European VLBI Network Newsletter

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Edited by Antonis Polatidis, EVN Secretary (ASTRON, The Netherlands; polatidis@astron.nl)

Message from the Chairman of the EVN Board of Directors

Dear Colleagues in the European VLBI Network, Dear Users of the EVN,

The European VLBI Network (EVN) Consortium Board of Directors (CBD) met on 25 and 26 October 2016 in Irbene and Jurmala (Latvia).

During its meeting the CBD welcomed the Ventspils International Radio Astronomy Centre (VIRAC) as a full member of the EVN. A few brief speeches were given. This is the culmination of the major overhaul by VIRAC of the 16-meter and 32-meter radio telescopes at its Irbene Observatory. The CBD heard about the latest technical progress, and the successful participation of the Irbene 32-meter telescope in recent EVN sessions at several frequencies. After lunch, the CBD was given a comprehensive guided tour in, on and around the 32-meter telescope (picture shown below). General admiration was expressed for the remarkable achievements of the VIRAC team, assisted by EVN friends from many places, in refurbishing this Soviet-vintage facility.

The EVN CBD also heard reports from the PC, the TOG, the correlators, JIVE, the stations, and partner organisations. Concerns were discussed about the possibly diminishing availability for VLBI of the GBT (GBO) and Arecibo. As Chair of the EVN CBD, I have written letters of support for these observatories to the NSF in the USA, pointing out in particular the unique strengths of these telescopes for VLBI, which I do not have to belabour in this EVN Newsletter. Although the formal deadlines for letters of protest may now have elapsed, I nevertheless urge every EVN user who shares these worries to continue to make concerns specific to the conduct of their own science known to appropriate authorities whenever the opportunity arises.

On a happier theme, the CBD noted with pleasure the imminent start of the new RadioNet, a H2020 project that will bring important technical development activities for VLBI, specifically the Joint Research Activities BRAND-EVN, on receiver development, and RINGS, on development of software including fringe-fitting. Some of the RadioNet Networking Activities will help to support the TOG and PC, as well as conferences, schools, and workshops in areas that include, among others, EVN science and techniques. Importantly, Trans

National Access funding will augment the user support levels at JIVE and will also bolster operational functionality for VLBI at individual EVN observatories.

The EVN CBD was also pleased to hear about the imminent start of JUMPING JIVE, another H2020 funded project, that will allow JIVE to achieve important extensions to its functionality, and to augment its EVN support in several areas. One of the work packages will support the EVN in updating its EVN2015 vision. The EVN CBD discussed how best to embark on this process, which can pick up from the round of consultation at the Users Meeting of the September 2016 St. Petersburg EVN Symposium. EVN scientists should expect to hear more about the process after the JUMPING JIVE kickoff.

The EVN CBD looked back to a very successful EVN Symposium 2016 (St. Petersburg), with a highly diverse range of high-quality presentations being given, at a most impressive location, supported by a smoothly running local organization, and matched by a very enjoyable social programme. The CBD thanked prof. Ipatov and his entire team at the IAA for their hard work and remarkable hospitality.

The CBD also accepted the kind invitation of Dr. Iván Agudo and colleagues at the Instituto de Astrofísica de Andalucía-CSIC (Granada, Spain) to host the next EVN Symposium, in 2018, at a date and specific venue to be further decided. However, I'm sure nobody will want to miss a meeting about EVN science held in Granada, so please watch this space for further information!

Immediately after the CBD meeting, a brief ceremony and press conference was held on 26 October 2016 in Riga, in the presence of Ms. Diana Laipniece representing the Latvian Ministry of Science and Education. The importance of the EVN milestone for VIRAC was explained, and linked to the wider growth of the scientific and technological capacity of Latvia. Dr. Karlis Kreslins, Acting Rector of the Ventspils University College to which VIRAC belongs, and I, as Chair of the EVN CBD, signed a document confirming VIRAC's accession to the EVN (bottom image, left).

The same meeting marked the exchange of letters (bottom image, right) between the JIV-ERIC Council, represented by the JIVE Director Huib Jan van Langevelde, and the Latvian Ministry of Education and Science, again represented by Ms. Diana Laipniece, on Latvian membership in the Joint Institute for VLBI - European Research Infrastructure Consortium (JIV-ERIC). Just a few weeks later, in its semi-annual meeting in Dwingeloo on 15 November 2916, the JIV-ERIC Council approved the new membership. From 1 January 2017, the Latvian flag is proudly displayed together with the five flags of other JIV-ERIC members and logos of four JIVE-ERIC participating organisations.

The next meeting of the EVN Consortium Board of Directors will be held on May 9 and 10, in Torun, Poland.

Meanwhile, the Call for Proposals for the 1st February 2017 deadline has already been circulated and describes in detail some of the new options available to EVN users. More information can be found in the next section. A notable addition is the availability of the Irbene 32m telescope at all available bands.
The EVN Programme Committee will meet on March 14, in Jodrell Bank Observatory to review the new proposals.

René Vermeulen,
Chairman, EVN Consortium Board of Directors

Call for the EVN Proposals

European VLBI Network
Call for Proposals
Deadline 1st February 2017

This text is also available on the web at
http://www.chalmers.se/en/centres/oso/radio-astronomy/vlbi/Documents/EVN_CfP.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 facility is open to all astronomers. Use of the Network by astronomers not specialised in the VLBI technique is encouraged.
The Joint Institute for VLBI ERIC (JIVE) can provide support and advice on proposal preparation, scheduling, correlation and analysis. See EVN User Support at http://www.jive.eu.

Future Standard EVN Observing Sessions (disk recording)

2017 Session 1 Feb 23 - Mar 16 18/21 cm, 6 cm ...
2017 Session 2 May 25 - Jun 15 18/21 cm, 6 cm ...
2017 Session 3 Oct 19 - Nov 09 18/21 cm, 6 cm ...

Proposals received by 1st February 2017 will be considered for scheduling in Session 2, 2017 or later. Finalisation of the planned observing wavelengths will depend on proposal pressure.

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

2017 Apr 11 - Apr 12 (start at 13 UTC) 18/21 cm, 6 cm, 5 cm or 1.3 cm
2017 May 09 - May 10 (start at 13 UTC) 18/21 cm, 6 cm, 5 cm or 1.3 cm
2017 Jun 20 - Jun 21 (start at 13 UTC) 18/21 cm, 6 cm, 5 cm or 1.3 cm
2017 Sep 19 - Sep 20 (start at 13 UTC) 18/21 cm, 6 cm, 5 cm or 1.3 cm
2017 Oct 10 - Oct 11 (start at 13 UTC) 18/21 cm, 6 cm, 5 cm or 1.3 cm
2017 Nov 14 - Nov 15 (start at 13 UTC) 18/21 cm, 6 cm, 5 cm or 1.3 cm
2017 Dec 14 - Dec 15 (start at 13 UTC) 18/21 cm, 6 cm, 5 cm or 1.3 cm

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

Successful proposals with an e-VLBI component submitted by the February 1 deadline will be considered for scheduling in the above e-VLBI sessions starting from April 11, 2017.

Note that only one wavelength will be run in each e-VLBI session, selected based on proposal priorities.

See http://www.jive.eu/jivewiki/doku.php?id=evn:guidelines for details concerning the e-VLBI observation classes and observing modes.

New Features for the Next Standard EVN and e-VLBI Sessions

e-VLBI at 2 Gbps is available at 6 cm and 1.3 cm at a subset of the EVN telescopes. The remaining telescopes will observe at 1 Gbps (mixed mode observation). The current status is given here:

http://www.evlbi.org/evlbi/e-vlbi_status.html

Disk recording at 2 Gbps is available at 6 cm, 3.6 cm, 1.3 cm and 0.7 cm at a subset of the EVN telescopes. The remaining telescopes will record at 1 Gbps (mixed mode observation). The current status is given here:

https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/2Gbps

Use of this data rate should be clearly justified and limited to projects that really need it.

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-VLBI array, availability of different stations per observing band and for the dates of the e-VLBI observing sessions.

Global VLBI Proposals

Global proposals can be proposed up to 2 Gbps including VLBA, GBT and the JVLA.

Some modes may require different bandwidth channels at different telescopes; correlation at JIVE can handle this.

JIVE support staff and Amy Mioduszewski at Socorro will assist during the scheduling process of such observations.

Global observations will be correlated at the SFXC correlator at JIVE (default) or at the DiFX correlator in Bonn or at the DiFX correlator in Socorro (if appropriate justification is given in the proposal).

RadioAstron Observations

Proposals requesting the EVN as ground array support or correlation at JIVE for RadioAstron AO5 observations in the period: 1 July 2017 to 30 June 2018, may be submitted at this deadline.

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.

Availability of EVN Antennas

The SRT will be offline for at least the entire 2017 and VLBI operations are expected to restart at some time in 2018. Exact date will be communicated at a later stage when closer to resume operations.

The Irbene 32 m telescope is a new EVN station located 30 km north of Ventspils, Latvia. The telescope may be requested for EVN disk recording observations at 18 (single pol., RCP, uncooled receiver), 6, 5 and 3.6 cm wavelengths.

The WSRT will be participating with a single telescope, equipped with dual circular polarization receivers. The frequency coverage will remain the same. Proposers who wish to use the EVN Calculator, should select "W1" instead of "Wb".

Tm65 is the 65 m telescope at Tianma, about 6 km away from the 25 m Seshan telescope (Sh). The 2-letter abbreviation for Tm65 telescope is T6. Both of these telescopes can observe at 18, 13, 6, 5, 3.6, and 3.6/13 cm. Tm65 can also observe at 21 cm. Tm65 is the default telescope; Sh will be used if the Tm65 is not available for some reason. If you select both, you should also discuss the motivation for the very short baseline in the proposal.

Integration of e-MERLIN Telescopes into the EVN

Integration of e-MERLIN outstation antennas into the EVN is now possible following recent software upgrades on the e-MERLIN correlator at Jodrell Bank. EVN experiments can now include multiple e-MERLIN outstation antennas in addition to an antenna at Jodrell Bank. The total recorded bandwidth for the outstations will be limited to 1 Gbps but can be divided between 1, 2 or 4 e-MERLIN antennas. PIs of proposals should indicate in the scientific justification which e-MERLIN antennas they wish to record. These data will then be available for correlation with all other EVN stations in mixed mode, providing a fully integrated additional set of short spacing EVN data for the first time. For example, within e-MERLIN, the baseline coverage from Jb + Da, Kn, De, and Cm would span separations of 11 to 220 km.

Proposers can alternatively still request a full bandwidth e-MERLIN observation for high sensitivity lower surface brightness imaging where the e-MERLIN telescopes are correlated at JBO. At L-Band the maximum bandwidth is 2x512 MHz; from Session I 2017, we envisage that at C- and K-Band a maximum bandwidth of 2x2 GHz will be available on a best efforts basis.
For any technical queries contact: vlbi@jb.man.ac.uk

Use of Korean VLBI Network Antennas

The Korean VLBI Network (KVN) is an Associate Member of the EVN. KVN telescopes may be requested for EVN observations at 1.3 cm and 7 mm wavelengths. For more details regarding the KVN, see: http://radio.kasi.re.kr/kvn/main_kvn.php

Use of Australian VLBI Network Antennas

Some Australian Long Baseline Array (LBA) time will be made available for simultaneous scheduling with the EVN, thus enabling the possibility of joint LBA/EVN observations. The easternmost stations of the EVN are in a similar longitude range to the LBA telescopes, and for sources in equatorial regions, baselines to western European stations are also achievable. Joint LBA time is likely to be heavily oversubscribed, and authors are requested to note whether they are prepared to accept scheduling without LBA antennas being present.

Any proposals for joint EVN+LBA observations submitted to the EVN by its 1 February 2017 deadline should also be submitted to the LBA by their (provisional) 15 June 2017 deadline and will first be eligible for scheduling in EVN Session 3/2017.

For more details regarding proposing time on the LBA, see:
http://www.atnf.csiro.au/observers/apply/avail.html & http://www.atnf.csiro.au/vlbi/index.html

EVN+LBA observations should be possible at all principal EVN wavebands from 21 cm to 1.3 cm.: See:
(http://www.evlbi.org/user_guide/freq_cov.html) and http://www.evlbi.org/user_guide/EVNstatus.txt.

Out of Session Observing

Out-of-Session observing time (up to a maximum of 144 hours/year), is now available to all proposals (disk recording or e-VLBI).

Proposals requesting Out-of-Session observing time must provide full scientific (and technical if appropriate) justification as to why observations must be made outside standard sessions.

Out-of-Session observing blocks should be no less than 12 hours in duration (although individual observations can be shorter), and occur no more than 10 times per year.

Proposals should specify which dates/GST ranges are being requested and indicate the minimum requirement in terms of numbers of telescopes (and any particular telescopes).

Proposals will only be considered for dates occurring after the regular EVN session that follows EVN proposal review.

Observations requiring much shorter lead times should be submitted as "Target-of-Opportunity" (ToO) proposals.

Joint observations with other facilities

For joint observations with other facilities, e.g., EVN+XMM, separate proposals should be submitted to the EVN and to the other facility. Such proposals will be considered by the EVN PC on a case-by-case basis.

How to Submit

All EVN and Global proposals (except ToO proposals) must be submitted using the NorthStar on-line proposal submission tool. Global proposals will be forwarded to NRAO automatically and should not be submitted to NRAO separately.

New proposers should register at http://proposal.jive.eu.

Proposals must include the following sections:

1. Science & technical justification
2. Figures, tables and references (optional)

These sections shall be submitted as a single PDF document. The total length of this document is limited to 4 pages (A4 or US Letter format), with a font size no smaller than 11 points. Proposers are free to adjust the length of the various proposal sections within this overall length limit.

The strongly recommended breakdown is 2 pages for the Science & technical justification and 2 pages for Figures, tables and references.

Figures and tables may be interleaved with the science justification, so that e.g. figures appear close to the location in the text where references are made to them.

When specifying requested antennas from the LBA, please specify 'LBA' under the "other" row in the telescope-selection box - this selects all that are available for joint observations.

The deadline for submission is 23:59:59 UTC on 1st February 2017.

Additional information

Further information on EVN, EVN+MERLIN, Global VLBI and e-VLBI observations, and guidelines for proposal submission are available at: http://www.jive.eu/jivewiki/doku.php?id=evn:guidelines

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-EVN 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.

A selection of recent highlights is presented here:
http://www.jive.eu/jivewiki/doku.php?id=evn:evn_science

A selection of recent refereed EVN publications is presented here:
http://www.jive.eu/jivewiki/doku.php?id=evn:evn_publications

Michael Lindqvist, Onsala Space Observatory, EVN PC Chairman

EVN Science Highlights: EVN localization of FRB121102

Fast radio burst are very short duration (a few milliseconds) dispersed radio signals of unknown origin. The first FRB was reported by Lorimer et al. in 2007. The high dispersion measure indicated that FRBs are most likely extragalactic in origin. If true, these signals could be used to probe the distribution of baryonic matter in the Universe, fundamental to cosmological models. The so far reported single-dish detections with Parkes, Arecibo and the GBT could not provide the accurate positions needed to identify a counterpart.

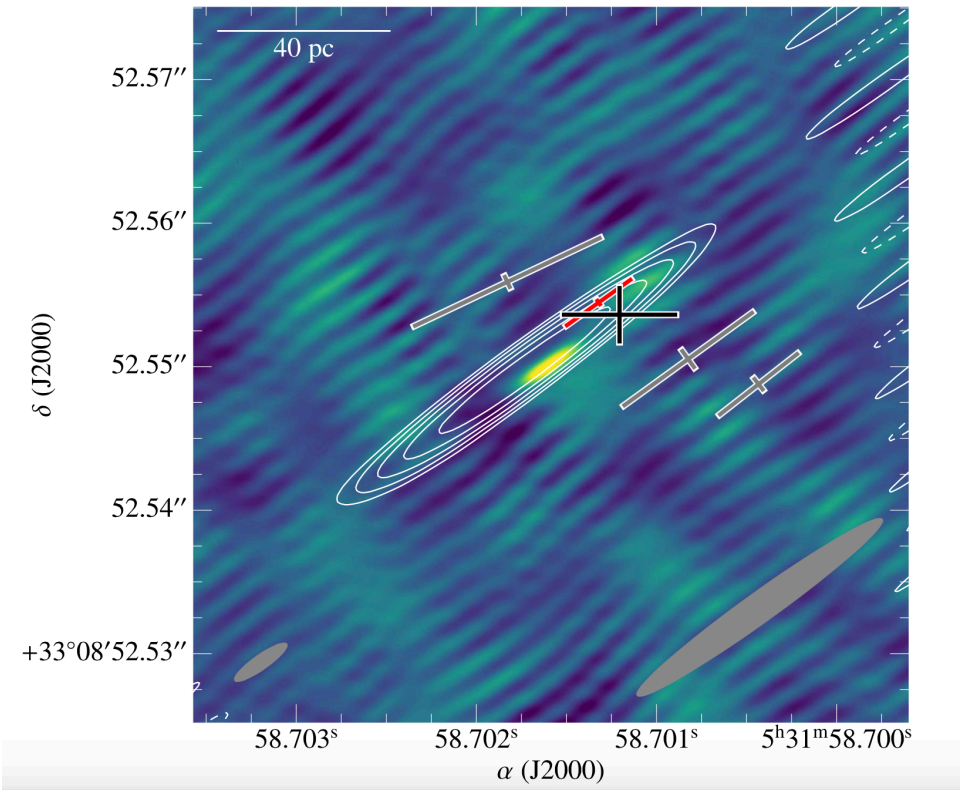
In the EVN Newsletter #44 Marcello Giroletti (INAF) reported EVN detection of a candidate counterpart to FRB 150418. The compact and variable nature of the radio source (Marcote et al. 2016, ATel #8959; Giroletti et al. 2016, A&A 593, L16; but also independently Bassa et al. 2016, MNRAS, 463, L36) indicated that it is a weak active galactic nucleus (AGN) in the galaxy WISE J071634.59-190039.2, and its relation to the FRB event is questionable. The continued variability of the putative counterpart to that FRB suggests that the apparent "afterglow" claimed by Keane et al. is quite plausibly AGN activity or scintillation of the compact source, and the association between this AGN with the FRB event is now tenuous.

The only way to reliably measure the position of an FRB is direct, interferometric detection of a burst. At JIVE we have worked in the past few years to develop a technique to localize ms-duration signals with the EVN (see Paragi 2016, arXiv 1612.00508). The discovery of repeated bursts from FRB 121102 (Spitler et al. 2016, Nature, 531, 202) provided an excellent opportunity to do this. We carried out five epochs of EVN e-VLBI ToO observations from February to May 2016 at 18cm, with parallel recording of the data at JIVE and with the pulsar backend in Arecibo (PI Jason Hessels, ASTRON). We did not detect activity in the field.

In August 2016 the Karl G. Jansky Very Large Array (VLA) succeeded, and provided the first accurate position to this source. Within about 100 mas the VLA found a weak persistent radio source as well. We recorrelated the EVN data with this new position, and found that the persistent source was compact on mas scales, and this was further confirmed with the VLBA. These results were reported by Chatterjee et al. 2017 in Nature (also available online, arXiv 1701.01098). To verify that the bursts and the persistent source are indeed coincident at higher resolution, we carried out further EVN+Arecibo observations in September 2016. This resulted in the detection of four bursts, the brightest of which clearly showing that the source of the bursts and the persistent radio source are co-located within about 10 mas (see figure below, from Marcote et al. 2017, ApJL, 834, L8). The persistent radio source itself is located in a dwarf galaxy at a redshift of z=0.1927 (Tendulkar et al. 2017, ApJL, 834, L7).

This result will certainly boost the FRB field further. We thank the continuous great support of all the EVN observatories to carry out these demanding, out-of-session observations, and the special efforts made at Arecibo to realize parallel e-VLBI streaming and pulsar backend recording. This mode of observations and the special processing of the VLBI data at JIVE (dedispersion, high time/frequency resolution correlation, gating) is available to the whole EVN community.

JIVE press release:
http://www.jive.eu/astronomers-pinpoint-radio-flashes-long-long-ago-galaxy-far-far-away
Video explaining the results:
https://youtu.be/1t-pKcD0Bsw



Marcote et al. 2017, ApJL, 834, L8: Individual burst locations (grey: weak bursts; red: the brightest burst ever detected in FRB121102) and the weighted mean burst location (black) with respect to the persistent radio source (contours: 18cm, color scale: 6cm EVN images).

Zsolt Paragi, B. Marcote (Joint Institute for VLBI ERIC) for the FRB 121102 team

JUMPING for the EVN

Formally Dec 1 2016, the EC funded project JUMPING JIVE started. This project was awarded € 2.983k€ from the Horizon2020 programme in a call aimed at excellent European Research Infrastructures seeking an opportunity to profile themselves. The new ERIC status qualified JIVE to apply for this. Under this programme JIVE and its partners will carry out a number of projects to ensure that our VLBI entity will be visible in the European science arena and ready for the future.

One thing that will be taken on from the start is communicating the scientific value of VLBI. Because of the distributed nature of the EVN, the outreach effort for VLBI is usually carried out by the national observatories, which can address their national community, in their own language if needed. But for

VLBI across Europe it is important to coordinate these efforts and address the public and policy makers on a European scale. As JUMPING JIVE is also aiming to advocate JIVE to new potential members, this will be a key effort. JIVE will also engage in a dialogue with the International LOFAR Telescope (ILT; coordinated by ASTRON's René Vermeulen) to evaluate whether the ERIC construct is also interesting for that telescope, which is similarly distributed across European countries.

Directly relevant for the EVN, is the work programme in JUMPING JIVE that will facilitate the development of an EVN science case and technology roadmap (led by INAF's Tiziana Venturi), which will be important for justifying continued funding for European VLBI. Another work programme focuses on integrating new antennas into the EVN and getting them ready and calibrated for scientific use. This activity will obviously need to be done in coordination with the EVN TOG, chaired by Pablo Vicente at Yebes. In particular, there will be an opportunity (led by Rob Beswick from University of Manchester) to support the science and engineering communities in African countries that are starting to get involved in VLBI and radio astronomy.

Looking at the future and global developments, the JUMPING JIVE project will also allow us to support the SKA VLBI working group. And a liaison scientist will work at the SKA organisation to discuss the technical and operational issues for doing VLBI experiments that involve SKA elements. Because we think that in that context it will be important to organise Global VLBI across all continents, we have successfully proposed to the EC to work on legacy software (specifically SCHED) and define more modern standards. Finally, we also have an opportunity to exercise geodetic processing on the EVN SFXC correlator platform, in collaboration with the experts in Bordeaux (Patrick Charlot). It is a long-standing desire to be able to process and verify data from JIVE with geodetic codes and such capabilities may become of interest to some of JIVE's international partners.

Huib Jan van Langevelde, Joint Institute for VLBI ERIC

e-Shipping in the EVN takes off

In order to minimise the physical shipping of disk packs and expand the available pool of recording media, the EVN board agreed to adopt and roll out the FlexBuff system. As a result, the use of e-shipping in the EVN has seen a steady increase over the past period. The FlexBuff, originally developed at Metsahovi Observatory as part of the NEXPReS project, is a high capacity COTS recording/playback system, suitable for simultaneous high-speed recording/correlation and data transfer. The current units have a chassis with 36 disks. At JIVE these are organised in six zfs raid arrays, combining optimal speed and resilience. This however does impact the usable storage capacity, which, using 4TB disks, adds up to 102 TB per FlexBuff. From the second half of 2016 on, 8TB disks have been used, doubling the capacity.

After initial tests Onsala Space Observatory purchased two

units, one to be deployed at JIVE, at the end of 2015. This was followed by Effelsberg, (using a Mark6 unit at the station side for recording), Yebes and Hartebeesthoek in 2016. Just before the end of the year Medicina and Noto also purchased two units for use at JIVE. Westerbork and Jodrell Bank are about to follow suit.

With all this new hardware, and more to come, the setup at JIVE will need some reorganising. This will take place in the coming months. New software tools were developed In order to facilitate monitoring and control of data spread over many FlexBuffs.

Arpad Szomoru, Joint Institute for VLBI ERIC

Recent and Upcoming Meetings

4-8 September 2017: IAU Symposium 336 Astrophysical Masers: Unlocking the Mysteries of the Universe.

Registration is open for the International Astronomical Union Symposium 336 on Astrophysical Masers which will be held on September 4-8, 2017 in Cagliari (Sardinia), Italy.

Astronomical masers touch on a very broad range of astrophysical phenomena. Originally, maser research concentrated on star formation and evolved stars, where the high resolution afforded by bright maser emission allowed one to probe dynamics on ~1 AU scale and with ~ 1 km/s motions. A couple of decades ago, the discovery of water masers from accretion disks around super-massive black holes opened new avenues to resolve the disks, measure motions, estimate supermassive black hole masses, and derive distances to galaxies geometrically.

On the past five years there has been an explosion of work on masers, especially related to the cosmic distance scale, the structure of the Milky Way, and the masses of (AGN) black holes.

Specific topics for this symposium will include:

- The Structure of the Milky Way
- Local Group Cosmology
- The Cosmic Distance Scale and the Hubble Constant
- Galaxy Kinematics and Black Hole Masses
- The Formation of Massive Stars
- Pulsation and Outflows in Evolved Stars
- Theory of masers and maser sources

Details are available on the conference website: http://iaus336.oa-cagliari.inaf.it