Photo taken by Norbert Tacken, 28.04.2010

Call for Proposals

.....Deadline June 7, 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 subreflector, 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.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 http://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

Effelsberg Radio Observatory

It is a pleasure to inform you that the radio observatory at Effelsberg has gained significantly new capabilities with the operation of the first international LOFAR station. The station consists of low- and high-band antennas and gives a glimpse of the exciting new possibilities that the full LOFAR telescope will provide for astronomers soon. A tiny preview is given by some of the observations reported here, ie. the first fringes between Effelsberg and the LOFAR core in the Netherlands, the first all-sky map with the high-band antennae in Effelsberg and the first simultaneous observations with the LOFAR station and the 100-m telescope. Combining the mighty 100-m dish with this new generation telescope allows astronomers in Effelsberg now to observe from a few tens of MHz to a nearly 100 GHz - across nearly the entire cm-radio window. We are grateful to all observatory staff and astronomers, students and post-docs involved in the installation and operation of this great new addition to the observatory.

by Michael Kramer

Key Science Projects

The MPIfR invites scientist to submit Key Science Proposals (KSPs) for the 100-m telescope at Effelsberg. This kind of proposals should obey the following rules:

1. The proposed project should address high-quality and high-impact science that requires significant observing efforts.
2. The observations should utilize the core strength of the 100-m telescope.
3. KSPs should be large projects that cannot be realized (or only with difficulties) with standard observing proposals, i.e. projects requiring between 150 and 500 hours of observing time per year. (The exact amount of time available for KSPs may be limited depending on proposal pressure and requested observing frequency).
4. The project should also have a strong potential for outreach.

Key Science Projects can be submitted to the normal deadlines for the 100-m telescope – currently around Feb, Jun, and Oct 1st. They should be submitted using the North Star Tool as normal proposals accompanied by a more extensive justification (up to 10 pages) explaining the

- Scientific background
- Observing procedure
- Data analysis plan and data release policy
- Publication strategy

The proposals will be judged by the Effelsberg PC (PKE) and by the directors of the MPIfR who might consult external referees. The MPIfR expects progress reports periodically and a quick publication of the data (preferably online).

In case absentee-observations are desired, clear instructions for the execution of the project (observing strategy, acceptable weather conditions, etc.) have to be given.

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.

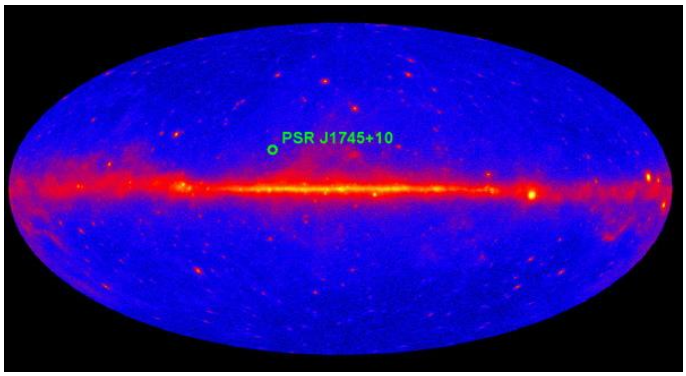
Observing time at Effelsberg is available to astronomers from EU Member States (except Germany) and Associated States that meet certain criteria of eligibility (see *http://www.radionet-eu.org/transnational-access*).

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 infrastructures, 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

Black Widow in Space



The picture shows the FERMI Sky map and the position of the newly discovered pulsar PSR J1745+10 (FERMI map: NASA/DOE/Fermi LAT Collaboration).

In 2009 the Fundamental Physics in Radio Astronomy group at the Max-Planck-Institut für Radioastronomie launched a project which uses the 100-meter Effelsberg radio telescope to search for previously unknown pulsars in the northern hemisphere. As part of this project, a number of unidentified point sources, found by the gamma-ray observatory FERMI, have been searched for radio pulsations. After searching about two dozen such sources, Ewan Barr, a PhD student in the pulsar group, succeeded in finding the first pulsar in this survey.

The newly discovered pulsar, PSR J1745+10 (named after its position in the sky), has a rotational period of only 2.65 milliseconds. This converts to about 23000 revolutions per minute, which is faster than the engine of a formula-one racing car. Such millisecond pulsars are expected to have a white dwarf companion. And indeed, observations following the discovery, using telescopes in the European Pulsar Timing Array, confirmed that PSR J1745+10 is in an 18 hour orbit around a companion star.

However, the companion seems to have a very small mass, just about 17 times the mass of Jupiter. This seems to indicate that PSR J1745+10 belongs to the group of so-called "black widow" pulsars. Presently about 20 "black widow" pulsars are known, all of them have a very light companion. It is generally believed that black widow pulsars, like other millisecond pulsars, used to have a white dwarf companion in the past, but due to their orientation have been bombarding their companion with highly energetic radiation, which is gradually evaporating it. Further observations of PSR J1745+10 in the radio, optical and other wavelengths are expected to eventually provide more evidence for the black widow nature of this pulsar.

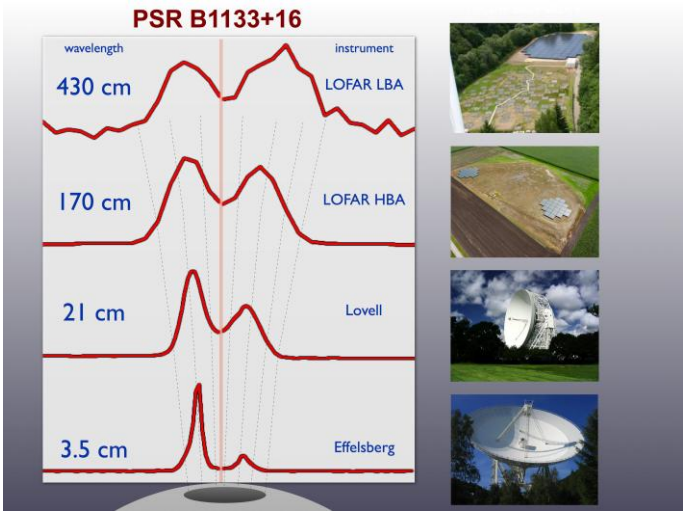
PSR J1745+10 marks the beginning of the pulsar search project. The main goal of this project is to find a large number of millisecond pulsars, well distributed over the northern sky. In combination with pulsar observations done at other radio telescopes, such a set of pulsars can help to directly measure gravitational waves caused by super-massive black holes in the Universe. These ripples in space-time should be detected as characteristic fluctuations in the arrival times of the pulsar signals.

By Norbert Wex

More details (in German) can be found at

http://www.mpg.de/bilderBerichteDokumente/dokumentation/pressemitteilungen/2010/pressemitteilung201002183/index.html

Pulsars in Many Octaves



Simultaneous detection of pulses from pulsar PSR B1133+16 in four widely spaced bands, using the Effelsberg telescope at 3.5 cm wavelength, the Lovell telescope at 21 cm wavelength, and LOFAR high-band (HBAs) and low-band antennas (LBAs) at 170 cm and 430 cm wavelength, respectively. Image: Aris Karastergiou, Oxford.

An international team of astronomers including scientists from the Max Planck Institute for Radio Astronomy has set a new world record in wavelength coverage for observing the enigmatic radio emitting stars called pulsars. By combining the world's largest radio telescopes, the Effelsberg in Germany and the Lovell in the United Kingdom, observing at wavelengths of centimetres, with the next generation telescope LOFAR, observing at wavelengths of meters, they were able to observe a set of six pulsars, each simultaneously across a range of nearly 8 octaves. These observations have the primary goal of better understanding how radio pulsars emit radiation.

Astronomers believe that pulsar emission at different radio wavelengths may be created at different heights above the star's magnetic poles. Experimental support for this hypothesis is the observation that the pulses of some pulsars become stretched out at long wavelengths (Fig. 1). The magnetic field lines that accelerate particles spread apart as one moves further and further away from the pulsar's surface and the shape of the pulsar's pulsed emission is seen to evolve quite drastically as a function of wavelength mapping the magnetic field line spreading.

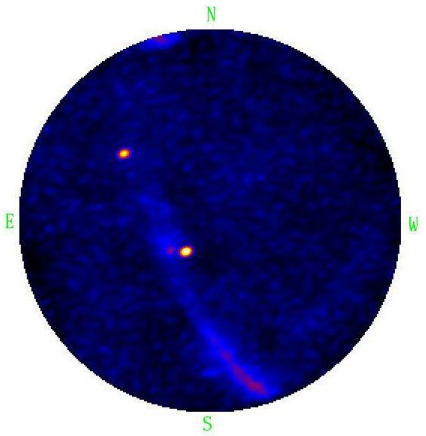
By Kosmas Lazaridis

More details can be found at

http://www.mpg.de/english/illustrationsDocumentation/documentation/pressReleases/2010/pressRelease201004201/index.html

LOFAR Station at Effelsberg - Part of the international telescope and one on its own

The LOFAR station at Effelsberg is becoming an integral part of both the international LOFAR telescope as well as the Effelsberg observatory. The ability to routinely obtain fringes between the Effelsberg station and the LOFAR core in the Netherlands is complemented by developments to use the LOFAR station as a single telescope in its own right. Successful efforts to observe pulsars (see article in this newsletter) are joined by the capability to obtain the first "all-sky" images in the 110 to 190 MHz range using LOFAR high-band antennas at the LOFAR station in Effelsberg.

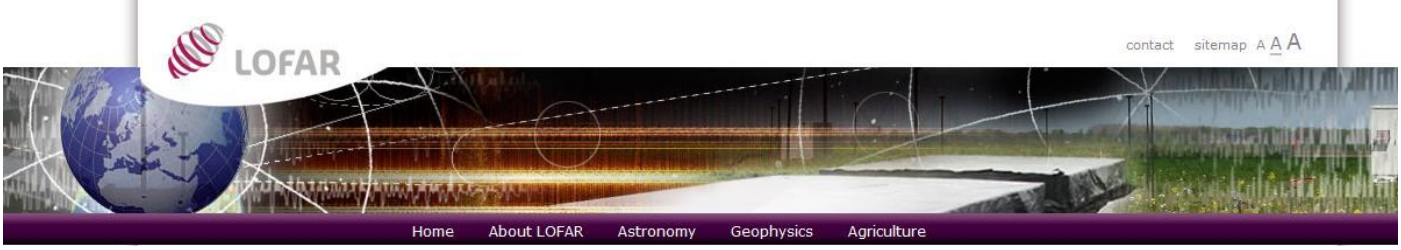


These images are the first high-band, all-sky images made from any complete LOFAR station. The shown all-sky image has North at the top and East at the left, just as a person would have seen the entire sky when lying on their back on a flat field near Effelsberg, if their eyes were sensitive to radio waves. The two bright (yellow) spots are Cygnus A, a giant radio galaxy powered by a supermassive black hole near, the center of the image, and Cassiopeia A, a bright radio source created by a supernova explosion about 300 years ago, at the upper-left in the image.

The plane of our Milky Way galaxy can also be seen passing by both Cassiopeia A and Cygnus A, and extending down to the bottom of the image. The North Polar Spur, can also be seen extending from the direction of the Galactic center in the South, toward the western horizon in this image. The image is a single 60-second exposure, demonstrating that the ability to make all-sky images in just seconds opens up exciting possibilities to detect and study rapid transient phenomena in the universe.

More details can be found at *http://www.mpifr-bonn.mpg.de/public/pr/pr-lofar-hi2009-en.html*

Contact: James Anderson, LOFAR Project Manager, MPIfR Email: anderson@mpifr.de http://www.lofar.org



Fachbeirat Visit 2010

From March 9th to 11th, 2010, the Scientific Advisory Board (Fachbeirat) of the MPIfR, composed of internationally recognized scientists from the US, Australia, and Europe, visited the institute. Scientific Advisory Boards (SAC) are the main instrument used by the Max Planck Society (MPS) for the regular evaluation of its research facilities. The board functions as an external advisory committee for those organs of the MPS which are responsible for decisions concerning the development of the institute.

On the first day, the committee visited Effelsberg. The members of the SAC were given the opportunity to a guided tour to the 100m-radio telescope and the LOFAR station. The weather was helpful, too, to make it a successful meeting. The second and third days of the visit took place in the institute in Bonn. Scientists, post-docs, and IMPRS students presented their scientific work and results in talks and posters. The day ended with a reception, inviting all staff of the MPIfR.

by Ulrike Wyputta, Scientific Coordinator, MPIfR

About Ulrike Wyputta:

Ulrike started her job as a scientific coordinator at the MPIfR in November 2009. Her background is meteorology and astronomy. After graduation, she took part in a 15-month overwintering stay at the permanent German Antarctic station, being responsible for meteorological and airchemical measurements. She was employed as a project manager mostly at the German Science and Humanities Council (Wissenschaftsrat). She says, *"Now I am happy to work at the MPIfR with its kind colleagues. For me it's a fantastic and interesting job and I hope that I can support the scientists"*.

What's on?

27 September - 1 October, 2010

European Single Dish School in the Era of Arrays, MPIfR, Bonn

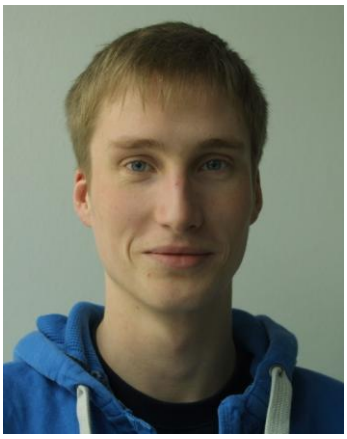
The first European Single Dish School in the Era of Arrays will take place from September 27 to October 1, 2010 at the Max-Planck-Institut für Radioastronomie (MPIfR) in Bonn and Effelsberg.

This school will provide information on the theoretical background as well as on practical matters of radio astronomical observations with a single-dish telescope.

A visit to the 100-m telescope in Effelsberg with observations is also included. The school is dedicated mainly to graduated students and PostDocs in astronomy.

Detailed information can be found at *http://www.mpifr-bonn.mpg.de/div/effelsberg/SummerSchool/index.html*

The Observer's View



Ewan Barr

Please tell us briefly about yourself?

For almost 7 months now I have been a PhD student of the Fundamental Physics in Radio Astronomy group at MPIfR in Bonn. Under the supervision of Prof. Michael Kramer and Dr David Champion I am working on blind pulsar searching in the radio regime, with our collective focus being the use of the Effelsberg telescope to search the northern sky for undiscovered pulsar systems. These undiscovered systems could provide the astronomy community with a vast wealth of new science and so the prospect of being part of the first group to look in detail at the whole northern sky is one I, personally, find very exciting. Before coming to Bonn I was living in the country of my birth, Scotland, and it was at the University of Glasgow that I completed my undergraduate studies in 2009.

What was your motivation to come and do your PhD in Bonn?

As I mentioned before, I completed my undergraduate studies in Glasgow in early 2009 and it was in the final year of my time in Glasgow that I took fortunate enough to end up on a lecture course taught by Dr Graham Woan. These lectures looked at the basic astronomy and physics behind pulsars is all their highly varied and fascinating guises. I already knew that I enjoyed research before this point, but I was never quite sure of which field I would like to move into after university. Thankfully the pulsars lectures which I attended made my mind up for me and so the next step was simply to decide where I would like to study.

The choice to come to Bonn was, in the end, quite easy. I had already been pointed in the direction of the MPIfR by some of my lecturers at Glasgow and coupling this with Effelseberg and the knowledge that, with Prof. Kramer moving here, there would be a lot of momentum behind the newly forming pulsar group, it was easy to see that Bonn would be my first choice.

Could you describe your experience observing in Effelsberg?

Observing pulsars with the Effelsberg telescope can be both a highly rewarding and very boring experience (at least in the short term) depending on your modus operandi for the session at hand. For example, when you are observing known pulsars you can look at a lot of your data in real-time, thus giving the observer the rush of seeing real solid proof of the target of his/her observation. The flip-side to this comes when you conduct blind survey work and even targeted survey work in which you do not know the distance to the pulsar and thus do not know its dispersion measure (the degree to which the broadband signal is dispersed in the ISM). In this case observations may be on timescales of a hour or more and with the high volumes of data being recorded there is no real-time method by which you can explore your current observation.

Despite the fact that the graveyard observing shift can be at times torturous, I still take a great deal of enjoyment from being at the telescope. I find the environment in the control room is oddly relaxing and so to keep myself awake in the early hours of the morning I like to turn on the speaker in the front-end room and listen to the signal from the receivers (although I very much doubt I will hear anything particularly interesting I still take pleasure from listening to all the crackly terrestrial radio signals and occasionally a very bright pulsar).

Of course as any pulsar astronomer will tell you, the vindication for the long observing hours is the discovery of new systems. This year, during a targeted search of unassociated gamma ray sources provided by the Fermi LAT, I was fortunate enough to make one of these discoveries. The discovery was of a millisecond pulsar, designated PSR J1745+10, which has a spin period of 2.65ms and exists in a 17.5hr binary orbit with a low mass companion (the system is thought to be a black widow system, in which the strong pulsar wind is ablating the companion object). This was the 18th pulsar discovered through radio observations of Fermi error boxes but importantly for the MPIfR it was the first millisecond pulsar ever discovered with the Effelsberg telescope.

Pulsar searching is somewhat analogous to a drug addiction, with each discovery giving you an adrenaline boost that leaves you craving more and so with this in mind I look forward with great anticipation to the up and coming full northern sky survey due to start later this year. The survey may well provide somewhere in the range of 500 pulsars, truly putting Effelsberg of the pulsar community's map.

How do you find living and studying in Bonn?

Bonn is a city of students and so, as a student, life here really isn't to difficult to adjust to. There is also a large community of international students in the city and so for a non German-speaker like myself it is easy to integrate and meet new people. Beyond the numerous bars and student parties there is the vibrant cultural side of Bonn to keep you entertained and if you ever run out of things to do the bustling metropolis that is Cologne is a mere stone's throw away.

As for studying, being at the MPIfR is a far different experience to that of studying in a university. Unlike a university, the student community here is not particularly strong. Fortunately this is balanced out by a strong group community in which there is continual information transfer and a relaxed working environment which highly conducive to learning. Having experts on many aspects of pulsar astronomy merely a few doors or a flight of stairs away is a benefit not to be underestimated by any student that gets the chance to study here.

by Busaba Kramer

Friend of the Telescope

Uwe Bach studied physics and astronomy from 1995 to 2001 at the Rheinische Friedrich-Wilhelms-Universität Bonn. From 2000 to 2001 he prepared his diploma thesis about VLBI observations of AGN in the VLBI group of the Max-Planck-Institut für Radioastronomie in Bonn. During his PhD he continued his studies of AGN jets in the VLBI group from 2001 to 2004.

Afterwards he spent a two year post-doc at the Osservatorio Astronomico di Torino in Italy where he worked on AGN multi-wavelengths variability. In 2006 he returned to the MPIfR as a support scientist at the Effelsberg radio observatory. He worked on the commissioning of the new sub-reflector and later became the VLBI Friend and Friend of the Telescope.

Since November 2009 Uwe Bach is staff member of the Effelsberg radio observatory. His main field of activities are the calibration and positioning of the Effelsberg 100m antenna, VLBI service and user support. Together with a group of scientists from Bonn he is establishing a User Support Group that will improve the accessibility for new observers at Effelsberg.

Job Opportunities

The Max-Planck-Institut für Radioastronomie (MPIfR) in Bonn (Germany) operates world-class facilities in order to do basic research in the field of astronomy, including the 100-m Effelsberg cm-wave telescope. The 100-m radio telescope is the second-largest fully steerable telescope in the world and enables highly sensitive observations at frequencies up to 90 GHz. In a programme to further enhance the spectroscopy capabilities of the telescope, we are looking for a post-doctoral researcher as a

Support Scientist (spectroscopy)

to be located at the 100-m telescope at Effelsberg to support the team of Uwe Bach. The successful candidate will work in a user support team in close collaboration with colleagues on site and scientists at the MPIfR in Bonn. With a focus on instrumentation relevant for spectroscopy, the candidate's use of the telescope for her/his own research is strongly encouraged and expected. The position will be available for two years with a potential extension. Further details for tasks, requested skills & qualifications and application procedure can be found at

http://www.mpifr-bonn.mpg.de/div/effelsberg/Technical_news/SupportScientist.pdf.

Deadline for applications is June 1, 2010.

Public Outreach Activities

Visitors' Pavilion and 100m Radio Telescope

The visitors' pavilion at Effelsberg radio observatory provides a program of public talks about both radio telescopes on site, the 100m dish and the Effelsberg LOFAR station and the scientific work pursued with them. An important part of the talks deals with distances of the investigated astronomical objects, ranging from the direct neighbourhood of our planetary system to galaxies which are several billion light years away.

Astronomical Walks

For a better imagination of distance scales in astronomy, we started a number of years ago to build our first astronomical walking path, the planetary walk.

Planetary Walk

Walking path of 780 m total length, leading from the car park of Effelsberg observatory to the visitor's pavilion. The walk, scaled 1:7.7 x 10^9, starts with the dwarf planet Pluto at the car park and leads to the inner planets and the sun in direct neighbourhood of the visitor's pavilion.

Milky Way Walk

Walking path of 4 km total length, leading from Burgsahr in the Sahrbach valley south of the Effelsberg telescope to the visitor's pavilion of the telescope.

The scale of the walk is 1:10^{17}, with 4 km corresponding to 40,000 light years. The described objects of the Milky way lead from the star forming region IC410 in the outer area of the Galaxy via sun and nearby objects to the Galactic center.

Galaxies Walk

In order to cover the extragalactic distance scale, we shall open a third walking path, the "Galaxies Walk", in summer this year. It is scaled 1:5 x 10^{22} and starts with the Milky Way and its neighbour, M31, in a distance of only 50 cm.

The Galaxies walk will lead from a starting point behind the 100m radio telescope to the "Martinshütte", a small hut in 2.6 km distance. The distance scale will cover a light travel time of up to 13 billion years, with J1148+5251, a galaxy with redshift 6.42, as the final target. The distances given in the Galaxies walk are light travel time distances, directly derived from the redshifts with standard cosmological assumptions. The targets cover a number of Effelsberg calibration sources, including quasars like 3C286, 3C295 and 3C48. MG J0414+534, where water emission has been detected with the Effelsberg telescope, is also included.

Information and references to all three astronomical walks are available at

http://www.mpifr-bonn.mpg.de/public/walks_e.html

Astronomy Talks

The 2010 "season" of talks in the visitors' pavilion has recently started after a complete rebuilt of the pavilion last winter.

Public talks are offered to groups from 10 up to a maximum of 80 people. The talks are normally held in German; English talks are available on request.

More information can be found at

http://www.mpifr-bonn.mpg.de/public/vortraege_e.html

Contact: Norbert Junkes, Public Outreach, MPIfR
Email: njunkes@mpifr.de

Photo taken by N. Tacken

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