

# Outreach

... activities of ZAH are focussed at the „Haus der Astronomie“ (HdA), Heidelberg’s center for astronomy outreach and education. The HdA was founded in 2008 by the Klaus Tschira Foundation and the Max Planck Society, with the University of Heidelberg and the City of Heidelberg as additional partners. The mission of the HdA is to share the fascination of astronomy and astrophysics with a broad audience - in particular with school children and their teachers - and to communicate the results of astronomical research to the media and to the general public.

## Selected outreach activities with ZAH involvement

„Universum für alle! Halbe Heidelberger Sternstunden“: The videos of 70 short public astronomy talks presented by Heidelberg Astronomers in 2011 can be found at Youtube ([www.universum-fuer-alle.de](http://www.universum-fuer-alle.de)). Written versions of the talks are published in the book „Universum für alle“ by Springer-Verlag.



**Universe awareness (UNAWA)** uses the beauty of the Universe to encourage children age 4 to 10 to develop an interest in science and technology, and introduces them to the idea of global citizenship and tolerance. The program is active in 54 different countries, with ZAH being the main German partner of EU-UNAWA. HdA is the home of the German UNAWA office and of the „Universe in a box“ astronomy kit, now being used for UNAWA activities world-wide.

**Haus der Astronomie (HdA)** has developed various astronomy kits, featuring hands-on experiments ready for classroom use, for loan to high schools. One example is the „Milky Way Box“, a key part of SFB 881 outreach activities, which offers hands-on activities and exploratory learning related to our home galaxy.



„**Wolke 7**“, initiated by female ZAH astronomers, introduces young girls about 13 years of age to the wonders and the excitement of physics and astronomy via hands-on experiments. The project is supported by Heidelberg University’s „Young University“ initiative and by the university’s equal opportunity office.



Zentrum für Astronomie  
der Universität Heidelberg (ZAH)

The **Zentrum für Astronomie der Universität Heidelberg (ZAH)** is the largest astronomy institution at a German university. The ZAH was established in 2005 by joining the former state institutes **Astronomisches Rechen-Institut (ARI)** and **Landessternwarte Königstuhl (LSW)** with the **Institut für Theoretische Astrophysik (ITA)** of Heidelberg University. Its spectrum of research and teaching activities ranges from planet formation and galaxy evolution to cosmology and state of the art computer physics in parallel with the development and assembly of instrumentation for telescopes and participation in satellite projects.

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#### Image credits

Cover: „Heidelberg at night“ by C. Reindel  
Background: „Milky Way“ by S. Guisard/ESO  
„Milky Way Box“: C. Scorza/HdA

Layout G. Thimm, Published 7/2013



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Zentrum für  
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Heidelberg

GENERAL INFORMATION

# Projects

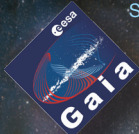
... and collaborations with ZAH astronomers as drivers or key scientists cover a large number of international activities spanning observations, instrumentation, simulations and theory. The ZAH has close cooperations with leading research institutions world wide on topics at the very forefront of astronomy and astrophysics.

## Selected projects with major ZAH involvement

The origin of the Milky Way and fundamental issues connected with galaxy evolution such as star formation and chemical evolution over cosmic time scales are the focus of the **Sonderforschungsbereich (Collaborative Research Center) „The Milky Way System“** at Heidelberg University, which is funded by the German Research Foundation (DFG).



**Gaia** is a Corner Stone space mission by the European Space Agency ESA. Gaia will do astrometry, photometry and spectroscopy of about one billion stars with very high precision. The **Astronomisches Rechen-Institut (ARI)** hosts Coordination Unit 3, „Core Processing“, which implements the data processing chain from receiving Gaia's raw telemetry to the core astrometric solution.



The **Cherenkov Telescope Array (CTA)** will be a new facility for ground-based gamma-ray astronomy. More than 100 groups from different countries participate in the development activities, which are coordinated by the central Project Office at the **Landessternwarte (LSW)**, with supported by the European Commission.



ESA's **Planck mission** Planck analyses, with the highest accuracy ever achieved, the remnants of the radiation filling the Universe since the Big Bang and observed today as the Cosmic Microwave Background (CMB). At the **Institute for Theoretical Astrophysics (ITA)**, software and algorithms for the Planck satellite have been developed. ITA is also involved in the scientific exploitation of the data.



Further initiatives and cooperations include major projects and facilities such as the **Sloan Digital Sky Survey (SDSS)**, the **Radial Velocity Experiment (RAVE)**, the **Southern Sky Survey (SSS)**, the **Large Binocular Telescope (LBT)** at Mount Graham International Observatory (USA), the **Large Sky Area Multi-Fiber Spectroscopic Telescope (LAMOST)**, **H.E.S.S. (High Energy Stereoscopic System)**, the **Transregio TR 33 „The Dark Universe“**, the **SPP 1573 „Physics of the Interstellar Medium“**, the **German Astrophysical Virtual Observatory (GAVO)** or the **PLANET** microlensing collaboration.

# Research

... at ZAH covers a broad spectrum in theory and observations ranging from extrasolar planets, star formation and stellar dynamics to galaxy formation and evolution, active galaxies, large-scale structure and cosmology. Moreover, the ZAH is involved in the development of instrumentation, high-performance computing, and satellite missions. The collaborative research center „The Milky Way System“ (SFB 881) represents a special research focus in which all astronomical institutes in Heidelberg participate.

## Research groups presently established at ZAH and their corresponding group leaders

- **Active Galactic Nuclei**  
apl. Prof. Dr. Jochen Heidt
- **Cosmology and structure formation**  
Prof. Dr. Matthias Bartelmann
- **Chemistry and Dynamics of the Interstellar Medium**  
Priv. Doz. Dr. Simon Glover
- **Exoplanets**  
Prof. Dr. Andreas Quirrenbach/  
Priv. Doz. Dr. Sabine Reffert
- **Extragalactic Astrophysics & High Energy Astrophysics**  
apl. Prof. Dr. Stefan Wagner
- **Extragalactic Astronomy**  
Priv. Doz. Dr. Thorsten Lisker
- **Gaia**  
Dr. Ulrich Bastian
- **Galactic Archaeology**  
Prof. Dr. Norbert Christlieb
- **Galaxy Clusters**  
Dr. Robert W. Schmidt
- **Galactic Halos**  
Dr. Andreas Koch
- **Galaxy star formation history**  
Dr. Anna Pasquali
- **Stellar Populations and Galaxy Evolution**  
Prof. Dr. Eva Grebel
- **Gravitational Lensing**  
Prof. Dr. Joachim Wambsganss
- **Instrumentation**  
Prof. Dr. Andreas Quirrenbach
- **Galactic Star Formation**  
Dr. Frank Bigiel
- **Planet Formation**  
Prof. Dr. Cornelis Dullemond
- **Star Formation and ISM Dynamics**  
Prof. Dr. Ralf Klessen
- **Statistics and Cosmology**  
Prof. Dr. Björn Malte Schäfer
- **Stellar Dynamics**  
apl. Prof. Dr. Rainer Spurzem
- **Galaxy Formation and Numerical Astrophysics**  
Prof. Dr. Volker Springel
- **Galaxy Evolution and Stellar Dynamics**  
apl. Prof. Dr. Andreas Just
- **Virtual Observatory/eScience**  
Dr. Markus Demleitner/  
Prof. Dr. Joachim Wambsganss
- **White Dwarfs**  
Dr. Stefan Jordan

**International conferences and workshops** organized in collaboration with other astronomical research institutes in Heidelberg further enhance the local scientific infrastructure and attractiveness for researchers from all over the world. Examples are „Protostars & Planets VI“ (2013), the „International Virtual Observatory Alliance Interoperability Meeting“ (2013), „Galactic Scale Star Formation: Observation meets Theory“ (2012), Annual Meeting of Astronomische Gesellschaft: „Surveys & Simulations - The Real and the Virtual Universe“ (2011) and „The Milky Way and the Local Group - Now and in the Gaia Era“ (2009).

# Education

... and training of physics and astronomy students is a central and important contribution of ZAH lecturers to the Bachelor, Master and PhD programs of the Department of Physics and Astronomy at Heidelberg University. ZAH scientists offer a broad range of courses at different levels, ranging from planets to cosmology.

## Educational infrastructure and career options for students and young researchers at ZAH

- 140 scientists are working at ZAH. Among these, nine full professors for astronomy or astrophysics, four adjunct professors and three junior research group leaders. They offer a contemporary astronomy and astrophysics curriculum.
- Currently, the ZAH hosts about 25-30 master- and 50-60 PhD-students.
- Many of ZAH's 40-50 postdocs and 25 staff scientists support the faculty with supplementary and special educational training options for young scientists.
- The ZAH hosts a number of postdoctoral prize fellows.

The graduate education at the **Heidelberg Graduate School of Fundamental Physics (HGSFP)** provides excellent and flexible education in the fields of fundamental interactions and cosmology, quantum dynamics and complex quantum systems, astro- and cosmic physics, and complex classical systems. The HGSFP combines doctoral projects from the forefront of international research with a broad and deep teaching program in these areas of fundamental physics and emphasises their interrelations.

The **International Max Planck Research School for Astronomy and Cosmic Physics at the University of Heidelberg (IMPRS-HD)** offers a broad range of research and training opportunities to PhD students in astronomy. Applications from students of all countries are solicited once per year. The IMPRS-HD is an independent part of the HGSFP.

Established in 2009, the **ZAH Gliese Fellowship Program** provides a competitive stipend and a generous research budget to outstanding postdoctoral fellows in any area of astronomy or astrophysics in which scientists at ZAH are active. The goal of the Gliese Fellowships is to offer scientists typically within a few years of their PhD the best possible opportunities to develop their talents within a fruitful and inspiring scientific environment.

Supported by the HGSFP, **IMPRS-HD Summer Schools** on various „hot topics“ are regularly organized in Heidelberg. They enjoy an excellent reputation among international students.