European VLBI Network Newsletter

Number 30

September 2011

Contents

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1) Message from the EVN chairman

Dear Colleagues,

I would like to open this newsletter with my heartfelt thanks to Professor Andrzej Kus for his excellent chairmanship of the EVN Consortium Board for the last two years. Andrzej has been involved with VLBI since the earliest days of the EVN and remains a true champion of the EVN. Andrzey has worked tirelessly to strengthen the EVN with the 32-m telescope in Torun and to bring in new telescopes, especially the three and hopefully four antennas of the Russian Kvasar network. Thanks again to Magdalena Kunert-Bajraszewska who ensured the smooth running of the CBD business.

It now is with great sadness that I have to report the passing of Prof Andrey Finkelstein, the director of the Russian Academy of Sciences' Applied Astronomy Institute. This is a sad loss to radio astronomy and geodesy - Andrey was the champion and driving force behind the superbly designed and operated Kvasar network. It was a real pleasure to visit both the IAA and its correlator in St Petersburg and one of the Kvasar telescopes, last year. The addition of these telescopes is a massive boost to the EVN and it was Andrey who made this possible. These telescopes are also a vital part of the IVS network as well as a powerful real-time geodetic network in their own right and Andrey made many important scientific contributions in this field. We send all our sympathy to Andrey's family and colleagues at this sad time.

We congratulate the Radioastron team on the successful launch of the Spektr-R orbiting radio telescope from the Baikonur Cosmodrome on 18 July and wish them luck as they complete the in-orbit check-out.

As I take over the chair of the EVN Consortium Board from Andrzej Kus' capable hands, and with Prof Anton Zensus as the new vice-chair, I am sure that we can look forward to a bright future for the EVN. The recent addition of new antennas, the promise of more, not least the 64-m in Sardinia, which is about to be comissioned, the strong desire in Africa and elsewhere to re-equip antennas and join the network, and the technical developments towards faster real-time connections, new DBBC and other digital front-ends and new software and FPGA-based correlators are all evidence of the global interest in developing the EVN. The enthusiasm of its growing user base, especially among younger scientists, was evident as the highly successful ERIS school held in Rimini this month. Thanks again to Tiziana Venturi, Anita Richards and all those to helped with the organising this event. And the highlights in this newsletter show how the EVN is increasingly being used for novel and demanding science applications

Finally, I'd just like to repeat our thanks to Tiziana Venturi and Walter Alef, for chairing the PC and TOG so succesfully and introduce Tom Muxlow and Michael Lindqvist as the new PC and TOG chairs, along with Rob Beswick as the new CBD Secretary, and editor of this newsletter.

Simon Garrington

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2) Call for EVN Proposals

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European VLBI Network

Call for Proposals

Deadline 1 October 2011

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This call for proposals is also available on the web as text or pdf.

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 specialized in VLBI techniques 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 3 Oct 20 - Nov 10 18/21cm, 6cm ...
- 2012 Session 1 Feb 23 - Mar 15 18/21cm, 6cm ...
- 2012 Session 2 May 24 - Jun 12 18/21cm, 6cm ...

Proposals received by 1 October 2011 will be considered for scheduling in Session 1, 2012 or later. Finalization of the planned observing wavelengths will depend on proposal pressure.

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

- 2011 Oct 17 - Oct 18 (start at 13 UTC) 18/21cm, 6cm, 5cm or 1.3cm
- 2011 Nov 23 - Nov 24 (start at 13 UTC) 18/21cm, 6cm, 5cm or 1.3cm
- 2011 Dec 14 - Dec 15 (start at 13 UTC) 18/21cm, 6cm, 5cm or 1.3cm
- *2012 Jan 10 - Jan 11 (start at 13 UTC) 18/21cm, 6cm, 5cm or 1.3cm
- *2012 Feb 07 - Feb 08 (start at 13 UTC) 18/21cm, 6cm, 5cm or 1.3cm

*Dates for 2012 still provisional. 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 October 1st deadline will be considered for scheduling in the above sessions starting from November 2011. Note that only one wavelength will be run in each session, depending on proposal priorities.

See http://www.e-merlin.ac.uk/vlbi/evn_docs/guidelines.html for details concerning the e-VLBI observation classes and the observing modes.

Features for the next regular EVN and e-EVN sessions

* The antenna in Noto is under repair and it will not be available until early 2012.

* Due to e-MERLIN commissioning VLBI at e-MERLIN out-stations (e.g. Cambridge) is not possible, and JB1 is the only homestation available. After commissioning, only separate EVN (Jb home-station only) 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 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.

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

All EVN, Global and e-VLBI 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.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 October 2011.

Additional information

Further information on Global VLBI, EVN+MERLIN and e-EVN observations, and guidelines for proposal submission are available at: http://www.e-merlin.ac.uk/vlbi/evn_docs/guidelines.html

The EVN User Guide 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 lists sources observed by the EVN and Global VLBI.

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3) EVN Science Highlights

a) VLBI imaging of a flare in the Crab nebula: more than just a spot

An unusually strong and long-lasting high-energy flare was detected in late September 2010 in the Crab nebula by AGILE and Fermi/LAT. A putative flaring region was identified in followup observations with Chandra and HST - suggesting that the flare was located either in the jet or near the inner wisp of the nebula.

Based on the estimates of brightness and compactness of the putative flaring region, an EVN+MERLIN observation of the Crab nebula was made in November 2010 at 1.6 GHz, aiming at detecting and localising a radio counterpart of the flare. The observation was made in the e-VLBI mode, with seven EVN telescopes (Eb, Jb, Wb, Mc, On, Tr, Hh) and two MERLIN antennas (Da, Kn). Data were recorded at 1024 Mbps at the EVN antennas and at 128 Mbps at the MERLIN antennas.

The 1.6 GHz data have enabled imaging the inner regions of the nebula on scales of up to ≈40″, yielding arguably the largest structure ever imaged with VLBI. This hase become feasible thanks to extremely strong emission of the nebula, an increased sensitivity of e-VLBI observations, and effective *uv*-filtering of contributions from emission on larger spatial scales.

The emission from the inner "wisps" is detected for the first time with VLBI observations. A likely radio counterpart (designated "C1") of the putative flaring region observed with Chandra and HST is detected in the radio image, with an estimated flux density of 0.5±0.3mJy and a size of 0.″2-0.″6. Another compact feature ("C2") is also detected in the VLBI image closer to the pulsar, with an estimated flux density of 0.4±0.2mJy and a size smaller than 0.″2. Combined with the broad-band SED of the flare, the radio properties of C1 yield a lower limit of ≈0.5mG for the magnetic field and a total minimum energy of 1.2×10^{41} ergs vested in the flare (corresponding to using about 0.2% of the pulsar spin-down power).

The 1.6 GHz observations have also yielded an accurate absolute position of the Crab pulsar, and an estimate of the pulsar proper motion $\mu_\alpha = -13.0\pm0.2$mas/yr, $\mu_\delta = +2.9\pm0.1$mas/yr.

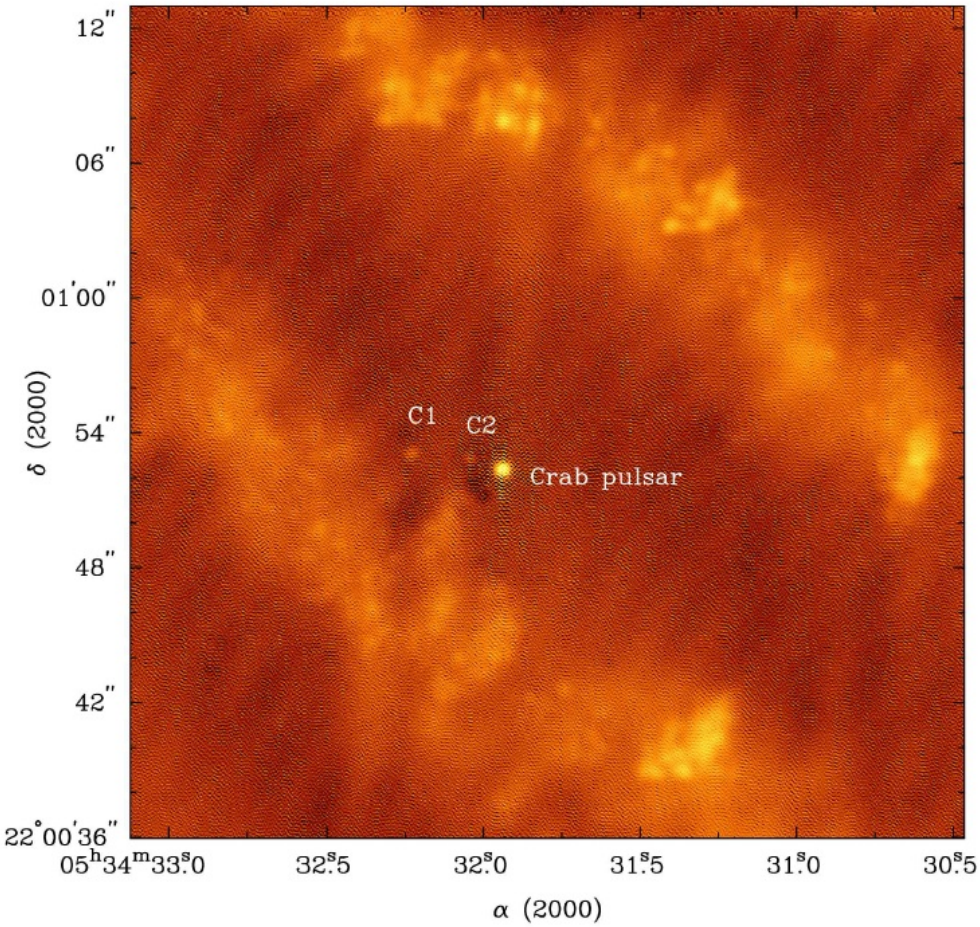


Image of the central region of the Crab nebula obtained from naturally weighted EVN+MERLIN data at 1.6 GHz, *uv*-tapered data on baselines up to 10Mλ. The image is obtained using a multi-scale CLEAN deconvolution and restored with a circular beam of 0.″5 in size. The image has a peak flux density of 8.5mJy/beam and an rms noise of 0.16mJy/beam. The total flux density recovered in the image is 148mJy.

Reference: A.P. Lobanov (MPifR), D. Horns (University of Hamburg), T.W.B. Muxlow (University of Manchester), A&A, 533, A10, 2011.

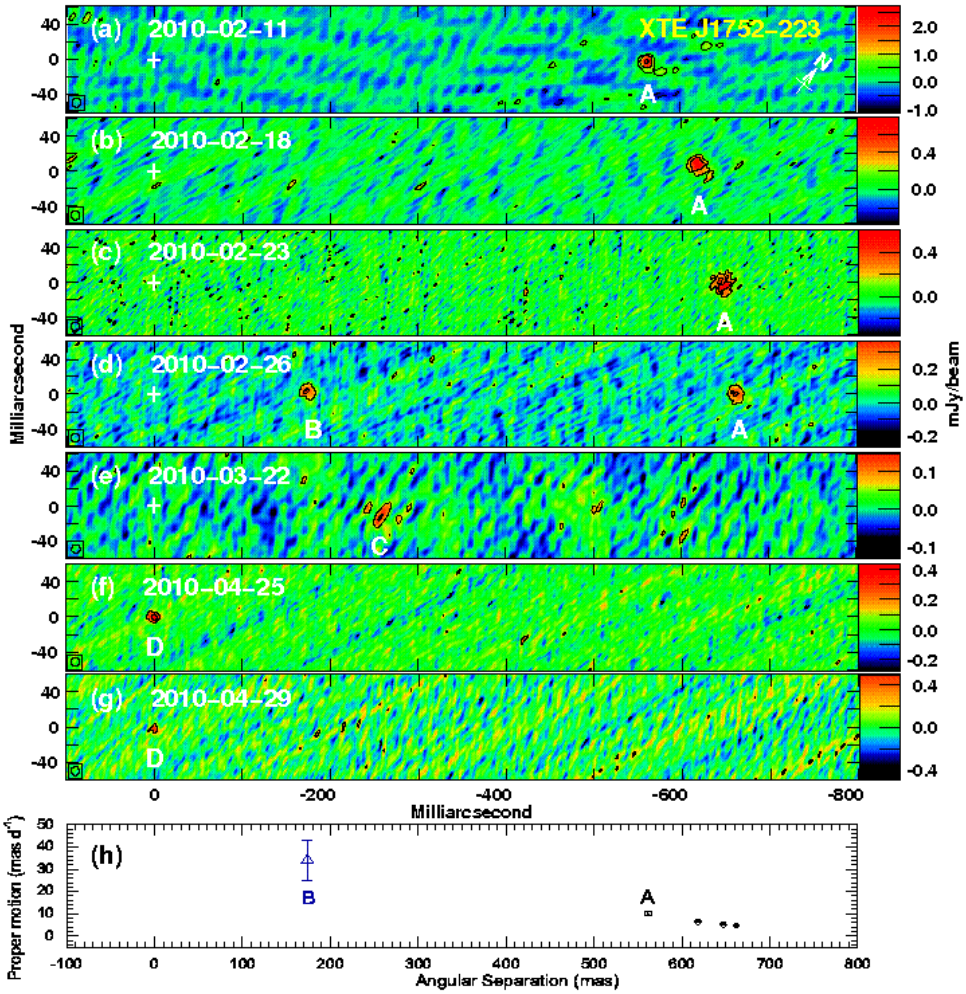
b) Revealing Transient Relativistic Ejections and the Core in the Galactic Black Hole Candidate XTE J1752-223

The X-ray transient XTE J1752-223 is a stellar-mass black hole candidate within our Galaxy. The figure below shows the European VLBI Network (EVN) and the NRAO Very Long Baseline Array (VLBA) imaging results during its first outburst. In 2010, we reported the detection of a transient and decelerating ejecta, marked as component A, observed in the first four epochs. Now, we present the new images in which a new transient ejection event associated with component C and later the reappearance of the radio core, marked as D, are revealed.

We also find that the component B, the one closer to the core, had significant proper motion during the single observation it was detected, and this proper motion was in fact significantly higher than the one derived for the older component A. This further strengthens our previous finding that the jet strongly decelerates on 100 mas scales, which has never been observed in X-ray binaries before. Although the distance to the transient source is not well constrained, it is clear that these ejecta are at least mildly relativistic at the early stage of their evolution. The bottom panel summarises the proper motion evolution in components A and B.

These new results have been published online in MNRAS letters

Jun Yang and Zsolt Paragi



EVN and VLBA images of XTEJ1752-223 during its initial outburst.

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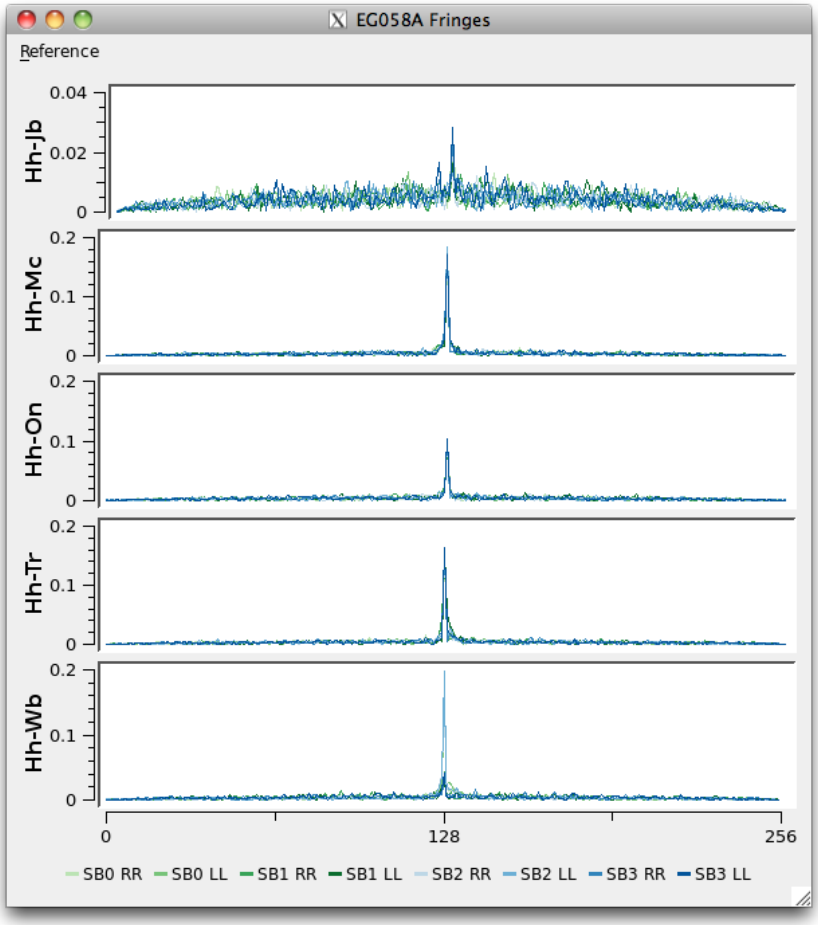
4) EVN Technical Developments

a) First real-time e-VLBI fringes with SFXC

During the test time preceding the August 26/27 e-VLBI session, real-time correlation with the JIVE-developed SFXC software correlator was successfully tested, resulting in the first SFXC e-VLBI fringes. Data from all available stations (Hh, Jb, Mc, On, Tr and Wb) were correlated and fringes were obtained on all baselines, as shown in the figure below. Due to local network constraints, the data rate was limited to 512 Mb/s. However, a recently completed network upgrade will allow significantly higher data rates into the dedicated HPC cluster that runs the correlator software. In addition, an expansion of the cluster is ongoing that will allow the correlation of up to 9 stations at a data rate of 1 Gb/s.



First real-time e-VLBI fringes with SFXC

This is good news for e-EVN users, since it means they too will soon be able to make use of the greater flexibility and higher data quality offered by the SFXC software correlator, currently only available for traditional disk-based VLBI.

Research leading to these results has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement No. RI-261525 NEXPReS.

b) 2 Gb/s fringes with the Chinese CDAS back-ends and SFXC

Earlier this summer SFXC was also used to to produce fringes at 2 Gb/s on the Seshan - Kunming baseline, with both stations using the new Chinese CDAS back-ends (see the figure below).

The correlation of this test observation followed the usual ftp fringe-test paradigm used in EVN network monitoring experiments -- in this case three separate one-second intervals of data were ftp'ed to JIVE and correlated on the SFXC software correlator, with fringe results posted on the EVN web page. The URL for the correlation-result page is:

http://www.evlbi.org/tog/ftp_fringes/CHIN03/index.html

During a second test, fringes to Urumqi were obtained as well.

These first fringes from 32 MHz subbands demonstrate that the SFXC correlator is ready to accept data produced both by the dBBC back-ends being rolled out in the EVN and the RDBE back-ends in use at the VLBA.

The Chinese CDAS back-ends

We would like to congratulate our Chinese colleagues on their successful efforts in the development of wide-band capability, and we look forward to additional test observations to include more stations and to characterize further the CDAS performance.

A KNAW/CAS grant for collaboration in radio astronomy has provided partial funding for personnel exchanges and tests supporting these developments.

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5) EVN Scheduler's Report

a) SESSIONS SCHEDULED SINCE THE LAST NEWSLETTER

2011 Session 2: 26 May - 16 June
Wavelengths: 5, 6, 90, 21/18 cm
Number of different user projects observed: 19
SESSION DURATION: 21.2 days
Scheduling efficiency: 46.0 %

Breakdown of observations by type and correlator. T-BYTES indicates the estimated disk useage (in TB) at EVN telescopes.

	N-OBS	HOURS	DAYS	T-BYTES
TOTAL	36	234.1	9.8	499.8
EVN-only	20	161.0	6.7	435.4
GLOBAL	5	37.0	1.5	36.2
Short Obs.	0	0.0	0.0	0.0
Tests	11	36.1	1.5	28.2
User: Cont.	12	81.0	3.4	293.6
User: Line	7	73.0	3.0	36.9
User: Pulsar	6	44.0	1.8	141.1
EVN-Corr.	26	176.3	7.3	413.5
Bonn-Corr.	5	38.0	1.6	86.3
VLBA-Corr.	0	0.0	0.0	0.0
e-VLBI-Corr.	0	0.0	0.0	
CAL-only	5	19.8	0.8	

		N-OBS	HOURS	DAYS	T-BYTES
MERLIN	0				
Arecibo	4				
VLBA	5				
GBT	2				
VLA	0				
Robledo	1				
Goldstone	0				

b) e-VLBI SCHEDULING

SESSION	DATE	WAVELENGTH	HOURS	e-VLBI	PROPOSAL	TYPE	
				Normal / Short	Disk / ToO	Trigger	
11e06	25AUG11	6cm	14h	1 / 1	- / -	2	1 triggered
11e07	06SEP11	(1.3cm)	(8h)	- / -	- /-	-	used for Disk ToO
11e08	17OCT11	6cm	10h	2 / -	- /-	2	

b) DATES FOR SESSIONS IN 2012

The following dates for sessions in 2012 have been agreed:

- SESSION 1: 23 Feb - 15 Mar
- SESSION 2: 24 May - 12 Jun
- SESSION 3: 18 Oct - 8 Nov

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6) The NEXPReS review

NEXPReS (Novel EXplorations Pushing Robust e-VLBI Services) is the EVN's next project to enhance the e-VLBI capabilities of the array. Following the successful introduction of e-VLBI as an operational facility, the aim is now to develop a more robust, more flexible and more sensitive facility, by making e-VLBI part of every observation. Generally speaking, this is done by introducing simultaneous recording and streaming at telescopes and correlators. Ideally we want to arrive at a system in which we correlate in real-time all the data that can be streamed, but we also maintain the option to correlate at a later time all the data that are required for the scientific goals of the experiment. Needless to say, the project is also important for maintaining the expertise we have built up in the past and fostering the collaborations we have with the Network providers.

Over the summer we collected and edited the first year's annual report and despite the different holiday periods across the network we managed to accumulate all the textual and financial input into an impressive document. We also won long battles with the new on-line system in order to upload this information to the EC. Then, on Thursday September 8 we met with the NEXPReS review committee in Brussels. Our team consisted of Ralph Spencer (chair of the board), Ari Mujunen (leader of workpackage 8), Arpad Szomoru (leader of workpackage 5), Charles Yun (project manager), Yvonne Kool (project secretary) and Huib van Langevelde (coordinator). We discussed the progress with a panel of 3 experts from the areas of astronomy, computing and networking. Of course the EC project officer was also present.

The NEXPReS away team anticipating the verdict (Yvonne Kool is behind the camera)

Although the overall technical progress of the project is sound, we did recognize that here were some areas where the committee could be critical. We are, for example, late with writing the rules down for our collaboration in a Consortium Agreement. And, as usual, we could not start all the work before we had filled the necessary staff positions. In all these cases the panel found our explanations and future strategy quite acceptable. Moreover, we received compliments for transparently presenting the state of the project. In the end the committee indicated they would judge the progress as "good" in their report. So, we returned home quite happy and ready to start addressing the items in year two of NEXPReS.

The NEXPReS management likes to thank all those who contributed to this success!

Huib Jan van Langevelde, director JIVE, NEXPReS coordinator

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7) Recent Meetings

a) 4th European Radio Interferometry School 2011

The 4th European Radio Interferometry School (ERIS) was hosted by the Institute of Radio Astronomy (INAF) with the support of RadioNet FP7, and it was held in Rimini, in the week 5-10 september 2011.

The main purpose of the European Radio Interferometry Schools is to make the new generations of radio astronomers familiar with radio interferometry and radio data handling and analysis. Beyond the short term goal, ERIS is actually the first step in the knowledge transfer, a critical step to ensure the growth and development of the radio astronomy. The format of the school followed the previous editions, and it included both lectures and tutorials, where the participants had a chance to play with the interferometric data themselves. LOFAR and ALMA data handling were part of the program, and the participants had a chance to work and play with brand new data sets taken with the new frontier radio interferometers at the two ends of the radio spectrum.

The Eurpoean Radio Interferometry School - Rimini 2011

A total of 100 particpants, including lecturers and students, gathered in Rimini, and shared an intense and very fruitful week. Students came from all over the Europe, but also from China, India, South Africa, Mexico and South America, and formed a large and very good group. The strong motivation of students, the generous availability of all lecturers and the warm and friendly hospitality of Rimini ensured a very successful school.

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Edited by Rob Beswick (JBCA/e-MERLIN)