Effelsberg Newsletter

September 2013

Science Highlights:

The discovery of radio pulsations from the first Galactic Centre pulsar with Effelsberg.

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Call for Proposals:

Deadline October 9, 2013, 15:00 UT

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/for_astronomers

Content

Icon Images: Norbert Tacken

Observing modes

Possible observing modes include spectral line, continuum, pulsar, and VLBI. Available backends are a FFT spectrometer (with 32768 channels), a digital continuum backend, a pulsar system (coherent and incoherent dedispersion), and two VLBI terminals (dBBC and RDBE type with MK5 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.

How to submit

Applicants should use the new NorthStar proposal tool for preparation and submission of their observing requests. NorthStar 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/proposals.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) (e.g. to NRAO for the VLBA).

After October, the next deadline will be on February 5, 2014, 15:00 UT.

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

Science Highlights

The discovery of radio pulsations from the first Galactic Centre pulsar with Effelsberg

Ralph Eatough

Artist's impression of PSR J1745-2900, a pulsar with a very high magnetic field ("magnetar") in the direct vicinity of the central source of our Galaxy, a supermassive black hole of approximately 4 million times the mass of our sun. Measurements of the pulsar imply that a strong magnetic field exists in the vicinity around the black hole.

Credit: MPIfR/Ralph Eatough

Link to the MPIfR press release:

http://www.mpifr-bonn.mpg.de/461331/news_publication_7502957?c=9060

The discovery of a pulsar at the centre of the Milky Way has been one of the goals of pulsar astronomers at Effelsberg since the telescopes construction. Pulsars, precise cosmic clocks, could be used to probe both the extreme and unusual environment in the Galactic Centre, and perhaps most excitingly, the space and time around the supermassive black hole candidate, Sgr A*.

Our own director, Prof. Dr. Michael Kramer, was the first to attempt this using the 100-m, during his PhD project. He was followed by Prof. Dr. Bernd Klein, who performed deep surveys of the Galactic Centre region at multiple radio frequencies. Alas, no pulsars were discovered with Effelsberg, or indeed by any other radio telescopes; a fact that has puzzled pulsar astronomers ever since – after all pulsars should be plentiful in this region of the Galaxy. It had been proposed that severe interstellar scattering of radio waves was the reason for the lack of detections. Because of this, over the last year Effelsberg had been searching for pulsars at higher radio frequencies (20 GHz) but still with no success.

Recently NASA X-ray telescopes detected a bright flare in the the direction of the Galactic Centre (just 0.0008 degrees → 0.4 light years from Sgr A*). Thoughts initially turned to the expected encounter of the "G2 cloud" with the black hole, an event proposed by our colleagues at the MPI in Garching, however, after precise 3.76 second X-ray pulsations were detected, the source could only be a pulsar! Although small in number some pulsars visible at

X-ray wavelengths can also be seen in the radio band. On April 28th, and as soon as the Galactic Centre became visible, the Effelsberg telescope was used to make pulsar observations with the 2-cm and 6-cm receivers.

Initially pulsations were not clearly visible, and as such we waited until the next available slot to try another frequency. On May 2nd observations were made at 3.6-cm. In this observation the pulsar had become very bright, and was easily detected. These fluctuations in radio brightness are typical of a special type of pulsar: magnetars; pulsars with very strong magnetic fields.

Since this first detection of the pulsar, now named PSR J1745-2900, two record breaking measurements (of the so-called dispersion measure "DM" and rotation measure "RM") with the 100-m, have unambiguously placed the pulsar in the Galactic Centre. So, Effelsberg is the first telescope to detect a radio pulsar in the Galactic Centre!

Already, measurements of the radio pulses from PSR J1745-2900 have provided a wealth of information on the environment in the Galactic Centre and allowed us to measure the strength of the magnetic field in the hot gas that the black hole will eventually swallow (Eatough et al. 2013, Nature). If this magnetic field is indeed consumed by the black hole it can explain the origin of radio and X-ray emission long associated with the Sgr A* radio source.

Unfortunately this pulsar is still too distant to accurately probe Einstein's spacetime around the black hole, but its discovery has raised our hopes of detecting further pulsars in the heart of the Milky Way with Effelsberg.

Many thanks to all the staff in the MPIfR who made these observations possible!

Reference: A strong magnetic field around the supermassive black hole at the centre of the Galaxy, *R. P. Eatough, H. Falcke, R. Karuppusamy, K. J. Lee, D. J. Champion, + et al. 2013, Nature doi:10.1038/nature12499*

The telescope during regular observations of the Galactic Centre region for unidentified pulsars. The Galactic Centre is in the Sagittarius constellation, which is extremely close to the horizon in the southern direction, and is only visible for approximately 2 hours and 25 minutes every day. Credit: MPIfR/Ralph Eatough

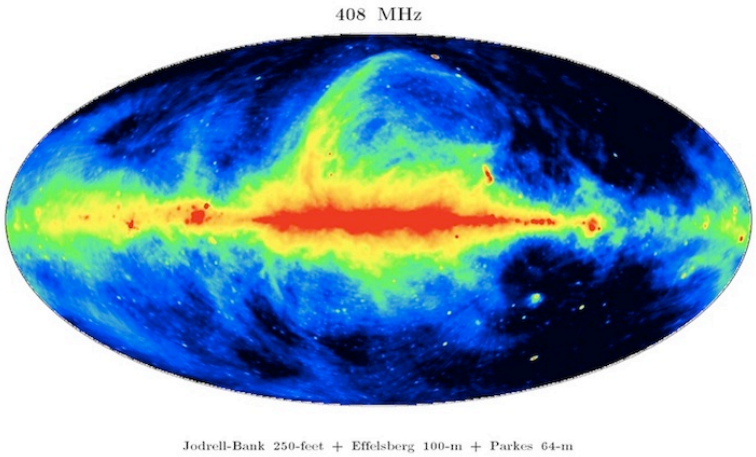
Glyn Haslam (1936-2013)

Richard Wielebinski

Glyn Haslam in front of the 408 MHz Survey Poster during the celebrations to mark the 40th anniversary of the 100-m radio telescope inauguration in Effelsberg in May 2011.

Glyn Haslam died on 27th August 2013 in England. He joined the institute in 1970 in the very first phase of its expansion. In 1970 the 100-m radio telescope was under construction, two new directors (Peter Mezger and Richard Wielebinski) joined Professor Otto Hachenberg, the founding director of the Max-Planck-Institut für Radioastronomie to build-up of the institute. The Max-Planck-Gesellschaft made a large number of positions available to ensure a solid basis for radio astronomy in Germany. Each director had a technical responsibility as well as a team for his direction of research. Professor Hachenberg was the Executive Director with interests in Solar research and HI regions. Peter Mezger's interests were HII regions and molecular spectroscopy. I came from Australia and was interested in pulsars and magnetic fields, hence continuum /polarisation mapping.

Each of the directors was recruiting staff to be ready for observations once the 100-m radio telescope became operational. Just before leaving Australia I was involved in the completion of an all-sky survey at 150 MHz (with Tom Landecker) some of which was finally reduced on a computer. Thus a close connection to the work of Glyn Haslam existed who has completed simultaneously a survey of the Galactic anti-centre region at 408 MHz in Jodrell Bank. There was a conference in Jodrell Bank in 1970 where negotiations led to a quick success – Glyn Haslam was coming to join the MPIfR, bringing with him the NOD2 data reduction package. At this stage there was a considerable controversy about the way that radio astronomy data should be reduced. The head of the Computer Division of the MPIfR, Peter Stumpff, developed an excellent telescope drive programme but limited data reduction to writing the data on magnetic tape. Each astronomer was then free to reduce his data with his programmes. This did obviously not work for two dimensional data – a reduction package like the NOD2 system was needed. Another lucky coincidence occurred – Glyn Haslam came with his family and could not find accommodation in Bonn. So the family established themself in the observers' quarters at the Effelsberg site. This meant that close contact was developed between Glyn Haslam and the local Electronics Division people – Nigel Keen in particular. Glyn Haslam witnessed the early drive tests and became concerned with the oscillations that occurred. At this stage he came up with the idea of putting a 408 MHz receiver in the telescope. This needed some political finesse since also other groups wanted to be first to use the telescope and it was important not to interfere with the construction. Also welding occurred at this time that was a source of interference. However after initial technical and political problems were overcome the gathering of 408 MHz data started. In fact when the official opening of



A 408 MHz all-sky continuum survey Reference: Haslam et al. 1982, Astronomy and Astrophysics Supplement Series, vol. 47, p. 1, 2, 4-51, 53-142.

the radio telescope took place on 12th May 1971 it were the 408 MHz survey observations that were demonstrated to the many important visitors.

The oscillation problem was solved and full astronomical observations were started in the middle of 1972. There was a continuum receiver for 2.75 GHz and later a system for 10.6 GHz. Glyn Haslam begun to use both systems showing that his NOD2 software was capable of handling the high frequency Effelsberg data. At first observations of supernova remnants and radio galaxies were made. This led quickly to the development of polarisation reduction software within the NOD2 system. The mapping of the Andromeda Nebula was a crowning combination of the excellent drive software and the NOD2 data reduction system. The completion of an all-sky 408 MHz survey was in the back of Glyn's mind. Some colleagues came from Australia to the MPIfR (John Whiteoak, Frank Gardner, Anne Green) wanting to be the early users the 100-m radio telescope. It was politically opportune to negotiate some sort of exchange agreement with CSIRO Radiophysics Division. I travelled to Sydney in 1972 and had discussions with Paul Wild, then the Director in Epping. I wanted to get access to southern hemisphere observations for members of my group. The result was an agreement that one person from MPIfR can work in Epping at a time with access to the Parkes telescope. Glyn Haslam was the first person 'to be sent to New South Wales' under this agreement to complete the southern extension of the 408 MHz survey. Numerous helpers joined Glyn for the many observing sessions. On his return to Bonn Glyn Haslam got a group of close collaborators (Chris Salter, Warwick Wilson, Herbert Stoffel) working on the completion of the remarkable data set, in a way the logo of the MPIfR – the 408 MHz all-sky survey. The 408 MHz survey is still, after nearly 40 years, a basic template for the synchrotron emission of the Galaxy. It has been cited over 800 times and continues to be used also by satellite (WMAP, PLANCK) continuum projects for the subtraction of the foreground Galactic emission.

The NOD2 based Effelsberg software has evolved over the years. It was exported to many countries (Australia, Argentina, China, Japan, Canada, France/IRAM, USA/NRAO-Arecibo) and in a way competed with the AIPS data reduction system. For single radio telescope data the NOD2 system proved to be excellent. A description of the system was given by Haslam in 1974 with complete documentation. However additional routines that were constantly developed and added led to some problems of documentation. The dedication of computer-oriented users led to the evolution of the NOD2 system: Ann Downes, Patricia Reich and many others.

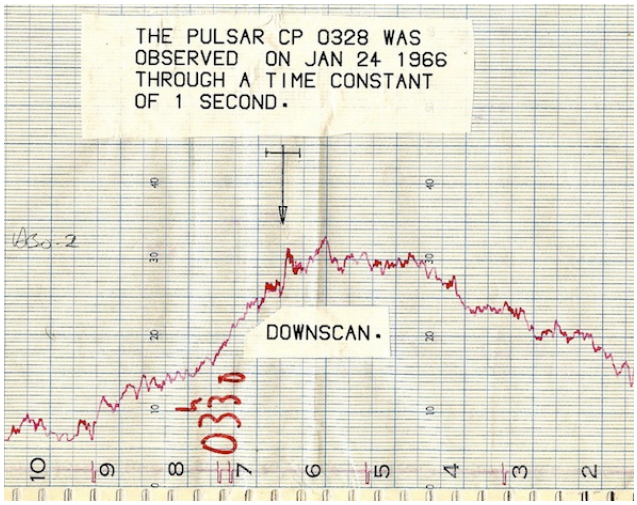
Glyn Haslam was a technically oriented radio astronomer of the old generation. He was not only interested in astronomical data but had also a very close insight in the technical problems. His method of working was to construct everything himself. In particular in his early days in Jodrell Bank Glyn was an inspiration to the more observationally oriented colleagues. To detect the weak diffuse emission from nearby galaxies required the addition of many single coverages. This was implemented in the NOD2 system. Another problem encountered in the mapping of the weak diffuse continuum

emission in Effelsberg at high radio frequencies were the weather effects. Glyn Haslam collaborated with Darrel Emerson and Uli Klein to develop a multi-beam method of mapping of extended sources. This method evolved later to the 'on-the-fly' observing method. Glyn Haslam also championed the handling of large data sets as witnessed in the later 11cm Galactic plane surveys led by Wolfgang Reich and Ernst Fürst. These developments helped the MPIfR to become a world leader in the studies of cosmic magnetic fields. Later in his career at the MPIfR, when the mm-wavelength astronomy projects were added to the scope of research at the institute, Glyn Haslam became involved with Ernst Kreysa in the implementation of multipixel bolometers for the Pico Veleta telescope. Important results at 1.2 mm wavelength were obtained using the NOD2 software adapted to such multi-beam observations.

Glyn was a very sociable person, always willing to start a long conversation. Many will remember Glyn as the tea maker with need for extended discussions. Outside the institute he was an ardent hobby model aeroplane flyer. His car was often filled with model aeroplanes in various stages of completion. His interest in model railways led occasionally to raised eyebrows when complex rail layouts appeared on the MPIfR printers. Glyn's inventive spirit led him to develop a bar code system for controlling his model railway – well ahead of the commercial use of such technology. He also continued right up to the last days to come with exhibits of historical radio astronomy projects. After returning to England Glyn began to develop amateur radio telescope systems for use in schools. Glyn Haslam attended the celebrations to mark the 40th anniversary of the 100-m radio telescope inauguration in Effelsberg in May 2011 - his (and my) great lifetime passion. Glyn Haslam contributed to the renown of the MPIfR, he will be missed by those that knew him.

A Personal Note about Glyn Haslam:

Bernd Klein



During working on my PhD in 2000, Glyn became a good friend for me and a very frequently visitor of the digital lab. Sometimes we talked about astronomy -- but mostly about model railways and fancy bar code navigation for the trains. Sometimes we chatted about pulsars – but mostly about the noise temperature of commercially available LNAs for sat-receivers and how they perform after some special modifications. Sometimes we discussed just a few minutes -- but mostly hours.

Glyn was not only an astronomer. He was an engineer, a programmer, an avid hobbyist and of course a good storyteller. I remember one evening in November 2001. I was a bit frustrated and told him from a further non-detection of a Galactic centre pulsar in my last observations. He listened to me, went to his office and comes back with an old piece of paper from a pen chart recorder (see chart above). Then he told me the story from his first pulsar "almost-discovery" in 1966, about one year before the official discovery by Jocelyn Bell in 1967. The chart already indicates the pulsar CP 0328 (PSR B0329+54) as a small positive peak. Due to the low time resolution of the chart recorder, the pulses are not recognizable and the pulsar appears as an ordinary continuum source. "Bad luck -- not the nobel price", he said. "But someday you'll find a GC pulsar!" How right he was! We all will miss him.

Who is Who in Effelsberg ?

Marcus Keseberg

I started my career 1996 as a motor mechanic trainee. After completing the trainee program I did my military service, first in the Netherlands, later in Burbach, Germany. Subsequently I received further education to become an automotive technician, which I supplemented with an industrial engineer degree at the 'Rheinische Fachhochschule' in Cologne, finishing in 2008.

I started my working career as a construction supervisor in a high-temperature oven producing company. Later I worked as a construction supervisor in Bonn, where I acquired the necessary knowledge on energetic renovation techniques on old buildings – when we got the opportunity of restoring the old guard house of the 'Radio Telescope Stockert' in the Eifel. After investing a total of 6,500 hours of hard work, we moved into the former guard house and are now enjoy a life in the middle of nature. "We", which is me, my wife, our dog, two cats, two horses and 23 chickens.

At the Radio-Telescope Stockert we are voluntarily active and try to keep the telescope at the best available technology. With my awaken interest for our “control room” I finally came to the Effelsberger control room. The job, moving around 3.200 tons of steel, is a great pleasure for me.

If there is a little bit spare time left, beside the daily work on the “little farm”, I like hiking, riding my mountain bike and travelling. I’m also active in the Euskirchen local politics.

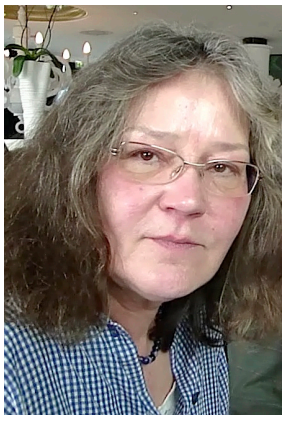
NRW Science Minister Visiting Effelsberg

On Friday, September 13, 2013, Michael Kramer, Executive Director of the Max-Planck-Institut für Radioastronomie, welcomed the minister for Innovation, Science and Research of the state Northrhine-Westfalia, Svenja Schulze, who visited Effelsberg radio observatory for the first time. He showed the observatory to Mrs Schulze and the local (Euskirchen) Social Democratic Party (SPD) candidate for the next federal elections, Helga Kühn-Mengel, and explained research with the Effelsberg 100-m radio telescope, recent results like the detection of the first pulsar in the Galactic centre region, and also future developments like the Square Kilometre Array (SKA) and their economic impact.

NRW Science Minister visiting Effelsberg Radio Observatory. Left to right: Helga Kühn-Mengel, Euskirchen SPD candidate for Federal Election, Svenja Schulze, Minister for Innovation, Science and Research of Northrhine-Westfalia (NRW), Prof. Michael Kramer, Executive Director of the Max-Planck-Institut für Radioastronomie

Credit: Norbert Junkes

In Memoriam Gabi Breuer



Most Effelsberg observers who came as guests to the institute over the last 40 years will have met Gabriele Breuer. Very sadly, Gabi passed away on May, 29 - shockingly unexpected and suddenly. Only a few weeks earlier, she was the central person in organising the "Radio Universe" conference in Bonn, like she has done so many times for the many conferences organised over the last four decades.

She has not only been a secretary to the Continuum and Fundamental Physics in Radio Astronomy groups, but she has been a pillar for the whole institute since most of us can remember. It is still very difficult to image an MPIfR without Gabi.

by Michael Kramer

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