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Call for proposals

Deadline May 30, 2024, 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!).

New broad-band receiver

The new "Ultra-Broad-Band"-Receiver (UBB) is a prime focus system covering the frequency range of 1.3-6 GHz. The system is now ready for regular observations. For more information, see the description of the system in the last issue of this newsletter.

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:
http://www.evlbi.org/using-evn.

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 Sep 26th, 2024, and on Feb 4th, 2025.

Opticon-RadioNet-Pilot Transnational Access Programme

The Opticon-RadioNet-Pilot (ORP) project
(see http://www.orp-h2020.eu/TA-VA)
includes a coherent set of Transnational Access (TA) programs aimed at significantly improving the access of European astronomers to the major astronomical infrastructures that exist in, or are owned and run by, European organizations.

Astronomers who are based in the EU and the Associated States but are not affiliated to a German astronomical institute, may also receive personal aid from the Transnational Access (TA) Program of the ORP. This will entail free access to the telescope, as well as financial support of travel and accommodation expenses for one of the proposal team members to visit the Effelsberg telescope for observations.

One – in exceptional cases more – scientists who are going to Effelsberg for observations can be supported, if the User Group Leader (i.e., the PI – a User Group is a team of one or more researchers) and the majority of the users work in (a) country(ies) other than the country where the installation is located. Only user groups that are allowed to disseminate the results they have generated under this program may benefit from the access.

For more details see http://www.orp-h2020.eu/TA-VA .

After completion of their observations, TA supported scientists are required to submit their feedback to the ORP project management and the EU. Publications based on these observations should be acknowledged accordingly:

The research leading to these results has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004719 [ORP].

by Alex Kraus

News from the observatory

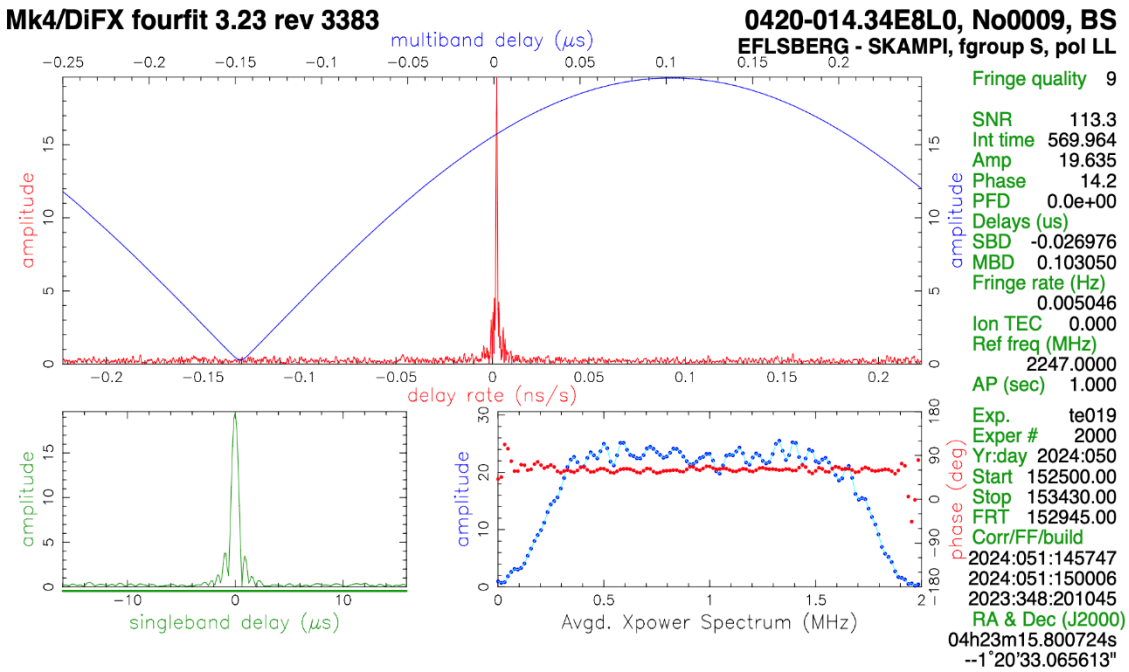
VLBI Fringes between Effelsberg and the SKA-MPIfR antenna in South Africa

The SKA-MPIfR telescope (SKAMPI) is a proto type dish for the SKA at the South African SKA site in Karoo. It is jointly operated and maintained by the Max Planck Institute for Radio Astronomy (MPIfR) and the South African Radio Observatory (SARAO). The antenna is equipped with a 1.75 GHz to 3.5 GHz S-band receiver and a 12 GHz to 18 GHz Ku-band receiver. To test the VLBI capabilities of the SKAMPI antenna and the installed high performance universal backend system a fringe test observations has been performed on February 19, 2024.

The SKA-MPIfR telescope (SKAMPI) in the Karoo semi-desert in South Africa.

An observing frequency of 2250 MHz is regularly used for geodetic VLBI observations and therefore the test was performed with the S-band receiver. An ad-hoc array of 4 stations, namely Effelsberg, Medicina, SKAMPI, and Yebes was

organized and the correlation of the data was done at the VLBI correlator of the MPIfR in Bonn. Due to the limited bandwidth of the internet connection to SKAMPI a relatively low data rate of 32 Mbps was used (2 pols, 2x2 MHz baseband channels) to allow a quick transfer of the data. Successful fringes were found between all 4 participating stations. A plot of the fringes between the Effelsberg and SKAMPI telescopes is shown in the Figure below.



This are the first VLBI fringes to the SKAMPI antenna and the first VLBI fringes using the GPU based universal backend (EDD, Effelsberg Direct Digitalization backend) in a digital down-conversion mode. Thanks to all people involved and thanks to Medicina and Yebes staff for the participation in our fringe test observation.

(by Uwe Bach)

Project to renew the main axes drive control continues

As reported earlier (issue 1/2023 of this newsletter), we started a project to renovate the main axes drives, including the power units and the corresponding control systems.

The project is well on track and we plan to have the new hard- and software installed in this summer. According to the current schedule, observations will cease at the end of June (after the EVN session). We hope to be able to restart with testing the new system sometime in August.

Information about the progress and the recommissioning will be presented in the next issue of this newsletter.

Final works to repair the flood damage

The final work to repair the damage from the catastrophic flood of July 2021 began in February. The stream beds and the surrounding area are currently being restored (in consultation with the landscape and water authorities). The work is expected to be completed by summer.

Pictures by Norbert Tacken

A wobbling magnetised star challenges the origin of repeating fast radio bursts

The rapid decay of a magnetar's precession after an X-ray outburst likely rules out free precession as their origin

An international research team led by Gregory Desvignes from the Max Planck Institute for Radio Astronomy in Bonn, Germany, has used the Effelsberg and Jodrell Bank radio telescopes to observe the precessing magnetar XTE J1810-197 — a highly magnetised and ultra-dense neutron star — shortly after its X-ray enhanced activity and radio reactivation. This precession damped on a timescale of a few months challenging some models used to explain the origin of the mysterious repeating fast radio bursts.

The results were published on April 8, 2024 in Nature Astronomy

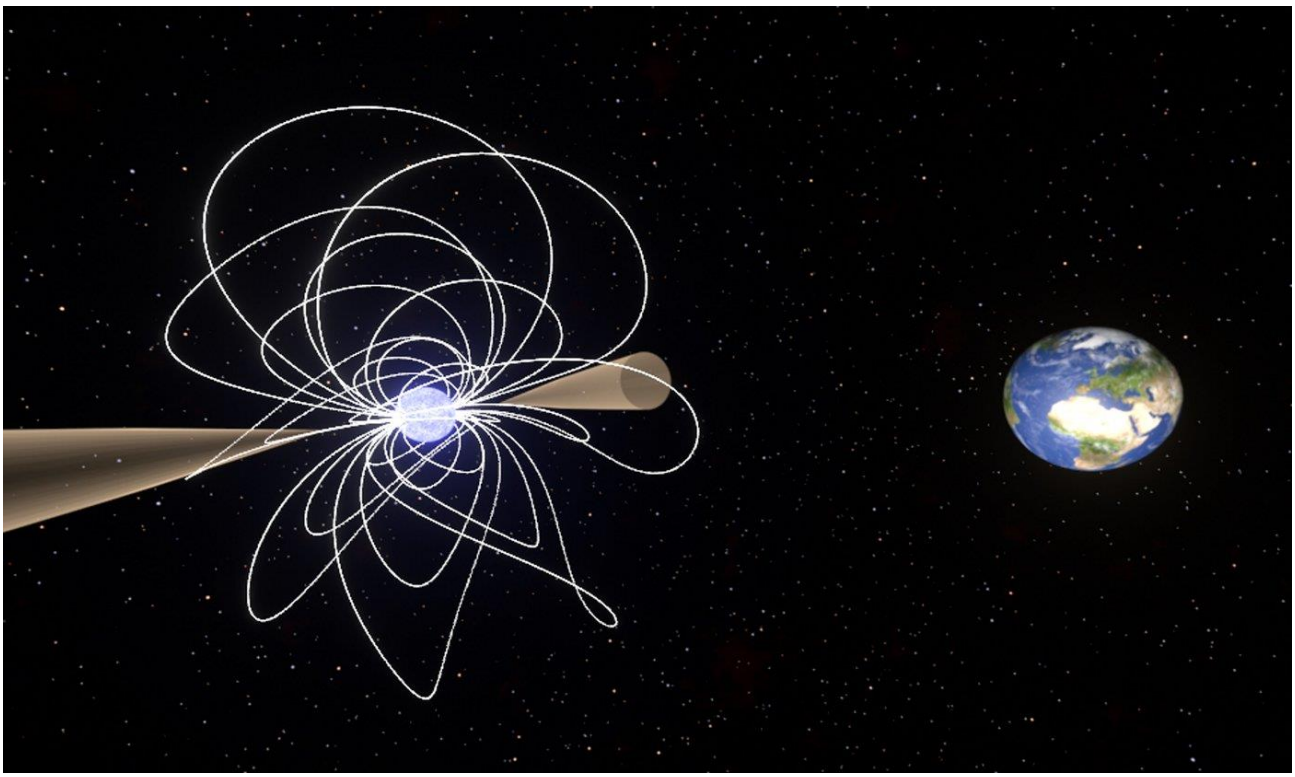


Fig. 1: Artistic rendering of a precessing magnetar with a twisted magnetic field and its radio beam pointing towards Earth.

Magnetars are neutron stars with extreme and twisted magnetic fields, remnants after the collapse of fuel-exhausted massive stars. These objects are so dense that they contain 1 to 2 times the mass of the Sun in a near-perfect sphere of about 12 km in radius. Of the 30 known magnetars, only a handful have occasionally emitted radio waves, with their radio beam sweeping the sky like a lighthouse. Magnetars are widely considered to be the source for the Fast Radio Bursts (FRBs) with some models invoking freely precessing magnetars as responsible for the repeating FRBs.

Together with colleagues from the Jodrell Bank Centre for Astrophysics and the Kavli Institute for Astronomy & Astrophysics, researchers from the Max Planck Institute for Radio Astronomy (MPIfR) are regularly inspecting some of these magnetars and unexpectedly caught one of them, XTE J1810-197, which started to emit radio emission in December 2018, shortly after the start of enhanced X-ray emission, and after a period of about ten years during which it was radio quiet.

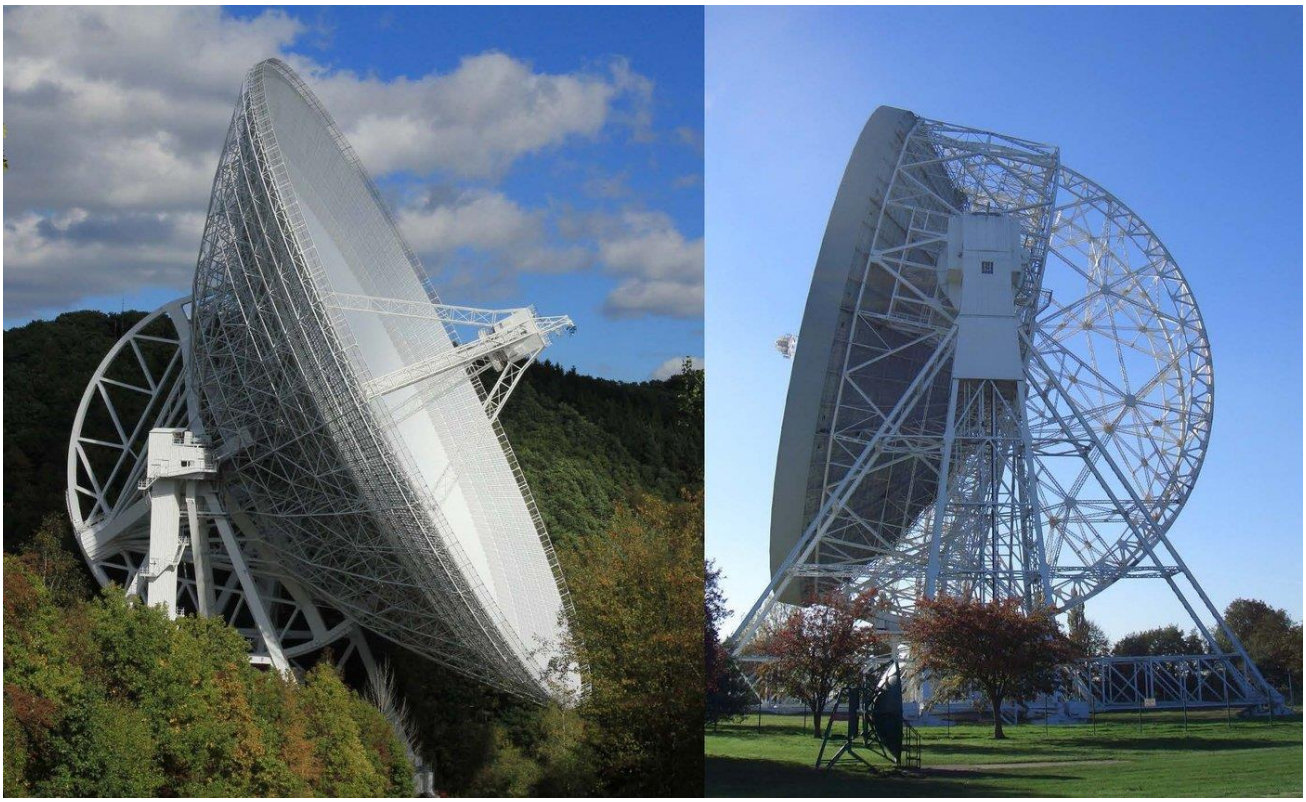


Fig. 2: The two radio telescopes used for this study: the Effelsberg 100-m telescope (left) and the Lovell 76-m telescope (right).

Embarking on an intense observing campaign following this event, the researchers noticed some very systematic changes in the properties of the radio light, namely its polarisation, revealing a shift in the orientation of the magnetar's radio beam with respect to Earth. The researchers attributed this to free precession, an effect that arises from a slight asymmetry in the magnetar's structure, causing it to wobble around like a spinning top. To their surprise, the free precession damped rapidly over the next few months and disappeared eventually. The disappearance of the precession with time contradicts that the suggestion by many astronomers who believe that FRBs, that repeat with time, can be explained by precessing magnetars.

"We expected to see some variations in the polarisation of this magnetar's emission, as we knew this from other magnetars," remembers Gregory Desvignes from the MPIfR, leading author of the study. "But we did not expect that these variations are so systematic, following exactly the behaviour that would be caused by the wobbling of the star."

Patrick Weltevrede from The University of Manchester adds: "Our findings were only made possible thanks to many years of dedicated monitoring of this magnetar with radio telescopes in Jodrell Bank and Effelsberg. We had to wait for over a decade before it started to produce radio emission, but when it did, it certainly didn't disappoint."

"Damped precession of magnetars might shed light on the inner structure of neutron stars, which is ultimately related to our fundamental understanding of matters," says Lijing Shao from Peking University.

"Radio astronomy is truly fascinating! The enigma surrounding the origins of FRBs still persists. However, catching intriguing objects like magnetars in the act to learn more about FRBs, underscores the capabilities of our facilities," concludes Michael Kramer, director at MPIfR and Head of its Fundamental Physics in Radio Astronomy Research Division.

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