ISSUE
72
September 2025

EVN/JIVE Newsletter

Welcome to the September 2025 issue of the EVN/JIVE Newsletter.

IN THIS ISSUE

Dear EVN Newsletter readers, this issue, as always, brings a wealth of exciting news and information.

Perhaps the most important of these reports is the joint observations made by the South African MeerKAT radio telescope network and EVN telescopes. This historic event not only increased the research potential of these collaborating networks but also enhanced cooperation within the radio astronomy community. This is crucial for the future of radio astronomy, which is closely linked to the SKA Observatory. From here I would like to sincerely thank all the people who contributed to this success. I must also add that MeerKAT will be available for EVN observations on a best-effort basis starting session 1/2026 and the call for proposals is already open.

The Scientific Highlights section contains a number of important new scientific reports, including investigations of a relativistic jet in the radio-quiet active galactic nuclei, an analysis of atmospheric spatial-structure errors in VLBI astrometry, the first detection of M82 X-1 in the radio band, the observation of ejection event in low-mass X-ray binary system, the localisation of a hyper active FRB source, and simulation of jets in the twin radio galaxy.

These excellent results once again confirm that, thanks to the EVN, it is possible to conduct scientific research at the highest level.

This issue also contains information about events relevant to the EVN community. I am especially pleased with the presence of JIVE and EVN at the European Astronomical Society Meeting. Furthermore, I would like to mention two important workshops: the "13th biennial Technical Operations Workshop" and the "Science and Technology with the WMT".

I am delighted to announce that the JIVE VLBI School (JVS 2025) began on September 15th, 2025, and is now in full swing. The school provides comprehensive training in VLBI data processing and imaging with the EVN, featuring a mix of general lectures, hands-on tutorials, and interactive sessions. Participants are attending in person at JIVE (the Netherlands) and the University of Pretoria (South Africa), as well as online. With nearly 200 participants registered, I wish everyone a rewarding and productive experience.

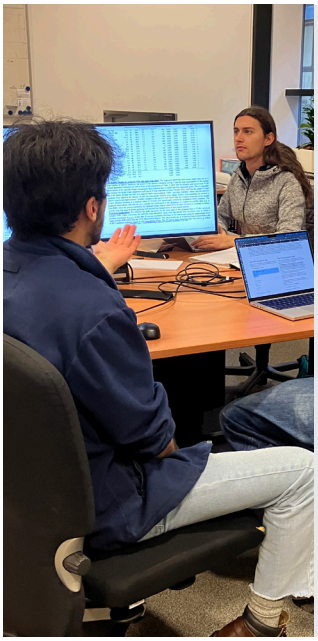
In addition, the popular EVN online seminars will continue this fall, with two very interesting talks already scheduled.

Finally, I would like to draw your attention to a very interesting interview with Olga Bayandina, formerly a JIVE support scientist and a postdoctoral researcher in Italy, and currently one of the VLBI experts at SKA-Mid in South Africa. Olga has also recently joined the EVN Programme Committee.

Dear readers, in conclusion, I hope that the current issue of the EVN newsletter will be as interesting as the previous ones and will provide you with another portion of exciting and important information from our vibrant community.

Visitors to JIVE's booth at the European Astronomical Society Annual Meeting in Cork last June. **Photo:** Ioanna Kazakou (JIVE)

Krzysztof Katarzyński
EVN Consortium
Board of Directors Chair



CALL FOR PROPOSALS

Observing proposals are invited for the European VLBI Network (EVN). Deadline: 1 October 2025, 16:00:00 UTC. The EVN facility is open to all astronomers, but currently restrictions apply to teams with PIs and/or co-Is with affiliation to institutes in Russia and Belarus. Astronomers with limited or no VLBI experience are particularly encouraged to apply for observing time. Student proposals are judged favourably. Support with proposal preparation, scheduling, correlation, data reduction and analysis can be requested from the Joint Institute for VLBI ERIC (JIVE). Check details of the call for proposals here.

SCIENCE HIGHLIGHTS

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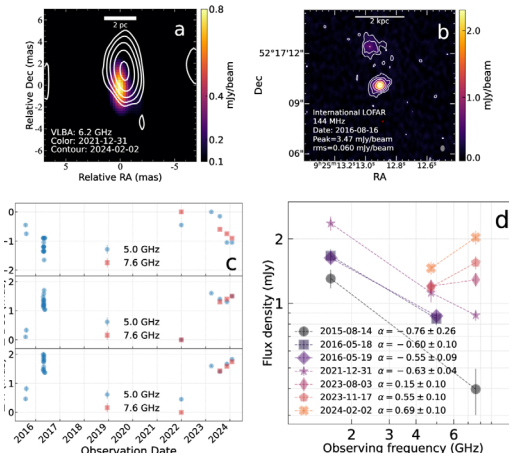
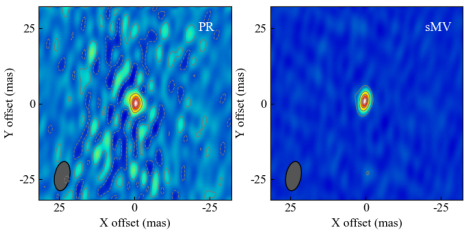


A relativistic jet in the radio-quiet active galactic nucleus Mrk 110

Ailing Wang

Over nearly a decade of VLBI monitoring, Mrk 110 was found to exhibit two distinct episodes of relativistic jet activity in 2015–2016 (Figure 1-c) and 2022–2024 (Figure 1-a). Proper-motion measurements revealed superluminal speeds up to 3.6 c during the first event, followed by speeds of 2.1–1.5 c in the later event as the jet decelerated at a projected distance of ~1.1 pc, corresponding to the BLR–NLR transition zone. Read more.

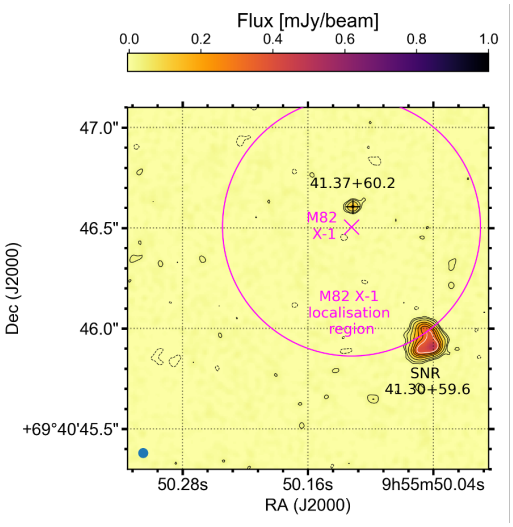
2



Serial MultiView: an efficient approach to mitigating atmospheric spatial-structure errors for VLBI astrometry

Jingdong Zhang

Atmospheric spatial-structure errors are a main constraint on the accuracy of VLBI relative astrometry (phase referencing, PR). MultiView technique compensates the residual spatial-structure phase errors through observing multiple calibrators around the target and interpolate at the target's position. However, phase ambiguities may cause large biases and are difficult to judge. This study presents a new approach, serial MultiView (sMV), which provides automatic ambiguity correction. Time-domain information is included to detect "phase wrap" robustly instead of fitting linear phase gradients for each group of scans independently. This approach is assessed using real VLBA data, proving its equivalence with conventional approach in ambiguity-free scenario and its satisfying performance in ambiguity correction. Read more.



3

Radio emission from the intermediate mass black hole candidate M82 X-1 using e-MERLIN and the EVN

David Williams-Baldwin

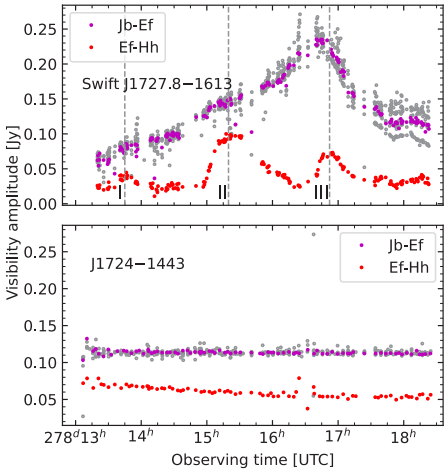
Nearby star forming galaxies are the perfect laboratory for studying compact radio sources such as supernova remnants (SNRs) and hence calibrating a galaxy's star formation rate in the radio with respect to the infra red emission [e.g. Magnelli et al. 2015]. Read more.

4

An ejection event captured by the EVN during the outburst of a Galactic black hole low-mass X-ray binary: Swift J1727.8–1613

Hongmin Cao

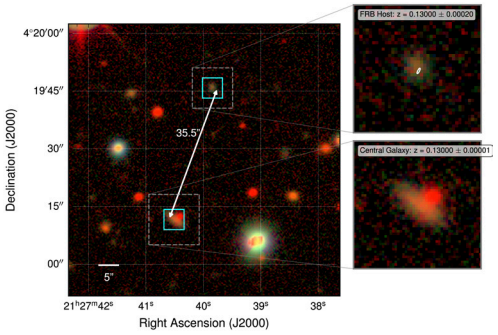
An extraordinarily bright X-ray transient, Swift J1727.8–1613, was discovered in the summer of 2023, which was later classified as a Galactic black hole X-ray binary. A 6-hour EVN target-of-opportunity (ToO) observation, carried out immediately after a radio quenching observed by the VLA, revealed a large-amplitude variability accompanied by an ejection event. The VLBI observation provides direct constraints on the kinematics and energetics of the approaching blob, which is assumed to dominate the source variability. Read more.



5

A hyperactive FRB pinpointed in an SMC-like satellite host galaxy

Mark P. Snelders Mohit Bhardwaj

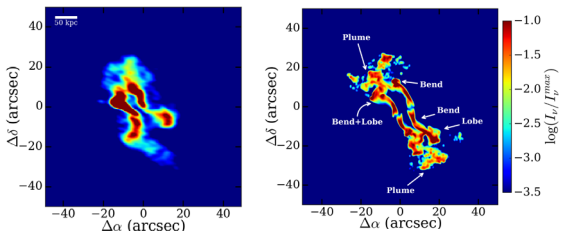


An important way to study fast radio bursts (FRBs) is to determine from what type of galaxies they originate and what their local properties are. The most precise localizations of (repeating) FRBs are achieved with the EVN. In this work we managed to localize the hyperactive repeating FRB 20240114A using the EVN in EVN-Lite mode (PRECISE; Pinpointing REpeating ChIme/FRB Sources with EVN dishes; PI: Franz Kirsten). The host turns out to be a low-metallicity start-forming dwarf galaxy at a redshift of z = 0.1300. What is even more interesting is that this host is gravitationally bound to a more massive nearby (85 kpc) galaxy at the same redshift. This work redefines our perspective on "hostless" FRBs or FRBs that have previously been localized far away from their apparent host. Read more.

6

Simulation reveals secrets of dancing jets in Twin Radio Galaxy TRG J104454+354055 in deep space

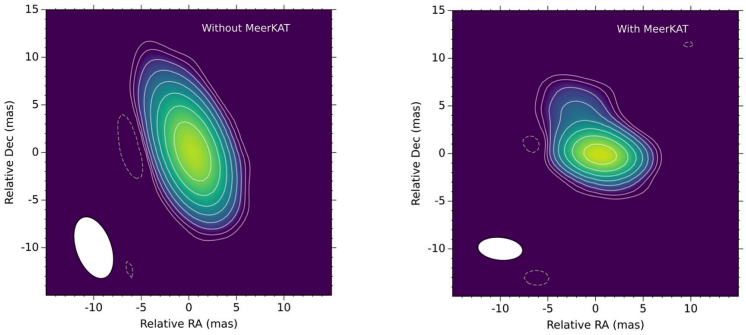
Santanu Mondal



Twin radio galaxies (TRGs) are rare interacting galaxy pairs where both supermassive black holes (SMBHs) host kiloparsec-scale radio jets. So far, three such systems have been confirmed after the advancement of high-resolution radio telescopes. The third one was discovered only recently by Gopal-Krishna et al. (2022). Due to both the extreme paucity and complexity of such systems, the launching of their jets as well as their mutual interaction during propagation through the ambient medium are not well understood. However, feeding and evolution mechanisms of the SMBH and the environment of the host galaxy/cluster may play pivotal roles in shaping their jet morphology. Read more.

OTHER NEWS

MeerKAT joins the EVN



IMAGES OF THE SUPERMASSIVE BLACK HOLE EJECTING JETS OF ENERGETIC PARTICLES, VISIBLE AT RADIO WAVELENGTHS, OBTAINED WITH THE EVN ARRAY WITHOUT (LEFT) AND WITH (RIGHT) THE INCLUSION OF MEERKAT. THE COMBINATION OF THE TWO TELESCOPES ENABLES US TO DECIPHER THE JET STRUCTUCTURE WITH GREAT RESOLUTION AND SENSITIVITY. **IMAGE CREDITS:** JIVE, SARAO.

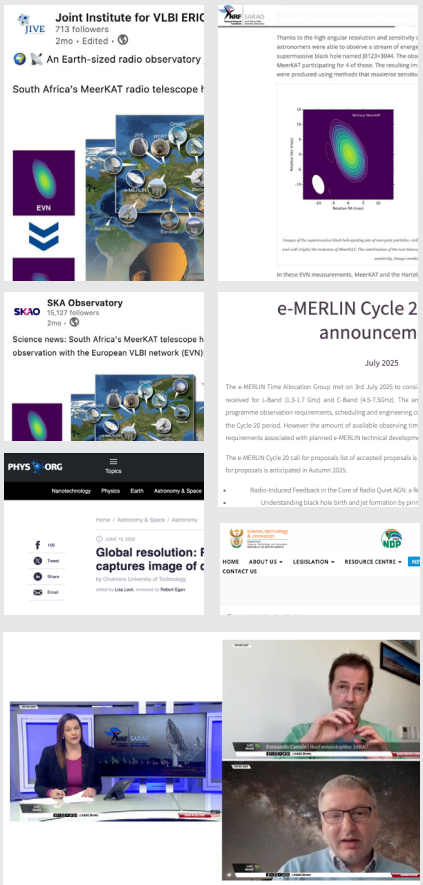
Earlier this year, South Africa's MeerKAT radio telescope successfully conducted VLBI observations together with EVN telescopes. With MeerKAT contributing to the network, both sensitivity and resolution improved considerably. SARAO and JIVE played central roles in achieving these results and producing the images that followed. Widely publicised and welcomed with great enthusiasm, this achievement showcases the power of international collaboration in radio astronomy and paves the way for transformative scientific discoveries.

The EVN extends well across Europe, with the longest baselines reaching as far as China and South Korea in the east and South Africa in the south. For many years, the Hartebeesthoek radio telescope has been the EVN's sole partner in the Southern Hemisphere, providing valuable baselines. The longest baselines are crucial for probing the most compact radio sources. But accurate calibration also requires the availability of shorter spacings. This is one of the reasons why MeerKAT is so important for the EVN.

Another key factor is sensitivity: phasing up as many as 64 MeerKAT dishes creates an exceptionally sensitive telescope. An interesting consequence is that when using natural weighting—which reduces the influence of smaller dishes—the beam remains relatively small, since the longest north–south baselines are highly sensitive. This effect was clearly demonstrated by the science commissioning experiment led by Suma Murthy at JIVE.

But MeerKAT has even more to offer. Its local interferometer data can be analysed and imaged independently, providing a complete view of the field of the target. This will be a powerful tool in the hands of EVN astronomers investigating exotic phenomena. These data may also prove extremely valuable for linking EVN calibration to flux calibrator sources and may help with fixing polarisation position angles on the sky. Achieving this, additional flux and polarisation calibrator sources will need to be scheduled in the observations. Other exciting opportunities are on the horizon; we have only had a first taste of what is becoming possible.

AT THE 2025 SKAO MEETING IN GÖRLITZ, JACK RADCLIFFE (UKSRC, UNIV. OF MANCHESTER) AND FERNANDO CAMILO (NRF/SARAO) HIGHLIGHTED THE MEERKAT–EVN COLLABORATION. AT THE EAS MEETING IN CORK, JIVE DIRECTOR AGA SŁOWIKOWSKA STRESSED ITS ROLE IN STRENGTHENING THE EVN–SOUTH AFRICA CONNECTION AND ADVANCING VLBI.



THE RESULTS OF THE JOINT MEERKAT–EVN OBSERVATIONS WERE ANNOUNCED IN A JIVE–SARAO PRESS RELEASE AND SHARED THROUGH EVN PARTNERS, SKAO SOCIAL, SOUTH AFRICAN WEBSITES, AND SABC NEWS ACROSS ITS FOUR TV CHANNELS, WITH INTERVIEWS BY FERNANDO CAMILO AND ZSOLT PARAGI (JIVE).

Onsala Space Observatory celebrates 75 years

On 15 May 2025, Onsala Space Observatory marked its 75th anniversary with sunshine, memories, and an international gathering of guests. The day began at Chalmers Campus Johanneberg, where visitors explored the clean room, supercomputers, and the Group for Advanced Receiver Development, before continuing at Onsala with speeches, music, and telescope tours.

Susanne Aalto, Deputy President and Deputy CEO of Chalmers, opened the programme by calling Onsala her "scientific home" and highlighting its role in international partnerships. Observatory Director John Conway shared milestones achieved by Onsala's small but dedicated staff, while Ylva Pihlström of NRAO stressed its importance as a training ground for young scientists. SKAO Director Phil Diamond reflected on his early days at the observatory and praised Sweden's recent decision to join the SKAO.

Among the speakers was JIVE Director Aga Słowikowska, who highlighted Onsala's pioneering role in Very Long Baseline Iinterferometry and the EVN. She recalled the legacy of Roy Booth, late Director of Onsala, a key figure in shaping the EVN and later JIVE's first Board Chair, and highlighted Onsala's enduring spirit of collaboration:
"One truth that VLBI teaches us is that sharing is multiplying. When we share telescope time, we multiply what we can learn. Collaboration is not just a method—it's a value. And Onsala lives by that value."

"Onsala is my scientific home." — Susanne Aalto

"Onsala has achieved so much with such a small but dedicated staff." — John Conway

"Access to Onsala encourages young people to enter these research fields." — Ylva Pihlström

"Sweden joining the SKAO is nothing short of fantastic." — Phil Diamond

"Collaboration is not just a method—it's a value. And Onsala lives by that value." — Aga Słowikowska

Strong presence of JIVE and the EVN at EAS 2025

JIVE and the EVN were highly visible at the European Astronomical Society Meeting (EAS) in Cork, Ireland, from 23 to 27 June 2025. This year, JIVE participated as an EAS Organisational Sponsor and presented a refreshed booth with three new banners, designed to be informative, people-oriented, and collaboration-driven, clearly conveying the scientific mission of JIVE and the EVN, as well as the research opportunities they provide.

The booth became a hub for long-time VLBI researchers and many enthusiastic early-career scientists, eager to explore how they could use the EVN in their research and how JIVE can support them.

JIVE Director Aga Słowikowska gave two talks. The first, "The EVN and South Africa: Expanding VLBI Collaboration and Future Prospects", highlighted the growing EVN–South Africa collaborations and upcoming opportunities (read more here). The second, in the session "European Forum of Astronomical Communities", focused on RadioNet's evolution and contributions. The talks in this session offered a broad overview of astronomy collaborations across Europe, their work, and future directions.

Finally, JIVE's Director was announced as a member of the EAS Policy Advisory Group (EPAG), an opportunity to bring her experience at JIVE to help shape the future of European astronomy (read more here).

Photo: **MIT Haystack Observatory**

TOW 2025: a must for VLBI stations

The 13th IVS Technical Operations Workshop (TOW 2025) brought together VLBI operators worldwide for four days of hands-on training, problem-solving, and updates essential for both geodetic and astronomical VLBI. In collaboration with the Bonn Geodäsiegruppe, MIT Haystack, and JIVE, the e-transfer class had an interactive aspect. Read more.

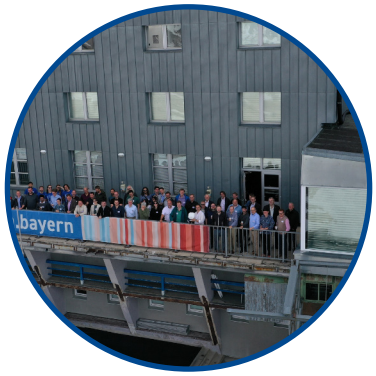


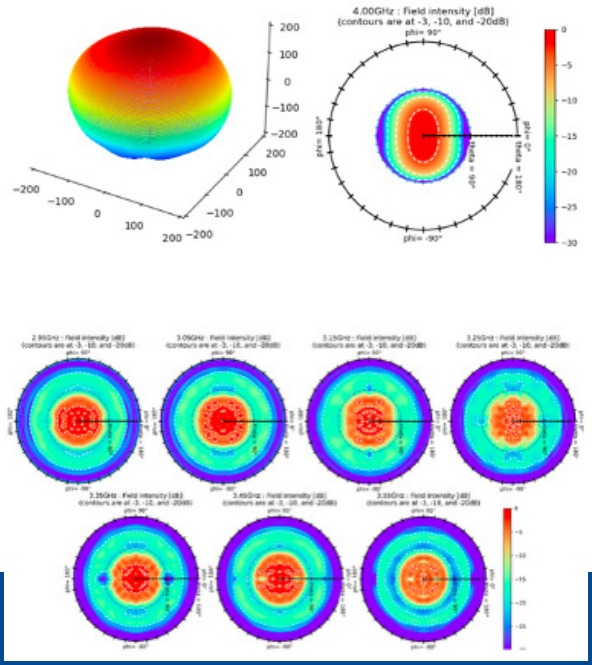
Photo: **Laura Schmidt (UFS)**

Science and Technology with the WMT

On 23–24 June, Julius-Maximilians-Universität Würzburg and the Environmental Research Station Schneefernerhaus hosted the “Science and Technology with the Wetterstein Millimeter Telescope” workshop. Astronomers discussed the telescope’s potential, with Bob Campbell (JIVE) outlining practical and technical aspects of the EVN relevant to WMT’s potential participation in EVN observations. Read more.

EVN seminars return in fall

The EVN continues its successful online seminar series, showcasing cutting-edge VLBI research. Past sessions attracted hundreds of participants and 700+ YouTube views. This fall, the speakers will be Miguel Pérez-Torres (6 Nov) and Sandor Frey (5 Dec). Read more.

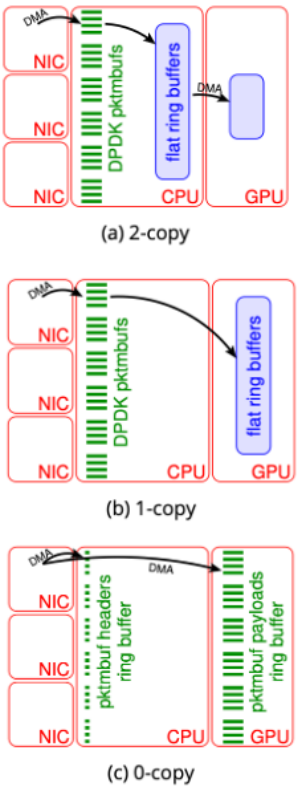


Simulation is performed in frequency space using a fixed wavelength, with multi-wavelength studies calculated automatically in sequence. A wide variety of plotting options is available for all modules. **In the left image:** two examples of far-field visualisation options are shown. Left: 3D plot of a CST-simulated dielectric resonator antenna. Right: 2D polar projection of the internal dipole field (50 mm dipole length). **In the right image**: CST far-field simulation data of an embedded DRA antenna for six frequencies, as used in the PAF simulation.

RADIOBLOCKS
UPDATES

Over the past months, the Radioblocks project produced several new reports detailing significant advances in simulation, data transport, and correlator applications for next-generation radio telescope systems.

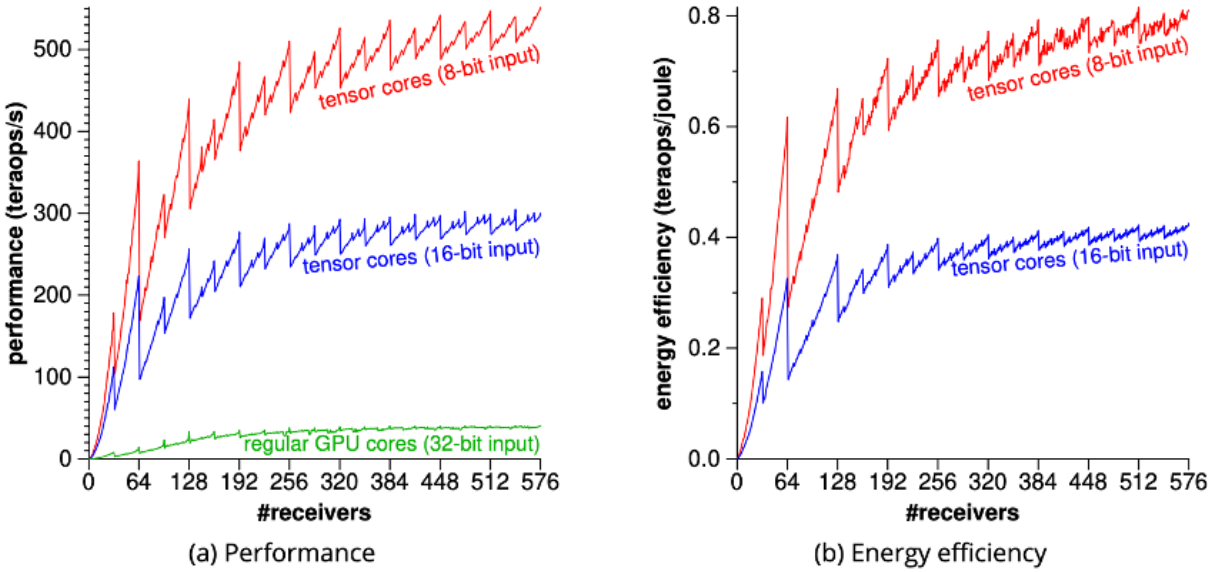
A report on the overall simulation work was recently submitted. At the core of this work is a full PAF frontend simulation system developed at the Max Planck Institute for Radioastronomy. The report demonstrates the capabilities of the simulation system as a whole. It does so through a variety of simulations and setups. A detailed description of the software can be found in the documentation, available publicly in the project's open research repository.



Three correlator variants were implemented, all using DPDK but with different data paths. **In this image:** comparison of the copy behaviour for the different implementations.

Alongside the simulation work, a project team led by the University of Bordeaux has developed a demonstrator to test high-speed data transport in radio telescope systems. The demonstrator explores two technologies, DPDK (Data Plane Development Kit) and RDMA (Remote Direct Memory Access), aiming to achieve—and potentially exceed—400 GbE transfer rates. It also introduces the first version of the high-speed data transport prototype, planned for integration into the ALMA Wideband Sensitivity Upgrade (WSU).

RADIO BLOCKS



Performance and energy efficiency of the Tensor-Core Correlator (TCC) on the Grace Hopper GH200. The TCC is currently the fastest GPU correlator library available.

RADIO BLOCKS

Adding to these updates, a document from ASTRON, created together with JIVE, the University of Manchester, VIRAC, and other partners, offered a clear look at the project's progress on GPU-based correlator applications. These applications use GPU "radio blocks", a collection of libraries designed for common signal-processing tasks in correlators and beam-forming. The libraries are highly optimised, each improving performance and energy efficiency while reducing the amount of code that needs to be developed and maintained. The correlator applications discussed in the report aim at handling the high data rates of upgraded instruments, taking full advantage of the efficiency offered by the shared radio blocks.

Q & A

We spoke with Olga Bayandina, formerly a JIVE support scientist and a postdoctoral researcher in Italy, and now one of the VLBI experts at SKA-Mid in South Africa, with many valuable stops along the way. We asked her about her new role on the EVN PC, her involvement in the SKAO Science Meeting in Görlitz, and her experience as a young woman scientist. As expected, we had a lot to discuss.

As one of the VLBI experts in the SKAO team, what are the key scientific or technical challenges you're currently focusing on? How do you see the prospects for SKA-VLBI and what role do you see yourself playing in building that synergy?

Since the SKA telescopes are still under construction, most of our current challenges are technical. Of course we look to the sky and keep science as our guiding star, but right now the day-to-day work is very down to Earth, and we are focused on making sure every piece—hardware, software, and operations—comes together smoothly. For VLBI, there's an extra layer, you can't do it alone. We need to be on the same page with telescopes all over the world while we're still in the process of writing our own page.

One particularly exciting frontier is VLBI with SKA-Low in Australia. That frequency range is relatively new territory for VLBI, and we're excited to be part of the ongoing technical and scientific exploration. Whatever the final configuration looks like, the SKA telescopes' sensitivity will open the door to discoveries we simply couldn't make before.

Beyond the technology, SKA-Mid's presence in South Africa is already inspiring fresh momentum for the African VLBI Network. While still in its early stages, it has the potential to open new avenues for collaboration and to encourage young scientists to engage with research that could, in time, help shape the future of astronomy on the continent.

As for my role, I find myself in an interesting position: on one hand, I'm a scientist eager to do all kinds of challenging science with SKA-VLBI as soon as possible. On the other hand, I'm also part of the telescope team, very aware of the technical milestones still ahead, and sometimes (most of the time, really) I have to rein in that impatient inner scientist..." Read the full interview.

FROM THE STATION

PREPARING MEERKAT FOR EVN INTEGRATION

Joining the EVN as a VLBI station has been a long-running goal for the MeerKAT telescope, which is built and operated by the South African Radio Astronomy Observatory (SARAO), with early fringe-finding experiments in cooperation with JIVE dating back to 2018. Work to create an operational MeerKAT VLBI observation mode has now reached an advanced stage, and integration of MeerKAT with the EVN is soon to be a reality.

Creation of a proof-of-concept VLBI mode for MeerKAT started in 2022 by adapting an existing correlator design. The correlator channelised 107 MHz from MeerKAT's L-band (900–1670 MHz), performed coherent beamforming with all 64 dishes and stored the beamforming output signal to disk. Phase-up of MeerKAT's dishes into a coherent beam was achieved by adapting online calibration routines developed for pulsar observations. A prototype algorithm, impractically slow for operational use, was designed to resample the stored beam signal to 2 x 32 MHz channels per polarisation in VDIF format. MeerKAT then observed a short section of EVN observation N22L3 for testing purposes. Using this data, JIVE staff successfully demonstrated fringes of a phased-up MeerKAT against the EVN, which validated the observation mode's basic signal chain design.

SARAO then proceeded to transform this proof-of-concept into an operational instrument. The resampling algorithm speed was improved dramatically by a fundamental redesign and implementation on GPU. Station calibration procedures were developed by leveraging MeerKAT's interferometric calibration pipeline, producing observation metadata in standard file formats. Functionality was also created for MeerKAT to interpret supplied VLBI Experiment (VEX) instructions and observe targets on the specified UTC schedule. Finally, a jive5ab server was established in Cape Town for storage and e-shipping of observation data. The EVN's Network Monitoring Experiments provided ample opportunity for gathering test data, and with invaluable assistance from JIVE staff, enabled testing and debugging of MeerKAT's VLBI mode.

MeerKAT recently participated in selected EVN observations for science commissioning purposes. To achieve full science readiness, functionality to re-phase MeerKAT's antennas during long VLBI observations must still be finalised. Development of MeerKAT's next-generation correlator is also in progress, where VLBI resampling will no longer occur after an observation has completed, but instead in real-time during observations.

Progress with integrating MeerKAT into the EVN comes as a result of the close partnership between SARAO and JIVE staff. MeerKAT is expected to join EVN calls for proposals soon on a best-effort basis. Operating in tandem with Hartebeesthoek station, MeerKAT will significantly increase sensitivity and calibration accuracy in L-band on the EVN's long southern baseline.

"The Core": the dense central region of the MeerKAT array, about 1 km in diameter, where most of the antennas are located. **Photo:** SARAO

UPCOMING MEETINGS

10th International VLBI Technology Workshop (IVTW 2025)

Gothenburg, Sweden, from 21 to 25 October, 2025. For more information, click here.

Towards high-performance mm-VLBI science operations with multi-band receivers

Bologna, Italy, from 28 to 31 October 2025. For more information, click here.

16th East Asian VLBI Workshop (EAVW 2025)

Pyeongchang, Korea, from 17 to 20 November, 2025. For more information, click here.

Get in touch

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