Effelsberg Newsletter
Volume 16, Issue 2 -May 2025

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Call for proposals

Deadline May 28, 2025, UT 15.00

Observing proposals are invited for the Effelsberg 100-meter Radio Telescope of the Max Planck Institute for Radio Astronomy (MPIfR).

The Effelsberg telescope is one of the World's largest fully steerable instruments. This extreme-precision antenna is used exclusively for research in radio astronomy, both as a stand-alone instrument as well as for Very Long Baseline Interferometry (VLBI) experiments.

Access to the telescope is open to all qualified astronomers. Use of the instrument by scientists from outside the MPIfR is strongly encouraged. The institute can provide support and advice on project preparation, observation, and data analysis.
The directors of the institute make observing time available to applicants based on the recommendations of the Program Committee for Effelsberg (PKE), which judges the scientific merit (and technical feasibility) of the observing requests.

Information about the telescope, its receivers and backends and the Program Committee can be found at
http://www.mpifr-bonn.mpg.de/effelsberg/astronomers
(potential observers are especially encouraged to visit the wiki pages!).

Observing modes

Possible observing modes include spectral line, continuum, and pulsar observations as well as VLBI. Available backends are several FFT spectrometers (with up to 65536 channels per subband/polarization), a digital continuum backend, a number of polarimeters, several pulsar systems (coherent and incoherent dedispersion), and two VLBI terminals (dBBC and RDBE type with MK6 recorders). Furthermore, the new flexible, fully-digital backend system EDD ("Effelsberg Direct Digitization") is currently being implemented and will be available for an increasing number of observations in the near future.
Receiving systems cover the frequency range from 0.3 to 96 GHz. The actual availability of the receivers depends on technical circumstances and proposal pressure. For a description of the receivers see the wiki pages.

How to submit

Applicants should use the NorthStar proposal tool for preparation and submission of their observing requests. North Star is reachable at https://northstar.mpifr-bonn.mpg.de .

For VLBI proposals special rules apply. For proposals which request Effelsberg as part of the European VLBI Network (EVN) see:
https://www.evlbi.org/proposal-submission.

Information on proposals for the Global mm-VLBI network can be found at http://www3.mpifr-bonn.mpg.de/div/vlbi/globalmm/index.html .

Other proposals which ask for Effelsberg plus (an)other antenna(s) should be submitted twice, one to the MPIfR and a second to the institute(s) operating the other telescope(s) (eg. to NRAO for the VLBA).

Important Remarks

Please note, that the Effelsberg Programme Committee (PKE) is composed of several scientist with different backgrounds. It is hence advisable to write the proposals in a way that they could be understood by readers who are not working in the particular field.
Furthermore, it should be noted that all proposals are treated confidentially. Therefore, it is not necessary to withhold or obscure information, which on the contrary might lead to a downgrading of the proposal.

The following deadlines will be on on September 29th, 2025, and on February 4th, 2026.

ACME Transnational Access Programme

The ACME ("Astrophysics Centre for Multimessenger studies in Europe") project (see https://www.radionet-org.eu/radionet/acme-project-started/) enables transnational access (TA) on the basis of scientific merit to a wide range of complementary astroparticle, high energy and astronomical Research Infrastructures to perform new science of multi-messenger astrophysics.

Transnational access to the 100-m telescope is provided to selected user-groups of one or more researchers, with the majority of the users working in EU and/or

Associated Countries and not affiliated with German institutes. The access includes the logistical, technological and scientific support and the specific training. Additionally financial support for travel and accommodation could be offered for selected user(s).

More extensive support can be offered as Effelsberg is one of the "Joint Centres of Expertise" for the radio regime within the ACME project. In that context, the staff of the Effelsberg observatory offers advanced support for the user community in all phases of an observing project, e.g.

- Extended counsel during the proposal writing
- Bespoke assistance with preparation of the observations, as well as with the data inspection and post-processing
- Commissioning of special observing modes
- Specific training sessions

Furthermore, help with the access to the Effelsberg data archive can be provided on request.

Only user groups that are allowed to disseminate the results they have generated under this program may benefit from the access. Publications based on TA programme should be acknowledged accordingly:

This project has received funding from the European Union's Horizon Europe Research and innovation programme under Grant Agreement No 101131928 (ACME).

For more details, please see: https://www.acme-astro.eu or contact the Effelsberg staff under sched100m@mpifr.de .

by Alex Kraus

News from the observatory

The 100-m telescope is back!

The project to renovate the main axes drives of the 100-m telescope >including the power units and the associated control systems< is now close to completion. In February, the telescope went back into operation, and we started to test and verify the various observing modes.

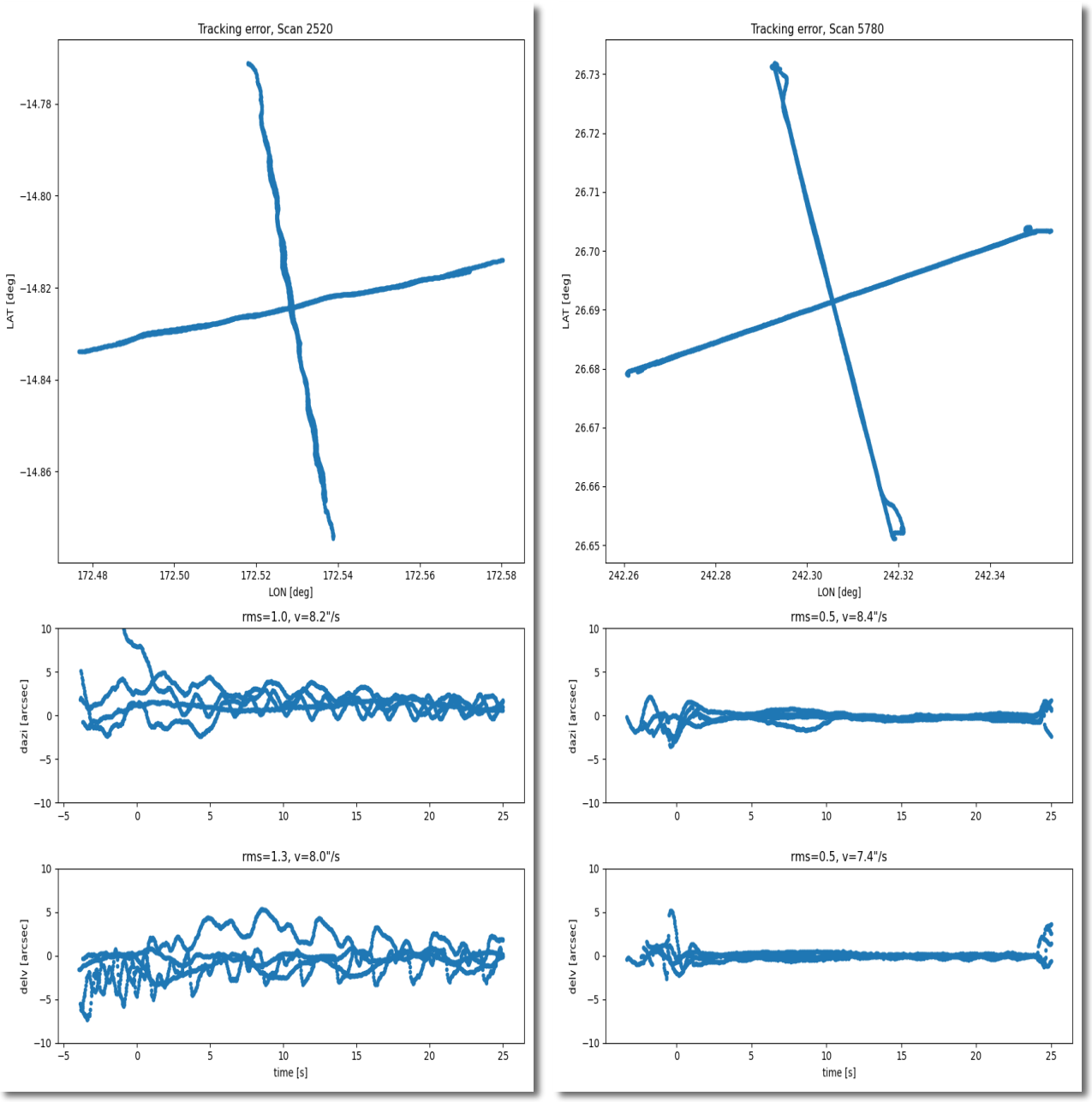
The hardware replacement began in June 2024, at which point scientific observations had to be suspended. In a first step, about a dozen hardware racks had to be removed and were replaced by new ones (see picture below).

Installation of the new racks in the telescope (picture by H. Homburg).

In the context of this project, also the angular encoders and safety switches were renewed as well as the control panel in the telescope's control room. Additionally, we took the opportunity to modernize various parts of the astronomical software.

The new touch panel for the main axes control (right), besides the touch panel for the subreflector – in the control room of the telescope (picture by H. Homburg).

Due to unforeseen problems, the project was delayed by quite some time. It seems, however, that the upgrade is a success and will improve the telescope's operation subtantially. Not only is the technical handling of the system much easier and comfortable, we are already observing noticeable improvements in both tracking and scanning accuracy (see below). A few software details still need refinement; these are expected to be resolved in the near future.



Cross-Scans in azimuth and elevation (upper panels) and scanning deviations (in both axes – lower panel) with the old (left) and new (right) control system. The improvement in tracking accuracy is clearly seen.

by Alex Kraus

M87: Revisiting the GMVA and ALMA imaging of the ring and the jet in the centre

APRIL 24, 2025

The galaxy M87 is one of the prime targets for high resolution radio imaging to investigate the ring-like "shadow" of its supermassive black hole, the innermost regions of accretion flow, and the formation of the relativistic jet. In 2018, observations with the Global mm-VLBI array (GMVA) including the Effelsberg 100-m telescope and with the Atacama Large Millimetre Array (ALMA) at 86 GHz enabled the simultaneous reconstruction of a ring structure and the extended jet emission (published in 2023 by Rusen Lu, see: https://www.mpifr-bonn.mpg.de/pressreleases/2023/6).

Recently, Jong-Seo Kim (IMPRS PhD student at the MPIfR) and his collaborators have applied the novel, Bayesian imaging algorithm _resolve_ to re-image the 2018 GMVA data. This work confirms the ring and jet detection at 86GHz and provides higher resolution images with more precise measurement of the ring and jet features. Their work is published in

Astronomy & Astropyhsics, Vol. 696, A169 (2025).

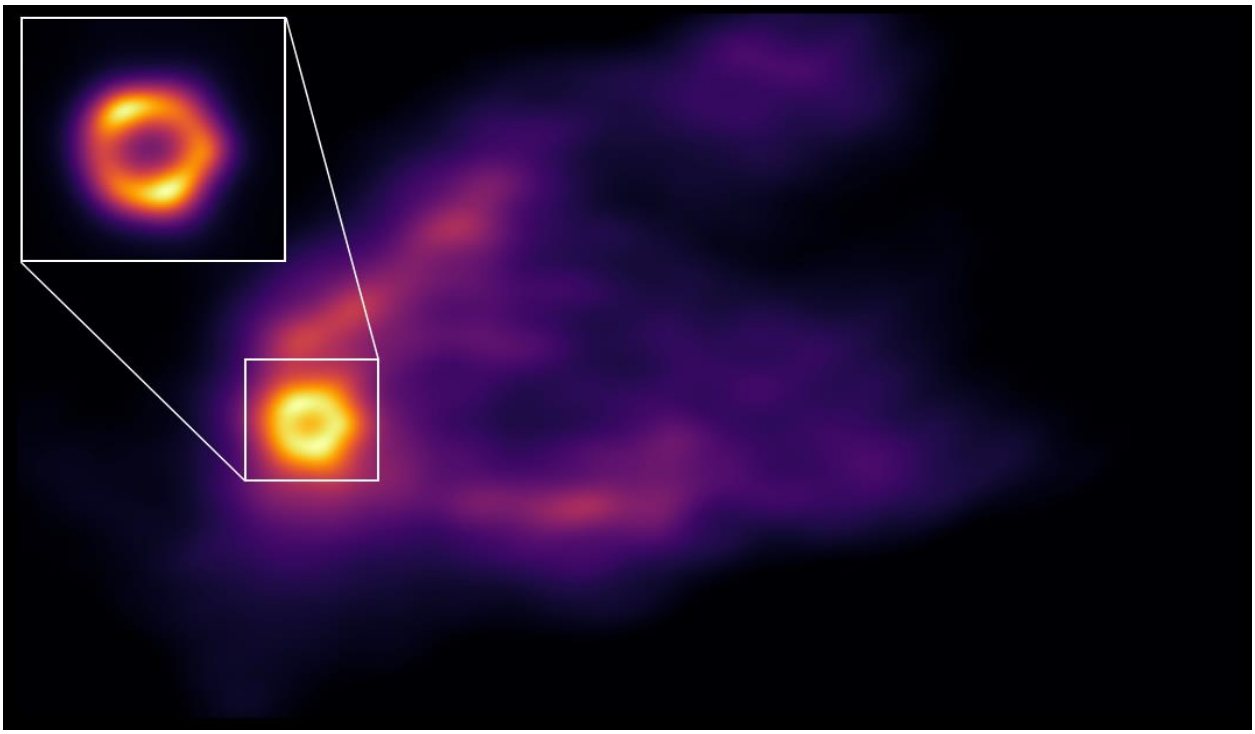


Image of the GMVA+ALMA observation of M87 at 86 GHz (performed in 2018). With this reconstruction which made use of the "resolve" algorithm (Bayesian self-calibration and imaging method), the ring structure could be better resolved than before. It revealed an diameter of 60.9 ± 2.2 µas (picture by Jong-Seo Kim, MPIfR).

The European Pulsar Timing Array received the Group Achievement Award of the Royal Astronomical Society

In January 2025, the Royal Astronomical Society (RAS) announced that the European Pulsar Timing Array (EPTA) is awarded this year's Group Achievement Award of the RAS.

EPTA is a far-reaching collaboration involving astronomers and gravitational-wave experts from more than ten institutions across Europe. It collects and analyses pulsar timing data from six of the world's most sensitive radio telescopes, including the 100-m radio telescope in Effelsberg which provided data for more than 25 years now.

In 2021, the collaboration reports on the outcome of a long-lasting observing campaign resulting in a candidate signal for the since-long sought gravitational wave background due to in-spiraling supermassive black-hole binaries (for more information, see also: https://www.mpifr-bonn.mpg.de/pressreleases/2021/11).

See here for the press release of the Royal Astronomical Society:

https://ras.ac.uk/news-and-press/news/pioneering-physicist-and-galaxy-luminary-among-2025-ras-award-winners

Congratulations to the whole EPTA team!!

Radio telescopes of the EPTA network. Clockwise from upper left: Effelsberg 100-m Radio Telescope (Germany), Nançay Radio Telescope (France), Jodrell Bank Telescope (UK), Westerbork Synthesis Radio Telescope (WSRT, The Netherlands), Sardinia Radio Telescope (SRT, Italy).