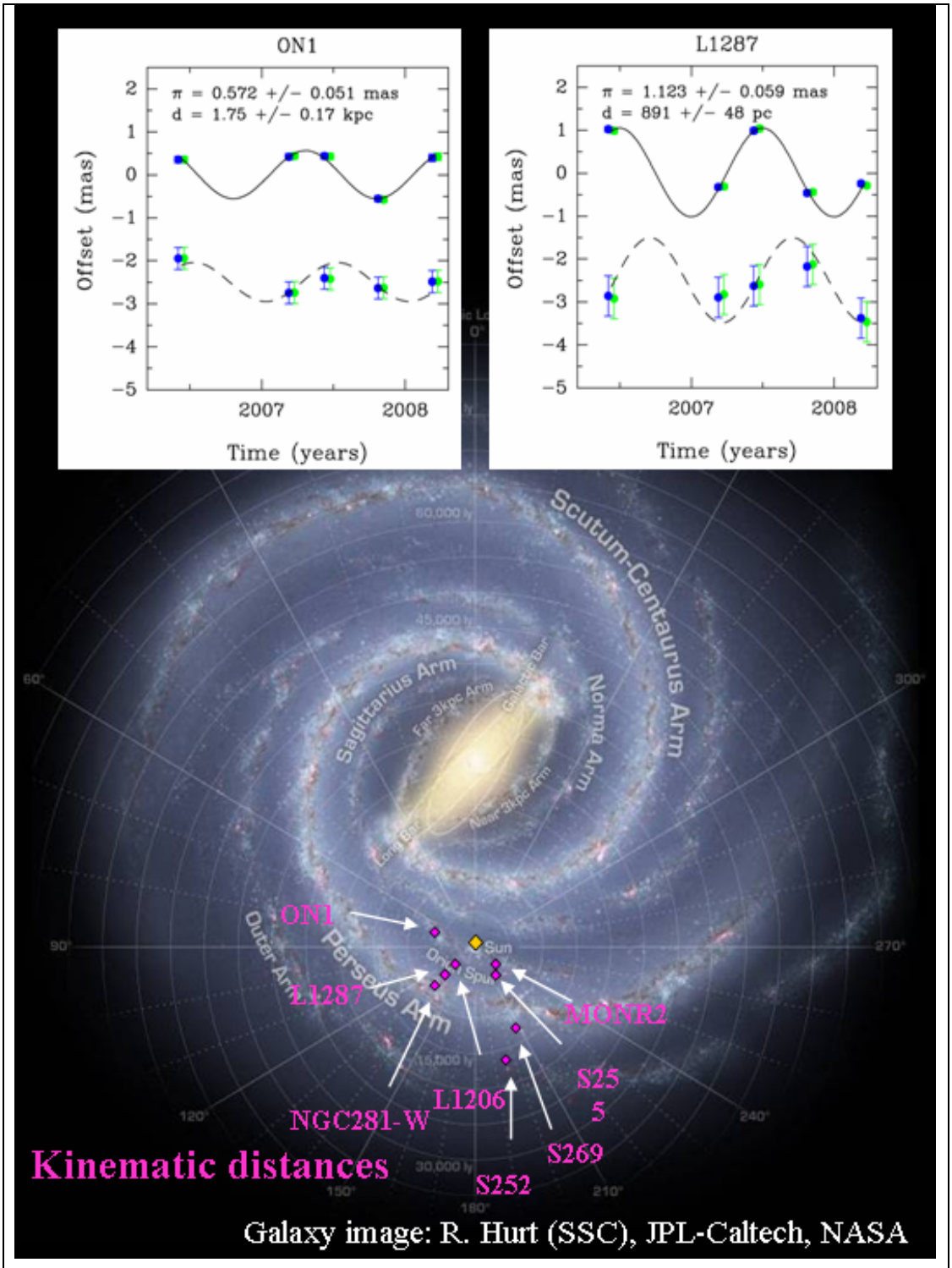
How does our Galaxy look like? What is its size and mass? The key to these fundamental questions are reliable distances on a Galactic scale. The most trustworthy and unbiased method is the trigonometric parallax. Using VLBI techniques for measuring parallaxes of molecular masers one can obtain very high accuracies up to 10 micro arc seconds, which translates to an accuracy of better than 10% up to distances of 10 kpc. This is a 100 fold improvement on Hipparcos, the first dedicated astrometry satellite at optical wavelengths. ESA's GAIA mission, a future astrometry satellite to be launched in 2012, will measure parallaxes and proper motions of one billion stars in the Milky Way with comparable accuracies. However, the regions traced by the molecular masers are usually highly obscured by dust and not visible in the optical. Thus the radio parallaxes will complement the GAIA results in regions like the spiral arms or the inner Galaxy.

The 6.7 GHz transition is exclusively associated with massive star forming regions, is very strong, stable, and has small internal motions. Furthermore, it is found several hundred times all over the Milky Way. This makes the 6.7 GHz transitions an ideal tool for measuring accurate distances and proper motions.

In a pilot study to investigate the feasibility of high precision astrometry of 6.7 GHz methanol masers with the EVN we observed eight target sources in five epochs between June 2006 and March 2008. This resulted, for the first time, in measured parallaxes of 6.7 GHz methanol masers. Preliminary parallax signatures and distance results for ON1 and L1287 are shown in the figure below. Both regions are well studied massive star formation regions, where our results solve the distance uncertainties, give insights to the kinematics of these regions and allow the determination of important physical properties such as length scales, masses and luminosities. In our preliminary results we reach accuracies up to 51 micro arc seconds, which still have the potential to be improved. This means that the 6.7 GHz methanol masers can be successfully added as a new tool to the astrometric tool bag.

Kazi L.J. Rygl (1), Andreas Brunthaler (1), Karl M. Menten (1), Mark J. Reid (2), Huib Jan van Langevelde (3,4),

1 MPIfR, 2 Harvard-Smithsonian CfA, 3 JIVE, 4 Sterrewacht Leiden

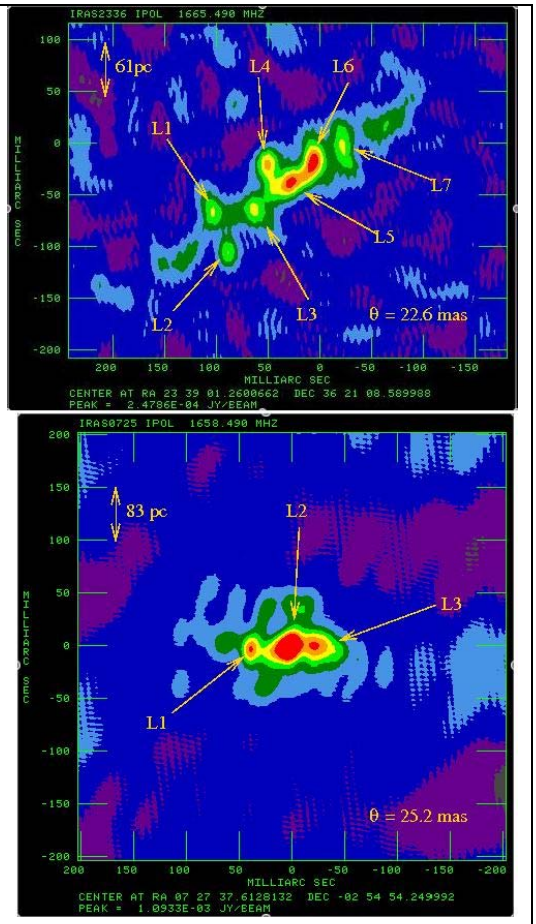


Caption: A face on image of our Galaxy (credit: R. Hurt (SSC), JPL-Caltech, NASA) overlaid with the star forming regions hosting the methanol masers observed by us placed according to their kinematic distances (magenta squares). The yellow square marks the position of the Sun. The top left and right insets show the parallax signatures in Right Ascension (solid line) and declination (dashed line) of ON1 and L1287, respectively.

- **EVN observations of the Ultra Luminous Infrared Galaxies IRAS 23365+3604 and IRAS 07251-0248**

IRAS 23365+3604 and IRAS 07251-0248 are two of the most distant Ultra Luminous Infrared Galaxies (ULIRG; L_FIR > 10^12 L_sun) in the local Universe, with expected CCSN rates of 5 and 8 SN/yr, respectively.

Using quasi-simultaneous observations with the EVN at 6 and 18 cm, we have obtained the deepest and highest resolution radio images ever of these supernova factories (see Figure 1 for the 18 cm observations). We have found a number of compact components whose inferred luminosities range from ~ 5 x 10^27 in IRAS 23365+3604, up to ~16 x 10^28 erg s^-1 Hz^-1 in IRAS 07251-0248. These luminosities are typical of Type IIL and Type IIn SN (bright radio events). A second epoch of observations should allow us to disentangle the nature of the compact objects we have found. The low rms (~ 13 microJy) that our EVN observations have, is crucial to detect objects as those we have found. Our results show that the EVN is a powerful tool to study the central regions of nearby ULIRGs, and can be efficiently used to determine the CCSN rate and SFR in those galaxies.



The results of this work are available at http://arxiv.org/abs/0812.0760 and will be published in the proceedings for The 9th European VLBI Network Symposium on The role of VLBI in the Golden Age for Radio Astronomy and EVN Users Meeting. An extended version is in preparation.

Cristina Romero-Cañizales (IAA-CSIC, Granada), Miguel A. Perez-Torres (IAA-CSIC, Granada) & Antxon Alberdi (IAA-CSIC, Granada).

- **EVN observations reveal parsec scale cores in Seyfert galaxies**

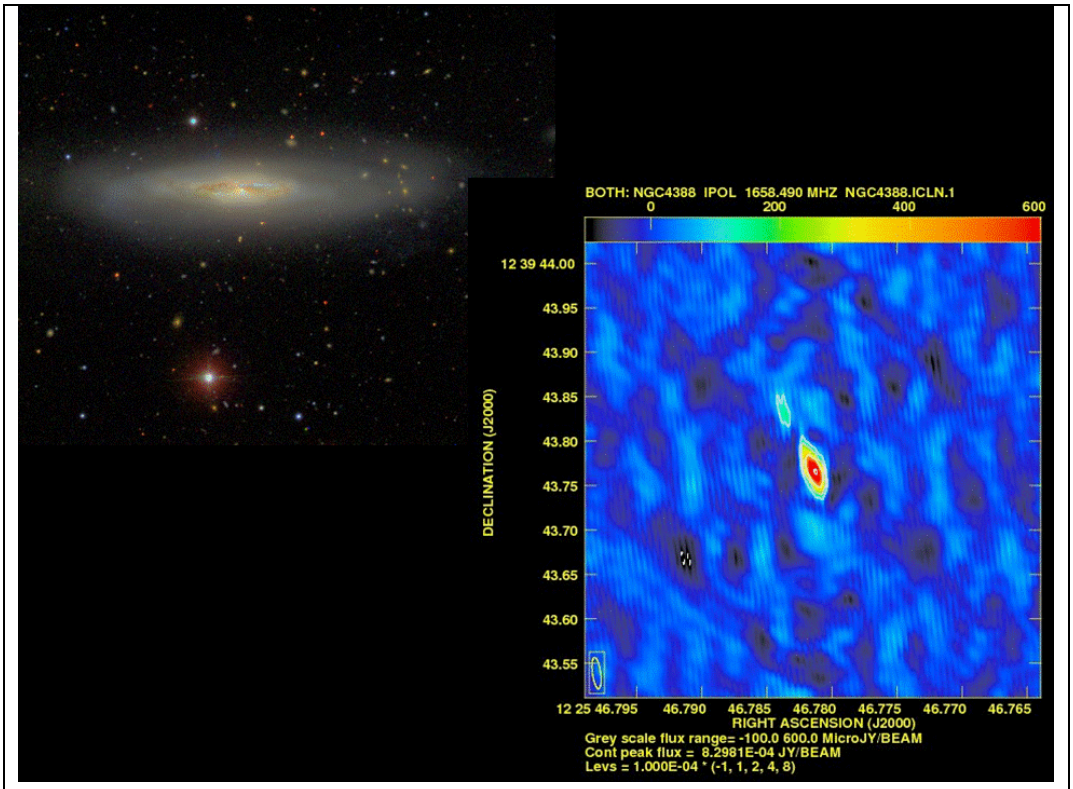
Active Galactic Nuclei (AGN) are traditionally divided in radio quiet (RQ) and radio loud (RL). While the latter are common targets of VLBI observations, only a few of the most nearby RQ sources have been imaged at milliarcsecond resolution.

In order to achieve a comprehensive understanding of the broadband properties of RQ AGN (and eventually clarify the nature of the RL/RQ differences), we are studying a distance-limited sample of 27 Seyfert galaxies. Literature VLA observations have revealed radio cores at the milliJansky level in these galaxies and we have selected 6 targets to be observed with the EVN at 1.6 and 5 GHz in 2007 session 2 and 2008 session 1.

Despite unfavourable observing conditions, we have been successful in revealing compact components in 4 out of the 6 sources: NGC 4051, NGC 4388, NGC 4501, and NGC 5033, three Seyfert galaxies of type 2 (or 1.9) and one of type 1.5. The flux densities are barely at the milliJansky level, but thanks to the great sensitivity provided by the 1 Gbps recording rate, these are all solid detections. Further analysis and accurate review of transfer solution from our phase calibrators will hopefully improve our images, e.g. confirming the possible jet-like feature visible in NGC 4388 (see figure).

The results have been presented at the last EVN Symposium in Bologna, and will be discussed in a forthcoming publication (Giroletti & Panessa, in preparation).

Marcello Giroletti (INAF/IRA, Bologna) & Francesca Panessa (INAF/IASF, Rome)



Images of NGC 4388 - Top left: An SDSS optical image of this beautiful Sy2 galaxy; bottom right: our (preliminary) EVN phase referenced map of its central region. The participating telescopes are Jb, Wb, Ef, On, Mc, Tr, Sh, Ur, Nt, Hh; the observing frequency is 1.6 GHz.

- **The 9th European VLBI Network Symposium on "The role of VLBI in the Golden Age for Radio Astronomy"**

The 9th European VLBI Network Symposium on "The role of VLBI in the Golden Age for Radio Astronomy" reached its end on Friday 26 September 2008 at 16:40, as planned, after the closing speech by Rafael Bachiller, Chairman of the EVN Consortium Board of Directors.

The Symposium, sponsored by the Istituto Nazionale di Astrofisica (INAF), RadioNet, and the Istituto di Radioastronomia, was held in the Conference Centre of the "Area della Ricerca del Consiglio Nazionale delle Ricerche", Bologna.

More than 140 participants, from 20 different countries (10 of which non-European) came to Bologna. The participants were affiliated with 22 universities and 26 research institutes, a very wide distribution. The Symposium lasted for 4 days, from Tuesday 23 September to Friday 26 September, with one afternoon being dedicated to the EVN

Users Meeting. The total number of applications to the Scientific Organizing Committee to give a 20-minute oral contribution requested more time than was available. The SOC policy was to allow as many presentations as possible, giving priority to contributions by young participants. The result was a rather full programme with 62 presentations, 8 of which were reviews and 6 were invited talks, distributed over 12 sessions. Thanks to the session Chairmen and to the collaboration of the speakers, it was possible to stay on time. There were also a large number of poster-papers: Thirty-four posters were set up, and they could be consulted for the full duration of the meeting.

The EVN Users Meeting was held at the Visitor Centre of the Medicina Radio Observatory. Participants had a guided tour of the two radio telescopes of the Observatory, the Northern Cross and the 32-m dish. The day at the Medicina Radio Observatory ended with the Symposium closing dinner at the restaurant "Aia Cavicchio". The dinner followed one of the main events of the meeting, the football match, now a tradition at the EVN Symposium. The local team, the "Local Fats", beat the "Giant Stars"-team 6 to 2. The referee of the match was from Australia, a neutral country.

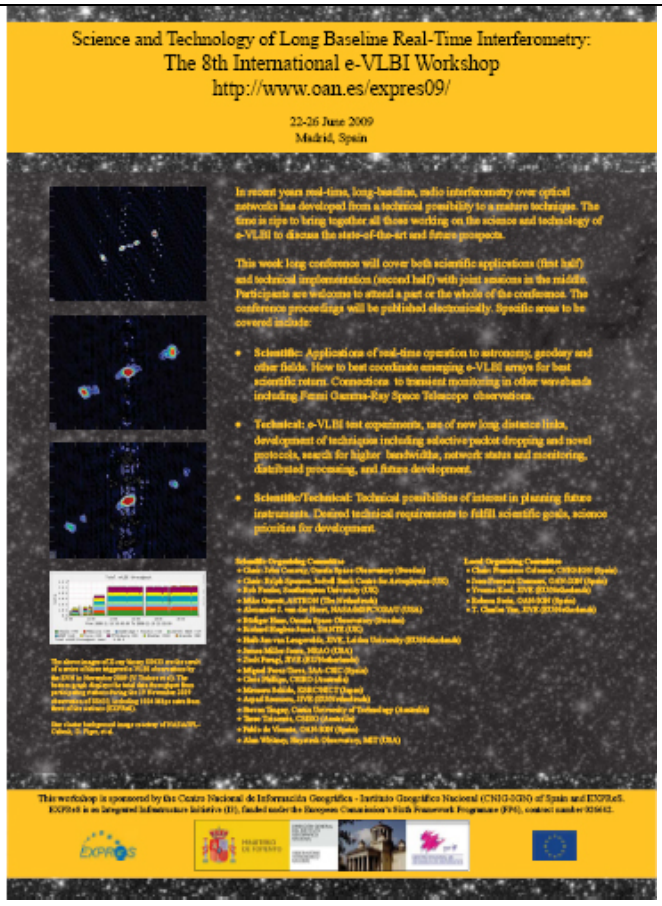
I like to finish this report by warmly thanking the members of the SOC and the Local Organizing Committee for their collaboration. Also many thanks to the IRA administration, to the technical staff, and to the many students who generously contributed to the success of the symposium.

The Proceedings of the 9th European VLBI Network Symposium will be published by Proceedings of Science (PoS), Sissa, Trieste.

Franco Mantovani, SOC Chairman.

- **Science and Technology of Long Baseline Real-Time Interferometry: The 8th International e-VLBI Workshop**

In recent years real-time, long-baseline, radio interferometry over optical networks has developed from a technical possibility to a mature technique. Scientifically, real-time operation is more important for long baselines, with their high spatial resolution, than for short baselines. However, until recently the required technology has not been readily available. Technical advances and the explosive increase of connection capacity have now radically changed the situation. Emerging radio interferometers (e-MERLIN, E-LOFAR, e-EVN and other e-VLBI arrays) will exploit mixed private/shared networks to achieve wide-bandwidth real-time operation. Mirroring developments in other wavebands of astronomy, these new real-time radio instruments are being optimized to study transient phenomena.

Moving data transport to fibre also gives the prospect of rapidly expanding observing bandwidth and sensitivity as network capacity continues to increase. Technically and operationally today's e-VLBI instruments serve as precursors to the real-time Square Kilometer Array. Given recent developments the time seems ripe to bring all those working on the science and technology of real-time, long-baseline radio interferometry together to discuss the state-of-the-art and future prospects.	

CONFERENCE

The conference will be held in Madrid (Spain) on June 22-26 2009. It will cover both scientific applications (first half) and technical implementation (second half) with joint sessions in the middle.

Participants are welcome to attend a part or the whole of the conference. The conference proceedings will be published electronically. Specific areas to be covered include:

- *Scientific:* Applications of real-time operation to astronomy, geodesy and other applications. How to best coordinate emerging e-VLBI arrays for best scientific return. Connections to transient monitoring in other wavebands including Fermi Gamma-Ray Space Telescope observations.
- *Technical:* e-VLBI test experiments, use of new long distance links, development in techniques including selective packet dropping and novel protocols, the search for higher bandwidths, network status and monitoring, distributed processing, and future development.
- *Scientific/Technical:* Future technical possibilities of interest in planning future instruments. Desired technical requirements to fulfill scientific goals, science priorities for development.

This workshop is sponsored by the Centro Nacional de Información Geográfica - Instituto Geográfico Nacional (CNIG-IGN) of Spain and EXPReS. EXPReS is an Integrated Infrastructure Initiative (i3), funded under the European Commission's Sixth Framework Programme (FP6), contract number 026642.

More information may be found in the web:
http://www.oan.es/expres09/

Francisco Colomer (LOC Chairman; OAN-IGN).

4. EVN Technical Development and Operations

▪ News from the e-EVN

The second half of 2008 was not eventless in the world of e-VLBI. During the 9th EVN Symposium the first results from sensitive e-EVN observations were presented, and the great progress in the EXPReS project were presented. This may have stimulated the PIs' curiosity because there were a number of e-EVN proposal submitted to the 1st October deadline. Besides the regular proposals, there was a target of opportunity request in early November to follow the evolution of a great flare in SS433 at three epochs. These observations produced a number of technical firsts for the e-EVN.

On 13 November the full e-EVN observed including Arecibo (and Shanghai, but this latter only in the test part). The data rate was 512

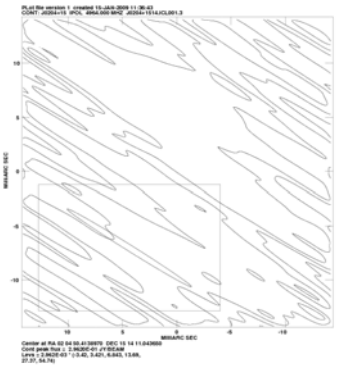
Mbps except for Arecibo, which was limited to 128 Mbps. This was the first e-VLBI experiment in which the telescopes in Westerbork were remotely operated from Dwingeloo. More importantly, the new digital backend system (TADUmax) and a Mark5B were used in Westerbork for the observations. In addition to the usual e-EVN array, a third MERLIN telescope participated in the experiment as well. Data from Knockin was streamed through the VLBA rack in IFs not in use by Cambridge, and ended up on tracks on the same Mark5A as used by Cambridge. The resulting datastream
was then sent to JIVE as a Multicast datastream. Each receiving Mark5A at JIVE that is responsible for handling the data from one of the MERLIN telescopes can subscribe to this stream, which is only sent across once from Jodrell Bank to JIVE. This was the first time we used this new feature in an science observation.

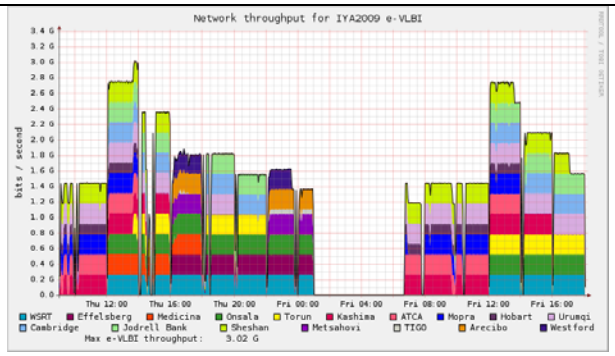
On 19 November the observations went in a similar fashion. However, an additional important milestone was achieved in that experiment. Three of the e-EVN telescopes, Effelsberg, Onsala and Westerbork observed and sent data at a full 1024 Mbps during the whole run, without dropping data packets. We are working on including more telescopes at a full 1024 Mbps in the near future.

In December 2008 there were a number of tests including stations in Asia and Australia, in preparation for the e-VLBI demonstrations at the opening of the International Year of Astronomy 2009. The participating stations were ATCA, Mopra, Hobart, Kashima, Sheshan, Urumqi, all at 256 Mb/s, except for Hobart, which took part at 128 Mb/s. These tests produced the first realtime fringe for Urumqi, Hobart, and Kashima, congratulations! The data at Kashima were dynamically translated from K5 to Mark5B format.

The **e-VLBI demonstrations at the IYA 2009 opening** went very well. This was a 33-hours observation with 17 telescopes participating from five continents! The stations were ATCA, Mopra, Hobart, Kashima, Urumqi, Shanghai, Metsahovi, Torun, Medicina, Onsala (both the 20m and the 25m), Effelsberg, Westerbork, Cambridge, Jodrell Bank, Arecibo, Westford and TIGO. The demo was split into 5 GHz and 8.4 GHz parts to accommodate all these telescopes. The 5 GHz data were mapped by the EVN data reduction pipeline on the fly, and was made publicly available together with live station webcams, and educational material on the web. This demonstration was a tremendous success. Obviously the pipeline images have their limitations, especially because nominal SEFDs were used instead of measured gains and
system temperatures, but we were please to see the jet component to the NW show up in agreement with the expectations (see movie here). Also shown is the total network throughput graph for the

experiment.





Note: the full movie can be watched on the URL:

http://www.oan.es/evnnews/J0204+1514_slideshow.gif

The EXPReS team

- **TKK / Metsähovi radio observatory e-VLBI news**

One of our newest developments from late 2008 is the 4G-EXPReS disk recorder. It records at 4-6 Gbit/s onto an external >=20 TB diskpack using COTS hardware. The system is targeted to record data from the upcoming digital backend systems with 10 Gbps Ethernet output such as the DBBC, DBE2 and others.

The Serial ATA port multiplier (PM) technology is often used in consumer and corporate systems in place of SAS. SATA PM boards are commercially available at low cost and they are supported by many modern SATA controllers.

Based on the PM technology and a gaming computer, we developed external low-cost diskpack variants that can carry 20 or 10 SATA disks. The diskpack is connected to the computer over one SFF-8470 SAS multilane ("InfiniBand") cable at rates up to 12 Gbit/s.

The recording system can emulate Mark5C control commands and can store network data in Mark5C, VDIF and other formats.

It is even possible to upgrade Mark5 units so that the same unit can be used in both Mark5 and 4G-EXPReS modes.

Continuous 4 Gbit/s recording over 17 hours is possible using 1.5 TB SATA disks. Recordings longer than 24 hours are possible using two diskpacks. The 2 TB SATA disks released this week allow even longer recording.

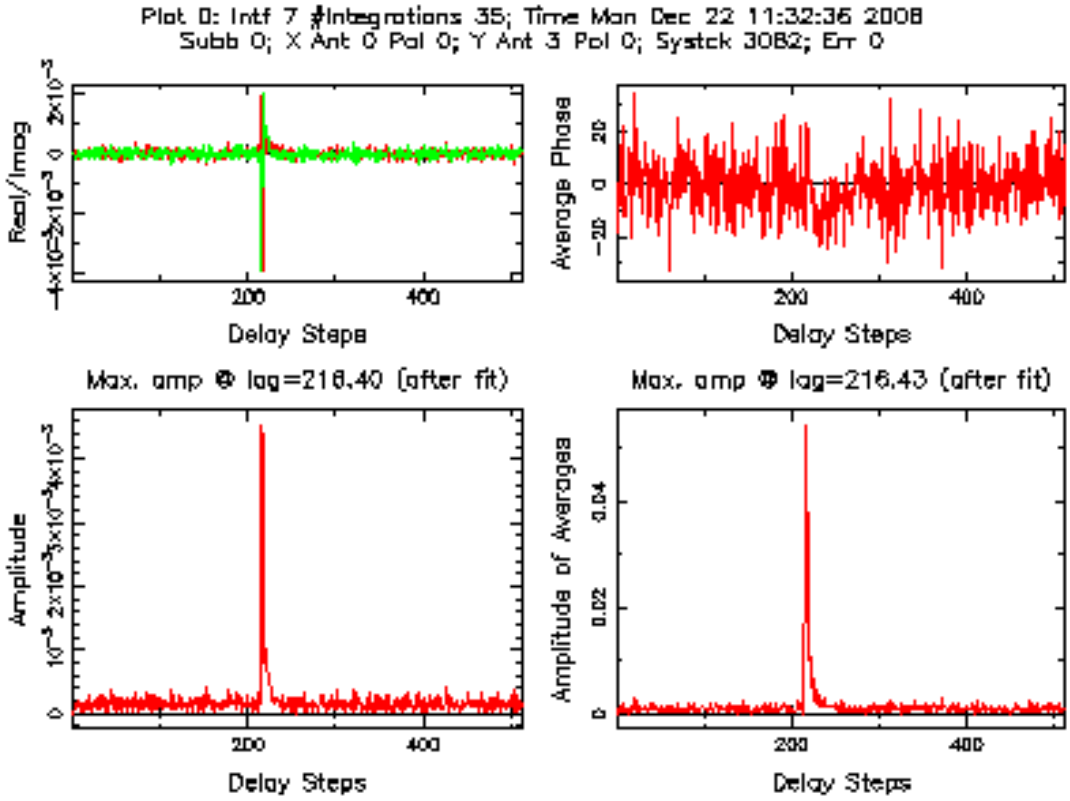
The diskpack is easy to carry and easy to ship from stations that do not yet have 10 Gbps networking. It presents a portable, shippable solution for high-speed recording and storage for those who do not desire to set up a traditional distributed network file system. A diskpack without side covers installed is shown in the Figure.	

Current write rates are in excess of 4 Gbit/s, reaching 6 Gbit/s. With newer motherboards this year we expect 8 Gbit/s rates to be achieved.

Jouko Ritakari, Jan Wagner, Guifré Molera, Minttu Uunila and Ari Mujunen (TKK/Metsähovi Radio Observatory); and Simon Casey (Onsala Space Observatory).

▪ First e-fringes to Urumqi

In preparation for the e-VLBI demonstration at the opening of the International Year of Astronomy, a fringe test with several Asian and Australian stations took place today. The participating stations were ATCA, Mopra, Hobart, Kashima, Sheshan, Urumqi, all at 256 Mb/s, except for Hobart, which took part at 128 Mb/s. Fringes were seen between all stations except Kashima, who had to park their telescope because of a storm. These were the first real-time e-fringes to Urumqi, and we welcome them to the e-EVN! The attached images shows the fringe between Urumqi and the Compact Array.



We also were able to transfer formatted data from the 34m Kashima telescope (dynamically translated from K5 to Mark5B) for the first time at 256 Mb/s. Hopefully the weather will allow us to see the first fringes during the next test.

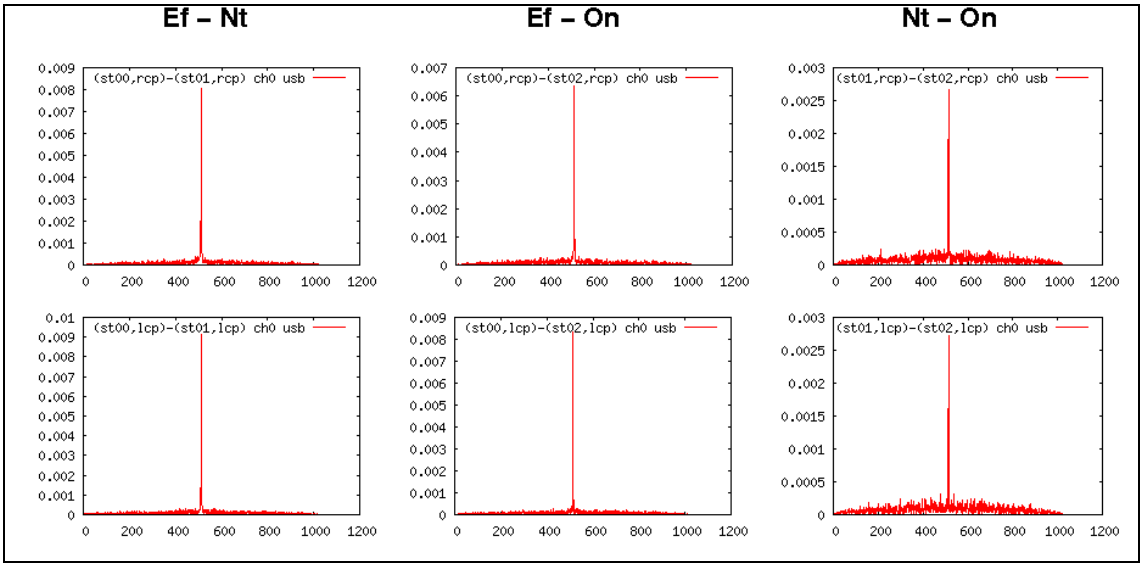
The fringes to Hobart were a repeat of another first, achieved last Friday during a test with ATCA and Mopra.

We wish to thank all the people involved, especially Chris Philips and Tasso Tzioumis from ATNF and Mamoru Sekdio from NICT, Paul Boven from JIVE, the people from CSTNet in China and of course the people from Urumqi station.

Mark Kettenis (JIVE).

▪ First EVN Network Monitoring Experiment Q-band

On 16 October 2008, it was for the first time that an EVN network monitoring experiment (NME) was performed at Q-band (7 mm, 43 GHz). Its main goal was to provide a "near-realtime" check of the 7mm setup of the EVN stations Effelsberg, Onsala and Noto, before the global Q-band user experiment GB060B started. The schedule included calibrator sources that are strong at 7mm and two SiO masers (43122 MHz). During the observations, data packages comprising up to 32 seconds of observing time were extracted from several scans at the participating EVN stations and sent by ftp to JIVE, where they were correlated using the JIVE software correlator. Two hours before the start of the user experiment, strong fringes had been confirmed for all channels (LCP and RCP) and all baselines, promising a great performance of all EVN stations in the following experiment. These were the first fringes to Noto at 43 GHz in a regular EVN session. Congratulations!



More results of the JIVE software correlator, including spectra of the SiO maser source U Her in LCP and RCP, can be found at http://www.evlbi.org/tog/ftp_fringes/N08Q1/index.html

Many thanks to Dave Graham and his colleagues of the GMVA for their advice on high-frequency VLBI!

Stefanie Muehle (JIVE).

- **EVN Scheduler's Report from the last observing session**

2008 Session 3: 16 October – 4 November
Wavelengths: 7mm, 13/3.6cm, 6cm, 18cm, 1.3cm

Again, for this session the main scheduling difficulties arose from the inclusion of many non-EVN telescopes in the observations, in addition to the restricted use of the Chinese antennas caused by the CHANG'E mission. Arecibo was required for 3 projects, the GBT for 4 and the VLA for 2 (one with single telescope, the other with the phased array). The 70m DSN dishes at both Robledo and Goldstone were used for 1 project, and Robledo was offered (and accepted) for another at a later stage of planning. MERLIN was used together with 1 project at 18cm. There were 5 global projects, one being correlated at the VLBA correlator; a single antenna at WSRT was used for this project, as the phased array could only be recorded using MK5B which cannot be correlated in Socorro with the hardware correlator. Shortly before the start of the session the failure of the Hartebeesthoek telescope was announced. As there seemed little prospect of a repair in the near future, PIs were advised to accept the time scheduled although this will degrade some projects.

A total of 16 user observations were scheduled; more could have been observed if the EVN had more disk-packs at its disposal. All except 2 projects with grades 1.6 or better were scheduled. The 3 antennas of the Russian QUASAR geodetic network were included in 3 parts of one project. The Yebes 40m telescope was included for all projects at 13/3.6cm and 1.3cm. Again I thank the Onsala, Noto and Effelsberg observatories for permitting the scheduling of a 5th wavelength (7mm) in the session.

Richard Porcas (EVN Scheduler)

5. EVN Staff matters

- **Job vacancies at EVN institutes**

- THE JOINT INSTITUTE FOR VLBI IN EUROPE (JIVE) is seeking candidates for fixed-term appointment as SUPPORT SCIENTIST to be located at JIVE, Dwingeloo, The Netherlands. **Deadline: 2 February 2009**.

The Joint Institute for VLBI in Europe (JIVE) operates the 16-station/Gbps MkIV EVN data processor (correlator) to support VLBI astronomical observations made with the European VLBI Network (EVN). The EVN is often used in conjunction with the MERLIN interferometer in the UK and the VLBA in the US. JIVE is actively developing e-VLBI techniques, and is pursuing significantly increased correlator capabilities to support the science goals of the EVN2015 document. JIVE is located in Dwingeloo, the Netherlands, at the headquarters of ASTRON, which is our host institute. Several Dutch universities are within easy reach, and interaction with other radio astronomy institutes throughout Europe provides for a vibrant scientific atmosphere. For further information regarding JIVE and the EVN, refer to www.jive.nl and www.evlbi.org.

We invite applications for the position of JIVE Support Scientist. This position would spend 50% of time on support duties and 50% on the appointee's own astronomical research. Support responsibilities typically include:

* assisting EVN users to schedule and analyze VLBI experiments.

* monitoring network performance through dedicated test observations.

* overseeing the correlation of user experiments: data-quality review, preparation of PI/station feedback, liaison with users, etc.

* testing new correlator/network features and capabilities.

The position may also involve other local-service collateral duties, such as visitor coordination or maintaining aspects of the JIVE computing environment for visitors.

The position requires a Ph.D. in astronomy or other relevant field, and a thorough knowledge of VLBI techniques. Applicants of any nationality are eligible to apply. A good command of written and spoken English is essential.

The appointment is offered for one year in the first instance with the possibility of an extension up to a total of three years. The appointee will be in the formal employ of the Netherlands Organization for Scientific Research (NWO). The position carries a competitive salary plus an excellent package of secondary benefits, including relocation expenses.

Please send your application to: Ms D. Verweij; Joint Institute for VLBI in Europe, Postbus 2, 7990 AA Dwingeloo, The Netherlands. Email: personnel@astron.nl

Applications should include a CV and list of publications, together with three letters of reference, which may be sent separately. All application materials should arrive **by 2 February 2009**, mentioning ref**. No JIVE2009/01**.

Responses are preferred by e-mail. Further information can be obtained from Dr. R.M. Campbell (campbell@jive.nl).

- THE JOINT INSTITUTE FOR VLBI IN EUROPE (JIVE) is seeking candidates for fixed-term appointment as DIGITAL ENGINEER to be located at JIVE, Dwingeloo, The Netherlands. **Deadline: 1 February 2009**.

The Joint Institute for VLBI in Europe (JIVE) operates an advanced purpose-built supercomputer (correlator) to support astronomical observations made with the European VLBI Network (EVN). This network of radio telescopes extends well beyond the boundaries of Europe, including telescopes located as far away as China, South Africa and Puerto Rico. During observing sessions the telescopes work together to form an earth-sized virtual telescope, creating images with an unsurpassed resolution. JIVE is located in Dwingeloo, in the Netherlands, at the headquarters of ASTRON, which is the host institute for JIVE. Further information regarding JIVE and the EVN can be obtained from http://www.jive.nl and http://www.evlbi.org.

The EVN is constantly expanding through the inclusion of new telescopes. In addition, developments in receiver and networking technology will enable a large increase in sensitivity of the network. In order to take full opportunity of these developments, the EVN correlator will need to be replaced. The next generation EVN correlator will have to provide several hundreds of Teraflops, comparable to the capacity of the largest current supercomputers.

In 2009 the UniBoard project, led by JIVE, will start. This project, part of the European Commission-sponsored RadioNet programme, will aim at the creation of a generic high-performance FPGA-based computing platform. This board will support several astronomical applications, including a correlator, a pulsar binning machine and a digital receiver.

JIVE is inviting applicants for the following appointment, becoming available immediately: **Digital Engineer**. This position involves:

- Translation of astronomical demands into system specifications
- Definition of architectural specifications

- Design and implementation of driver software
- (co-) responsibility for development and implementation of firmware
- Definition and execution of tests, both regarding astronomical integrity and computing performance

We are seeking an individual with an academic level education in digital engineering, or equivalent experience. He/she should be experienced in design and development of digital systems, have knowledge of design methods and development tools and experience with the definition of demands and specifications. We are seeking someone with a pragmatic attitude, who can function well both in a team and singly, and with the ambition to look beyond his own responsibility. A good command of written and spoken English is essential.

The appointment will be based at JIVE in the Netherlands and is offered for one year in the first instance with the possibility of an extension up to a total of three years. A further extension may be possible, depending on the availability of funding. The appointees will be in the formal employ of the Netherlands Organization for Scientific Research (NWO) with a competitive salary plus an excellent package of secondary benefits, including relocation expenses.

Please send your application to: personnel@astron.nl. Ms D. Verweij; Joint Institute for VLBI in Europe.

Applications including a CV should arrive by February 1 2009, mentioning ref. No. JIVE2008/07. Further information can be obtained from Arpad Szomoru (szomoru@jive.nl, +31521596509).

▪ Staff changes at EVN institutes

At JIVE, **Jun Yang** started as a support scientist on 1 Nov 2008. **Giuseppe Cimo** remains at JIVE, but leaves his support scientist position in the Science Operations & Support group to take up a posdoctoral fellow in VLBI techniques and applications after 1 Jan 2009. **Antonis Polatidis** will shortly depart as a support scientist at JIVE to fill the position of head of science support for the Radio Observatory at ASTRON, effective 1 Feb 2009.

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