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Call for proposals – Deadline Oct 5, 2021, UT 15:00

by Alex Kraus

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).

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 web pages.

Please note, that observing proposals for the new **Phased-Array-Feed** cannot yet be accepted – the system is still being commissioned.

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/proposals/>.

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

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) (e.g. to NRAO for the VLBA).

The following deadline will be on Feb 3, 2022, 15.00 UT.

Opticon-RadioNet-Pilot Transnational Access Programme

by Alex Kraus

The new Opticon-RadioNet-Pilot (ORP) project (see <http://www.orp-h2020.eu>) 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>.

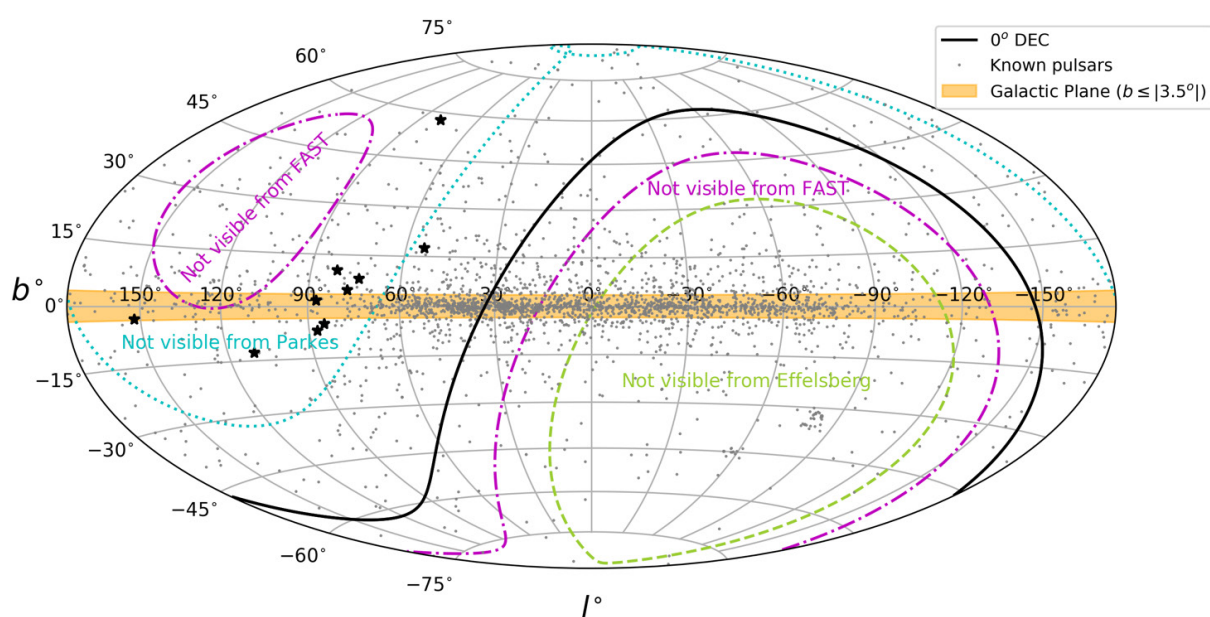
After completion of their observations, TA supported scientists are required to submit their feedback to the ORP project management and the EU. Publications based on these observations should be acknowledged accordingly:

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].

Monitoring of FAST's early pulsar discoveries

by Marilyn Cruces

A major full-visible-sky (covering $\sim 57\%$ of the whole sky, from declination -14° to $+66^\circ$) blind multi-purpose survey, namely the Commensal Radio Astronomy FAST survey (CRAFTS) has started using the largest single-dish radio telescope, the Five-hundred-meter Aperture Spherical radio Telescope (FAST). Pulsar searching is a key component of CRAFTS, along with HI imaging, HI galaxies, and transients. Pilot CRAFTS scans started in the middle of 2017 during the commissioning phase of FAST, with an un-cooled receiver, namely the Ultra-Wide-Band receiver (UWB: 270 MHz – 1.62 GHz). In 2018, CRAFTS switched to using the L-band Array of 19-beams. To date, more than 120 new pulsars have been confirmed.

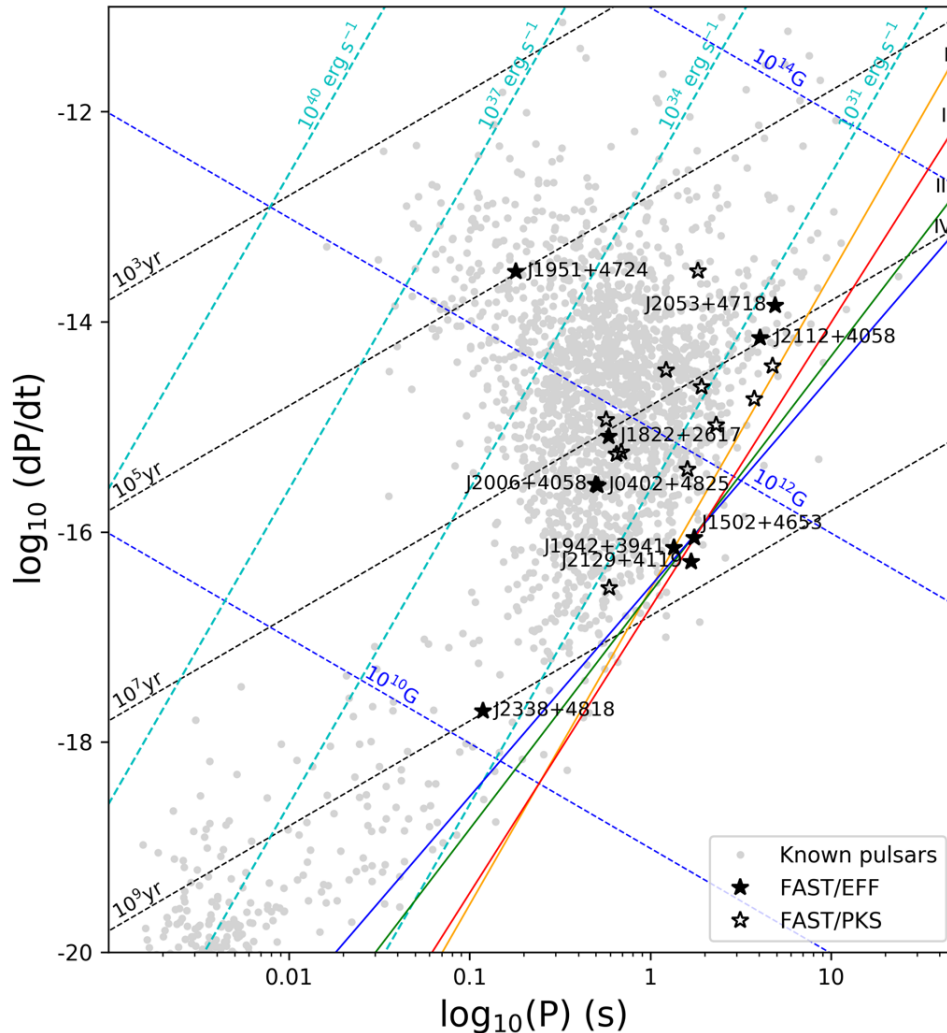


Sky coverage in Galactic coordinates of the 500-m FAST (magenta), the 100-m Effelsberg (green) and the 64-m Parkes (cyan) radio telescopes. The black-stars show the position of the FAST/EFF pulsars.

The 100-m Effelsberg (EFF) radio telescope has been key in confirming and following-up the CRAFTS discoveries. Although much more sensitive, FAST needs to operate more than 1000 actuators to accomplish re-pointing, taking up to 10 minutes. The Effelsberg 7-beam receiver provides more time-effective and prompt sky coverage of the pulsar candidates, whose position uncertainty can be substantially bigger than the beam size during drift scans. The 7-beam receiver gain of 1.6 K/Jy at L-band versus the gain of 10 K/Jy of FAST's UWB receiver, implied that in order to achieve the same sensitivity an integration ~ 40 times longer had to be considered (taking into account the lower system temperature of the Effelsberg receiver, but also the higher frequency used).

Therefore, the observations carried out by Effelsberg ranged between 0.5 to 2 hours per pointing. They were split into *searching mode* and *timing mode* observations. While searching observations allow us to confirm a candidate and to refine its position, timing observations

lead to a phase-connected solution that accounts for every rotation of the pulsar – key to extracting their scientific potential.



A P - \dot{P} diagram. The new pulsar discoveries monitored by EFF are plotted with filled-black stars, and by PKS with open-black stars. Alongside are drawn lines of constant magnetic field strength (dark-blue dashed lines), lines of constant spin-down age (black dashed lines) and lines of constant rotational energy loss (cyan dashed lines) as derived from the rotating dipole model. The death lines shown correspond to [Bhattacharya et al. \(1992\)](#) polar gap model (model I), [Chen et al. \(1993\)](#) model for a decreased polar cap area (model II), and [Zhang et al. \(2000\)](#) models for curvature radiation from the vacuum gap model (model III) and from the space-charged-limited flow (model IV).

We have confirmed and timed 10 FAST pulsars for at least one year, obtaining highly precise measurements of its spin period P and derivative \dot{P} . We plot the FAST-EFF pulsars in the so

P- \dot{P} diagram alongside 11 pulsars from the southern counterpart of the CRAFTS survey using Parkes, against the population of known pulsars.

As it is seen in Figure 2, most of the FAST pulsars seem to be located toward the right-hand-side of the normal pulsar zone, thus implying that they correspond to an older pulsar population. Furthermore, three pulsars are located below the deadline models, which corresponds to the point at which radio pulsars are expected to turn off as pair production can no longer sustain the emission. We have additionally supported our hypothesis with a Kolmogorov-Smirnov test for the age distribution of known pulsars and the 21 FAST pulsars.

Notable sources are PSRs J1951+4724 – a young and energetic pulsar visible up to a frequency of 8 GHz – and J2338+4818 which is a pulsar in a binary orbit of 95.2 days. PSR J2338+4818 turns out to be a mildly recycled pulsar with a massive CO-WD companion. Assuming a pulsar mass of $1.4 M_{\odot}$, the companion is to have a minimum mass of $1.049 M_{\odot}$. Such a system likely evolved from an intermediate-mass X-ray binary, where the inefficient mass transfer through type C Roche-lobe overflow phase led to a pulsar that is not fully spun-up ($P = 0.1187$ s) and in an orbit with discernible eccentricity (0.0018). It is also the widest binary with a massive white dwarf companion ($M > 0.8 M_{\odot}$), among the recycled/mildly-recycled systems. Additionally, PSR J2338+4818 exhibits turn-offs on time scales longer than one hour. We continue the monitoring of this source to discern whether the turn-offs are due to diffractive scintillation or intermittent emission.

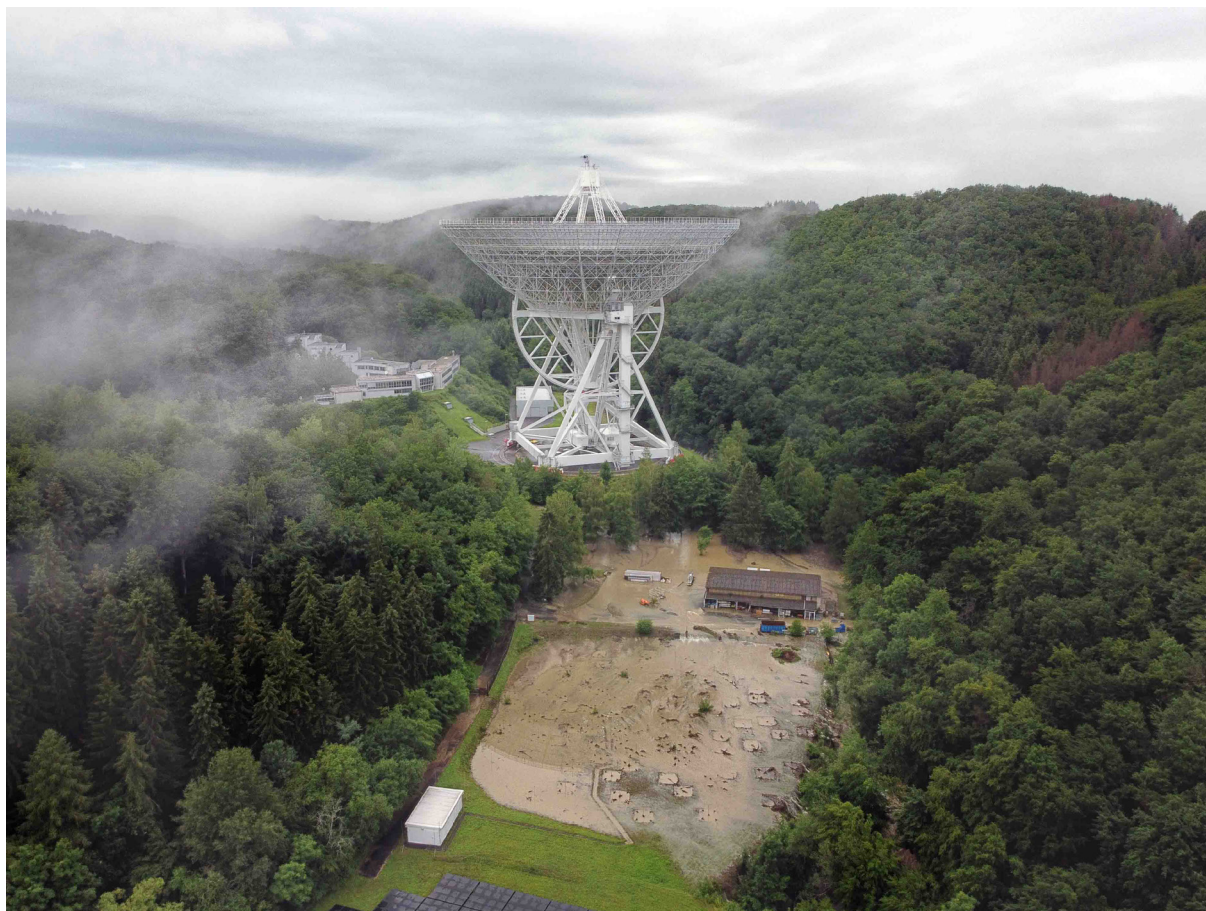
This work represents one of the early CRAFTS results with a receiver built with the purpose of commissioning. The upgrade of FAST to the 19-beam receiver, with a gain of ~ 18 K/Jy, has potential to substantially enrich the pulsar sample.

This work has been accepted for publication in Monthly Notices of the Royal Astronomical Society. The preprint is available at <https://arxiv.org/abs/2108.09121>.



Aftermaths of the flooding event in July at the observatory

by Norbert Junkes and Alex Kraus



Aerial view of the Effelsberg radio observatory on the morning of July 15, 2021. The image shows in the foreground the completely flooded "low-band" part of the Effelsberg station of the European LOFAR telescope network. In the background the 100 m radio telescope and to the left the observatory building with control room.

The extreme weather situation with heavy rainfalls on July 13 and 14, 2021 caused serious flooding in the Ahreifel and neighboring regions, with sometimes devastating inundations. To a relatively small extent – compared to the neighboring valleys of the Ahr and Erft – the observatory was also affected. Due to its location in a valley, with the Effelsberger Bach and the Rötzelbach (normally tiny creeks), there was also massive flooding here.

Part of the ground was overflowed, including the access road and the storage building south of the telescope. A container with technical equipment was washed away and some low-band-antennas of the LOFAR field were destroyed (see pictures). Fortunately, no-one was harmed during this event. The institute, however, was without electricity, water and telephone for a few days. Thanks to the energetic efforts of many colleagues from Effelsberg

and Bonn, the situation could soon be eased. Astronomical observations with the 100 m telescope could also be re-started after just five days.

The just resumed lecture program in the visitors' pavilion in direct sight of the telescope had to be cancelled and a foot path connecting the astronomy trails built by the institute in collaboration with local tourist initiatives was washed away.

In the immediate vicinity of the observatory, both in the district of Euskirchen and in the district of Ahrweiler (the observatory is located directly on the state border between North Rhine-Westphalia and Rhineland-Palatinate, which separates the two districts), the extreme weather conditions had devastating effects. The entire observatory crew, a good portion of whom live in the immediate vicinity of the telescope, is very concerned about the neighborhood, which has been hit hard by the effects of the heavy rain.



The picture shows the access road to the 100 m radio telescope Effelsberg with the Rötzelbach running parallel to it. Normally a rather narrow trickle, it led to flooding of the road and the adjacent meadow during the heavy rainfall of July 13-14, 2021.



Effelsberg Photos: Norbert Tacke/MPIfR