
*Photo taken by Norbert Tacken, Summer 2010*

## Call for Proposals

**Deadline October 11, 2010, 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. With the advent of the new sub-reflector, observations from the secondary focus (especially at frequencies > 10 GHz) gain from a much higher sensitivity and flatter gain-elevation curves. The new hexapod driving system leads to a faster and more precise focusing of all receiving systems in the primary and secondary focus.

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/english/radiotelescope/index.html*

**Observing modes**

Possible observing modes include spectral line, continuum, pulsar, and VLBI. Available backends are a FFT spectrometer (with 16384 channels), a digital continuum backend, a pulsar system (coherent and incoherent dedispersion), and two VLBI terminals (MK4 and VLBA type).

Receiving systems cover the frequency range from 0.6 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.

**How to submit**

*Applicants should use the new NorthStar proposal tool for preparation and submission of their observing requests. North Star is reachable at*

*https://proposal.mpifr-bonn.mpg.de*

*From 2010 on only proposals submitted via NorthStar will be accepted.*

For VLBI proposals special rules apply. For proposals which request Effelsberg as part of the European VLBI Network (EVN) see:

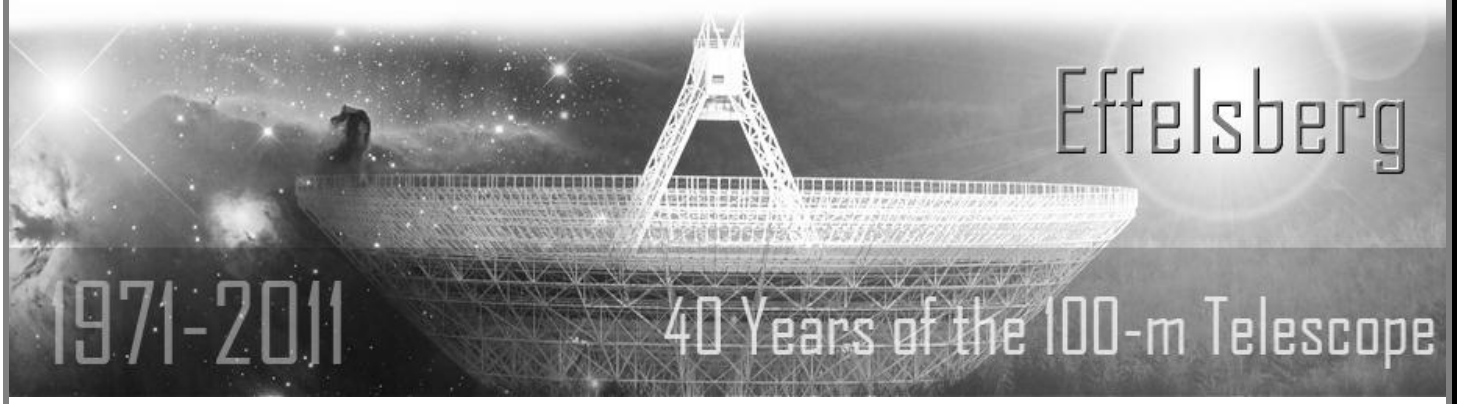
*http://www.evlbi.org/proposals/prop.html*

Information on proposals for the Global mm-VLBI network can be found at

*http://www.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).

*by Alex Kraus*



## RadioNet Transnational Access Programme

RadioNet (see *http://www.radionet-eu.org* ) includes a coherent set of Transnational Access programmes aimed at significantly improving the access of European astronomers to the major radio astronomical infrastructures that exist in, or are owned and run by, European organizations. Observing time at Effelsberg is available to astronomers from EU Member States (except Germany) and Associated States that meet certain criteria of eligibility. For more information:

*http://www.radionet-eu.org/transnational-access*

Time on these facilities is awarded following standard selection procedures for each TNA site, mainly based on scientific merits and feasibility. New users, young researchers and users from countries with no similar research infrastructure, are specially encouraged to apply. User groups who are awarded observing time under this contract, following the selection procedures and meeting the criteria of eligibility, will gain free access to the awarded facility, including infrastructure and logistical support, scientific and technical support usually provided to internal users and travel and subsistence grants for one of the members of the research team.

*by Alex Kraus*

## What's new @Effelsberg

# New Telescope Control System for the 100-m telescope

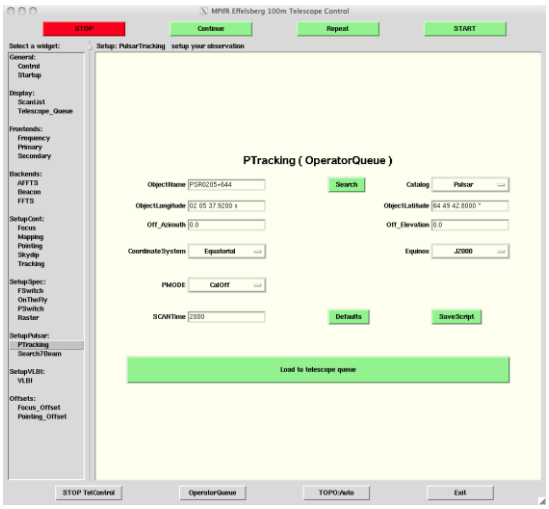
In July this year the old control system for the 100-m telescope – based on a microVax computer (running mostly FORTRAN code) and some additional specifically designed hardware (everything more than 15 years old) – has been replaced by new hard- and software. This new system consists of two VME computers (which control the telescope, the subreflector and the receiver frontends) and a Linux PC that runs the central control processes and hosts the observer interface. The software of the new system is mostly programmed in PYTHON and C/C++.

The new system is much better suited to incorporate new backends or additional observing modes. It is much easier to operate as the observer's interface is based on a GUI (see pictures below). Additionally, it allows better planning of an observing run by building a queue of individual observations and will also simplify remote observations.

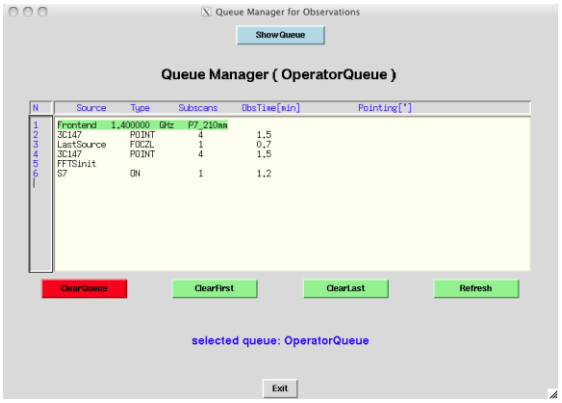
The system is still under test, however, by this time, most observing modes were used successfully; several regular programs are already performed with it. We expect to have the implementation and testing completed by the end of September, so that the new system will be fully functional with the beginning of the winter season.

*By Alex Kraus*


Observer's input for continuum mapping




Observer's input for Pulsar Observations (Tracking)

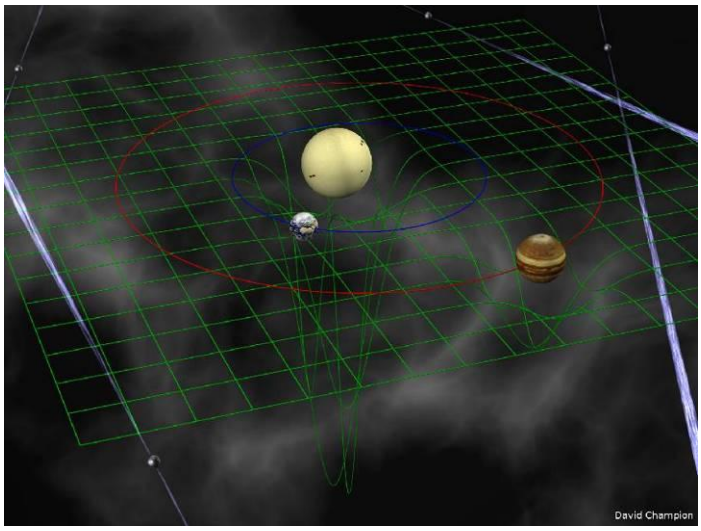



Queued observations


Main control display

# Science Highlights

## Effelsberg plays role in weighing planets and exciting the public




*The mass of Jupiter can be determined by means of pulsar timing observations. Image: David Champion*

In two independent projects described in recent press releases, observations with the 100-m telescope played an important role in two international projects. David Champion and his colleagues used radio signals of pulsars to derive the masses of the large planets in our solar system. Within the "Einstein@Home" project, the first pulsar could be detected in survey data taken with the Arecibo radio telescope and analysed in the computers of German and American "citizen scientists". Dedicated observations of the new pulsar performed by Michael Kramer and colleagues with the Effelsberg telescope helped to establish the nature of the discovered pulsar.

An international research team led by David Champion, now at Max Planck Institute for Radio Astronomy in Bonn, with researchers from Australia, Germany, the U.S., UK and Canada has come up with a new way to weigh the planets in our Solar System, using radio signals from pulsars.

Until now, astronomers have weighed planets by measuring the orbits of their moons or of spacecraft flying past them. That's because mass creates gravity, and a planet's gravitational pull determines the orbit of anything that goes around it - both the size of the orbit and how long it takes to complete. The new method is based on corrections astronomers make to signals from pulsars. Measurements of planet masses made this new way could feed into data needed for future space missions.

Data from a set of four pulsars have been used to weigh Mercury, Venus, Mars, Jupiter and Saturn with their moons and rings. Most of these data were recorded by CSIRO's Parkes radio telescope in eastern Australia, with data contributed by the Effelsberg telescope in Germany and the Arecibo telescope in Puerto Rico. The masses were consistent with those measured by spacecraft. The mass of the Jovian system (Jupiter and its moons), $9.547921(2) \times 10^{-4}$ times the mass of the Sun, is significantly more accurate than the mass determined from the Pioneer and Voyager spacecraft, and consistent with, but less accurate than, the value from the Galileo spacecraft.

The new measurement technique is sensitive to just 0.003% of the mass of the Earth, and one ten-millionth of Jupiter's mass (corresponding to a mass difference of two hundred thousand million million tonnes).

Astronomers need accurate timing results because they're using pulsars to hunt for gravitational waves predicted by Einstein's general theory of relativity. Finding these waves depends on spotting minute changes in the timing of pulsar signals, and so all other sources of timing error must be accounted for, including the traces of solar system planets.

In a project led by colleagues at the Max-Planck Institut für Gravitationsphysik (Albert-Einstein Institut) the "Einstein@Home" project was used to analyse data taken during the P-ALFA survey at Arecibo, which led to the discovery of a pulsar now called PSR J2007+2722. The pulsar rotates 41 times per second and is located in the Milky way at a distance of approximately 17,000 light years. Unlike most of the pulsars spinning that fast, PSR J2007+2722 sits alone in space without a companion star, established with the help of Effelsberg observations. Astronomers consider the pulsar as especially interesting since it is likely that the new pulsar is a recycled pulsar that lost its companion, similar to the "Black widow pulsar", earlier detected by MPIfR's "Fundamental Physics in Radio Astronomy" research group.

Both press releases, referring to research papers in "Astrophysical Journal" and "Science", are available via MPIfR web pages:

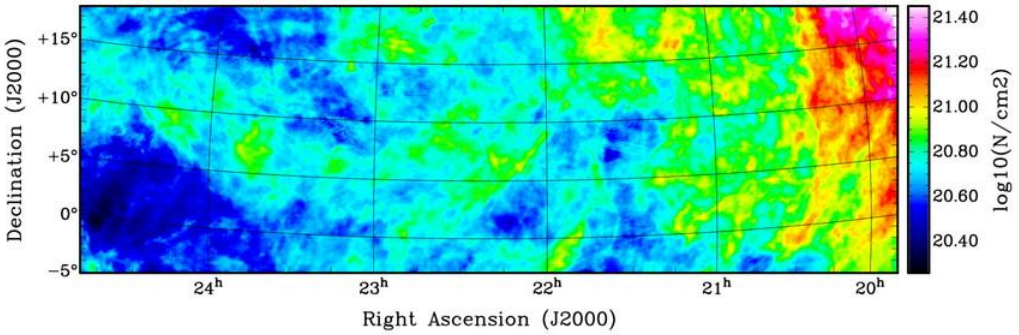
**Weighing the Planets - from Mercury to Saturn,**
*http://www.mpifr-bonn.mpg.de/public/pr/pr-pulsarweight-en.html*
**Pulsar von Amateuren entdeckt,**
*http://www.mpifr-bonn.mpg.de/public/pr/pr-pulsareinstein-dt.html*
**Einstein@Home ‚citizen scientists' discover new pulsar,**
*http://www.aei.mpg.de/pdf/pm_news/2010/PM2010_Einstein_Home_pulsar_engl.pdf*

*By Norbert Junkes*

# The Effelsberg-Bonn HI Survey (EBHIS) in Full Swing

Using a seven-feed receiver system equipped with state-of-the art Field-Programmable Gate Array (FPGA) spectrometers, the 100-m Effelsberg telescope performs an all-sky survey north of Dec = -5 degree, the Effelsberg-Bonn HI survey (EBHIS). Using 100 MHz bandwidth EBHIS performs for the very first time in parallel a Milky Way and an extragalactic HI survey out to a red shift of z = 0.07.

*One of the two large coherent fields we have observed so far. The Figure shows a column density map (as calculated within a radial velocity between -50 and +50 km/s). Due to the high angular resolution of the Effelsberg 100-m telescope we see lots of filamentary web-like structures, shock fronts, and shells.*

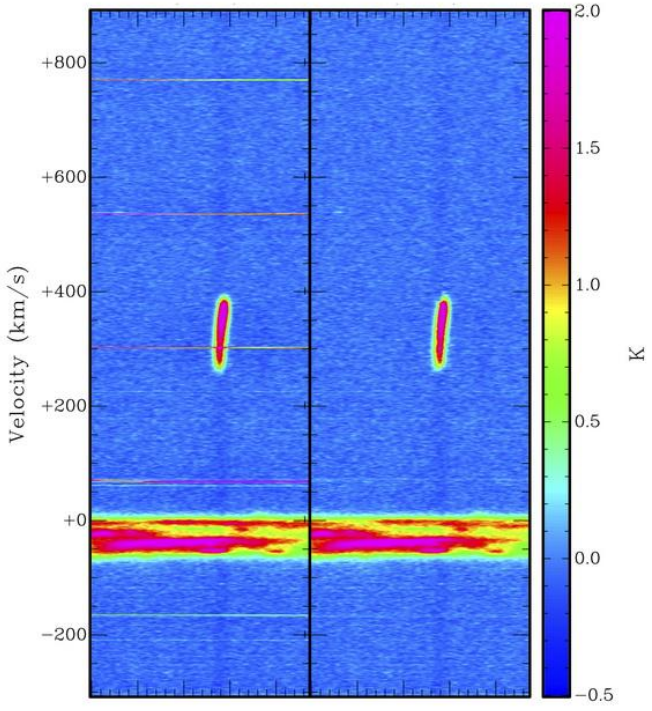



Regular EBHIS survey observations started during the winter term 2008/2009 after extensive system evaluation and verification tests. Until today, we surveyed about 8000 square degrees, focussing during the first coverage on the galactic north pole region and the northern extension of the Magellanic cloud system. The first whole northern sky coverage of the EBHIS is expected to be finished until mid 2011 and will offer an RMS limit of less than 90 mK at full velocity resolution of 1.3 km/s. Hence, already the first EBHIS coverage will reach a sensitivity level comparable to GASS and HIPASS and will complete the radio view of the whole sky at 21-cm.

The HI mass limit of the first coverage allows to detect galaxies with $10^8$ solar masses at the distance of the Virgo Cluster. The EBHIS deep survey area - towards the whole Sloan-Digital Sky Survey area - offers HI data by a factor of five more sensitivity. First evaluation studies towards Virgo cluster confirm these detection limits in practice. High speed HI spectra storage (0.5 s) allows to mitigate more than 95% of the contaminating Radio Frequency Interference (RFI) signals. The EBHIS data yield a calibration accuracy of better than 3% across the whole band and is corrected for stray-radiation. The data will be will be publicly available at

http://www.astro.uni-bonn.de/hisurvey/

*By Jürgen Kerp & Benjamin Winkel for the EBHIS team*

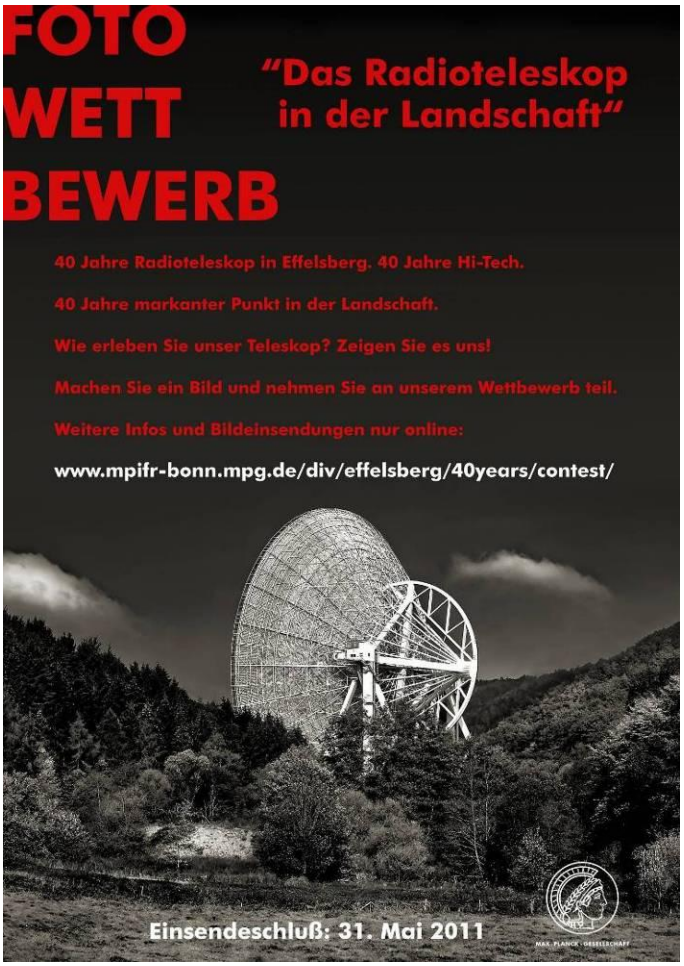



*Position-Velocity plot of one of our measurements showing the Milky Way emission and the galaxy NGC 4395 at a radial velocity of about 350 km/s. The left panel shows the data without radio frequency interference mitigation applied, the right panel uses our mitigation algorithm.*

## Norbert Tacken, Telescope Operator

**Norbert Tacken** is one of the operators for the 100-m telescope but to a lot of us his name might even more ring a bell when it comes to Photography and Photoshop issues…

After 10 years in an architectural office in Bonn-Bad Godesberg and several years of freelancing as an IT-Expert, Photoshop Trainer and Photo-Designer he finally made his way to the Max-Planck-Institute. In 2002 he joined the Effelsberg staff as telescope operator. Since then he began taking care of the telescope and the observers. At the same time, he started to support our PR-Department with his photos.




In his spare time Norbert is really fond of taking pictures and many of his artistic results -concerning the telescope- might be well known to us (see e.g. the header of the Effelsberg Newsletter). His pictures are appearing regularly on our web sites. He has been designing calendars, postcards, T-Shirts and many more. His fields of interest in Photography are: People, Travel and Architecture (and our telescope of course). Besides a couple of exhibitions he had performed pretty well at several photo contests and was honored with a couple of prizes. His favorite all time motto is: Always look at the bright side of life (especially when using a digital camera).

As part of the celebrations for the 40th anniversary of the inauguration of the 100-m telescope next year, we decided to call for a photo contest with the slogan "The Radio Telescope within the Landscape". Norbert will be in the jury, which will review the pictures – guess who created the poster for the contest …

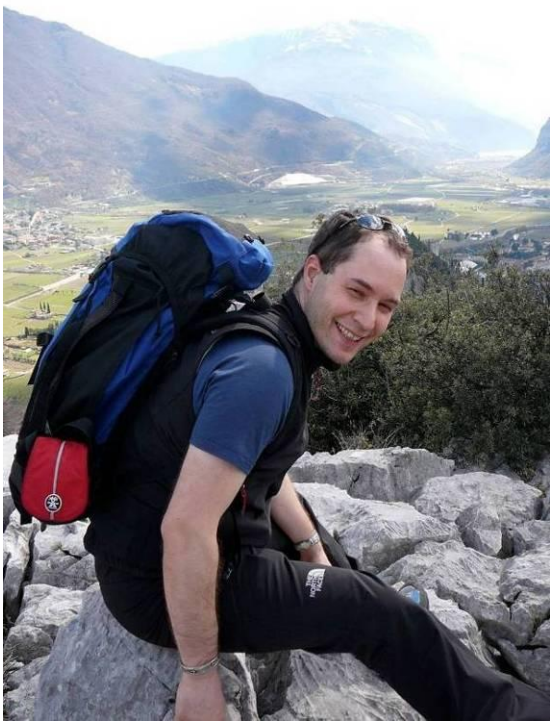
## Who is who in Effelsberg ?

### Heiko Hafok, New Software Engineer @Effelsberg

**Heiko Hafok** studied physics at the Universität zu Köln from 1990 to 2001. In 1996 he joined the KOSMA group (Cologne Observatory for Submillimeter Astronomy) and worked on the motion control system for the KOSMA 3m Telescope in Zermatt, Switzerland. During his PhD he continued his work with the KOSMA 3m telescope, observing molecular transitions of carbon monoxide in spiral galaxies to investigate the global properties of the cold molecular gas. He finished his PhD thesis in 2001.

Afterwards he spent 2 years at the Radioastronomisches Institut der Universität Bonn (RAIUB). During this time he did the first design of a new LINUX based control system for the KOSMA 3m telescope and SOFIA. End of 2002 he joined the the Max-Planck-Institut für Radioastronomie in Bonn. In the following years he did software development for APEX (Atacama Pathfinder EXperiment) and the ALMA (Atacama Large Millimeter Array) control system and the data reduction pipelines in the group for submillimeter technology.

Since 2010 he joined the computing team at the Effelsberg radio observatory. His main field of activities are software development of the control system and the management of the computing environment at Effelsberg.



## Public Outreach Activities

### The 100-m radio telescope will soon turn 40!

The Effelsberg radio telescope was built between 1967 and 1971, the official opening took place on May 12, 1971. After several months of testing and implementation of receivers the full commencement of operation took place on August 01, 1972. Thus, the 40$^{th}$ anniversary of the 100 m telescope will be celebrated with a number of events from spring 2011 to autumn 2012. One highlight is certainly the next Open Day at the radio observatory which will be held on Saturday, September 10, 2011. Other events within the framework of the anniversary will include series of talks, celebrations, a photo contest (see article on page 5). Please stay tuned – information about the Effelsberg anniversary will soon be available via:

http://www.mpifr-bonn.mpg.de/div/effelsberg/40years

*By Norbert Junkes*

*The 100m radio telescope under construction (early 1971).*
*Image: Hans Kärcher, MT aerospace.*

## Contact the Editor

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