European Astronomical Society
2016 Prizes

Tycho Brahe Prize

The 2016 Tycho Brahe Prize is awarded to ***Prof. Joachim Trümper*** in recognition of his visionary development of X-ray instrumentation, from balloon experiments and the discovery of cyclotron lines probing the magnetic field of neutron stars to his leadership and strong scientific involvement in the ROSAT mission.

Lodewijk Woltjer Lecture

The 2016 Lodewijk Woltjer Lecture is awarded to ***Prof. Thibault Damour*** for his outstanding career on theoretical implications of General Relativity and in particular on the prediction of the newly-observed gravitational wave signal of coalescing binary black holes.

MERAC Prizes

The 2016 MERAC Prizes for the Best Doctoral Thesis are awarded in

Theoretical Astrophysics

to ***Dr Maria Petropoulou*** for her thesis on radiative instabilities and particle acceleration in high-energy plasmas with applications to relativistic jets of active galactic nuclei and gamma-ray bursts.

Observational Astrophysics

to ***Dr Yingjie Peng*** for his thesis on the simplicity of the evolving galaxy population and the origin of the Schechter form of the galaxy stellar mass function.

New Technologies

to ***Dr Oliver Pfuhl*** for his thesis on an innovative design of two subsystems for the VLTI instrument GRAVITY: the fibre coupler and the guiding system.

All five awardees are invited to give a plenary lecture at the European Week of Astronomy and Space Science (EWASS) to be held in Athens, Greece on 4 – 8 July 2016.

The European Astronomical Society (EAS) promotes and advances astronomy in Europe. As an independent body, the EAS is able to act on matters that need to be handled at a European level on behalf of the European astronomical community.

For further information, please visit the EAS website: http://eas.unige.ch/ and contact the EAS President: Prof. Thierry Courvoisier, Tel: +41 22 379 21 01, thierry.courvoisier@unige.ch

The Tycho Brahe Prize is awarded in recognition of the development or exploitation of European instruments or major discoveries based largely on such instruments.

The Tycho Brahe Prize is funded by the Klaus Tschira Stiftung, a German foundation, which was established by the physicist Klaus Tschira in 1995 as a non-profit organization. The Klaus Tschira Stiftung promotes the advancement of the natural sciences, mathematics, and computer science, and wants to raise appreciation for these fields.

Klaus Tschira Stiftung gemeinnützige GmbH

KTS

Tycho Brahe Prize

The 2016 Tycho Brahe Prize is awarded to **Prof. Joachim Trümper** in recognition of his visionary development of X-ray instrumentation, from balloon experiments and the discovery of cyclotron lines probing the magnetic field of neutron stars to his leadership and strong scientific involvement in the ROSAT mission.

In his PhD work (1957–59) at the universities of Hamburg and Kiel, Joachim Trümper developed the first triggered spark chamber and used such a device in 1960 to measure the spectrum of cosmic ray muons from the Zugspitze mountain. He continued to work on high-energy cosmic rays and initiated the Kiel extensive air shower experiment aiming at solving the problems of the chemical composition of cosmic rays in the “knee region”. After the discovery of pulsars in 1967, J. Trümper turned his attention to this new field. In 1969–70, on sabbatical leave from Kiel, he visited the Max-Planck-Institut für Extraterrestrische Physik (MPE) in Garching and decided there to start a programme of observational X-ray astronomy in Germany. This materialised in 1971 when he became Director of the Astronomical Institute of the University of Tübingen (AIT) and started a competitive hard X-ray balloon programme. The stratospheric balloon observations continued even after his appointment in 1975 as Director of MPE, leading to unprecedented observations of the cataclysmic variable AM Herculis and the black hole binary Cygnus X-1. The most important discovery was, however, the detection of a cyclotron absorption line in Hercules X-1. At an energy of ~40 keV, the line indicates a magnetic field of ~ 5×10^{12} Gauss, which was the first direct measure of the extreme magnetisation of neutron stars. As a follow-up to the balloon programme the MPE/AIT group turned to space projects with the development of the hard X-ray spectrometer HETE operating from 1987 to 2001 aboard the Soviet/Russian Mir Station. HETE discovered in particular delayed X-ray emission from the nearby supernova SN 1987A.

The preparatory work for the “Röntgensatellit” (ROSAT) was initiated by J. Trümper already in 1972 in collaboration with Carl Zeiss, with the goal to improve the mirror performance for large imaging X-ray telescopes. This lead to two technological breakthroughs: the use of Zerodur for X-ray optics, and the reduction of the mirror roughness to only 2.5 Å. Based on these achievements, he proposed an early version of ROSAT already in 1975, as an element of the German space programme. With the growth in complexity, USA and UK were involved, but Germany kept the leadership of the project and built at MPE the two main detectors of ROSAT. MPE also built a powerful long X-ray test and calibration facility, which was not only used for ROSAT, but then also for all major European and US X-ray satellites, including EXOSAT, BeppoSAX, Chandra, XMM-Newton and Swift. ROSAT was launched in 1990 and operated until 1999 impacting strongly on many fields of astrophysics with about 7’000 refereed publications and around 100’000

citations. The ROSAT all-sky survey yielded an unprecedented detailed view of the diffuse soft X-ray emission from the Galaxy including many supernova remnants, and ~125'000 discrete sources. Besides being the principal investigator and the director of the observatory, J. Trümper was personally involved in a number of ROSAT highlights. These include in particular the famous X-ray picture of the moon, the unexpected discovery of X-rays from the comet Hyakutake, the discovery of the first millisecond pulsar in X-rays, and the ROSAT deep and ultra-deep surveys that showed that compact sources like quasars account for most of the extragalactic X-ray background at ~1 keV.

The MPE, under the directorship of J. Trümper from 1975 to 2001, also actively prepared the post-ROSAT era with several instrumental developments. These include the low-energy transmission gratings for Chandra and the complex mirror system for XMM-Newton. To develop X-ray CCDs for the PN-camera of this ESA cornerstone mission, J. Trümper founded a dedicated semiconductor laboratory, which continues developments for the detectors of the future eROSITA and ATHENA space missions.

The very long and successful career of J. Trümper resulted in an impressive list of more than 700 publications among which almost 300 are refereed papers and totalising nearly 20'000 citations so far.

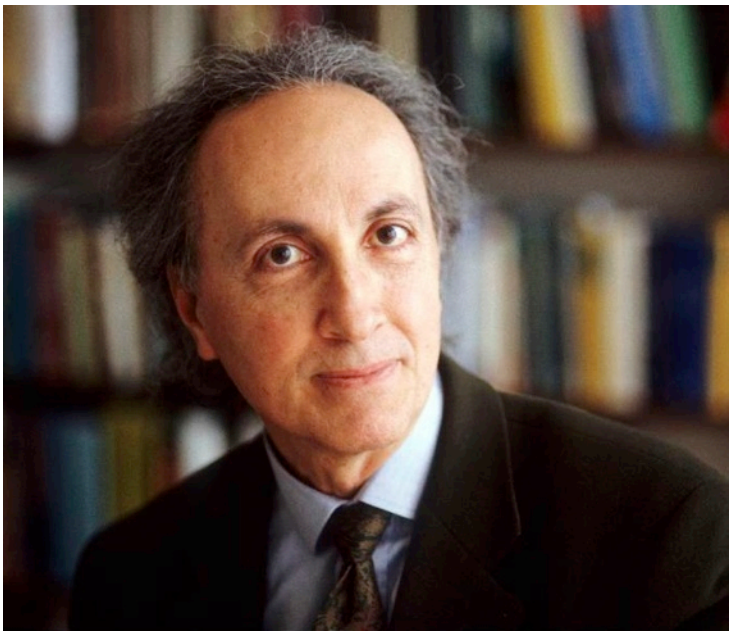
Joachim Ernst Trümper was born in 1933 in Haldensleben. He finished the high school in 1951 in Bernburg and spent a year in industry as an apprentice in electro-mechanics, since he was not admitted to an university in the GDR for political reasons. In 1952 he succeeded to enroll at Halle University to study physics. In 1955 he moved (illegally) to Hamburg and in 1957 to Kiel. Here he obtained the PhD in physics in 1959 and became a cosmic ray physicist. After the discovery of pulsars he became interested in neutron star physics and the young field of X-ray astronomy. In 1971, he started a comprehensive program in X-ray astronomy at the University of Tübingen, before he moved in 1975 to the Max-Planck-Institute for Extraterrestrial Physics (MPE) in Garching near Munich. After his retirement from the MPE directorship in 2001, he is continuing his scientific work at the institute. Since 50 years his hobby is sailing, currently on an H-Boat on the nearby Chiemsee.

The Lodewijk Woltjer Lecture honours astronomers of outstanding scientific distinction.

Lodewijk Woltjer Lecture

The 2016 Lodewijk Woltjer Lecture is awarded to **Prof. Thibault Damour** for his outstanding career on theoretical implications of General Relativity and in particular on the prediction of the newly-observed gravitational wave signal of coalescing binary black holes.

Thibault Damour is a French theoretical physicist born in 1951 in Lyon. After studies at the Ecole Normale Supérieure de la rue d'Ulm (1970-1974), he obtained his Thèse de Doctorat de troisième cycle in 1974 (Université de Paris VI), and, later, his Thèse de Doctorat d'Etat ès Sciences Physiques (Université de Paris VI, 10 janvier 1979). He started his career (1977-1989) as researcher at the Centre National de la Recherche Scientifique (CNRS). Since 1989 he is permanent professor at the Institut des Hautes Etudes Scientifiques (IHES).



Thibault Damour is a theoretical physicist working on consequences of Einstein's theory of General Relativity, and its String Theory extensions. He has made lasting contributions on: the theory black holes, the dynamics and relativistic timing of binary pulsars, the generation of gravitational waves, the motion and coalescence of black holes, as well as several aspects of early cosmology. He has introduced in 2000 (with several collaborators) a new method for describing the motion and gravitational radiation of coalescing binary black holes, which gave the first prediction of the gravitational wave signal observed by LIGO in September 2015. His work was crucially used for interpreting the observed signal and measuring the masses and spins of the two coalescing black holes.

MERAC Prizes

FONDATION MERAC (Mobilising European Research in Astrophysics and Cosmology) is a non-profit foundation started in 2012 with headquarters in Switzerland to recognise and support young European astronomers.

There are yearly three MERAC Prizes awarded by the European Astronomical Society. The prizes of 20'000 € are for each of the three categories:

- ★ Theoretical Astrophysics
- ★ Observational Astrophysics
- ★ New Technologies (Instrumental/Computational)

The prizes alternate by year for:

- ★ Best Early Career Researcher Prizes (on odd years)
- ★ Best Doctoral Thesis Prizes (on even years)

The awardees are also eligible for further support from the FONDATION MERAC.

The MERAC Prize Committee was impressed by the high quality of the nominated candidates for the three MERAC Prizes of 2016.

Best Doctoral Thesis in Theoretical Astrophysics

The 2016 MERAC Prize for the Best Doctoral Thesis in Theoretical Astrophysics is awarded to **Dr Maria Petropoulou** for her thesis on radiative instabilities and particle acceleration in high-energy plasmas with applications to relativistic jets of active galactic nuclei and gamma-ray bursts.

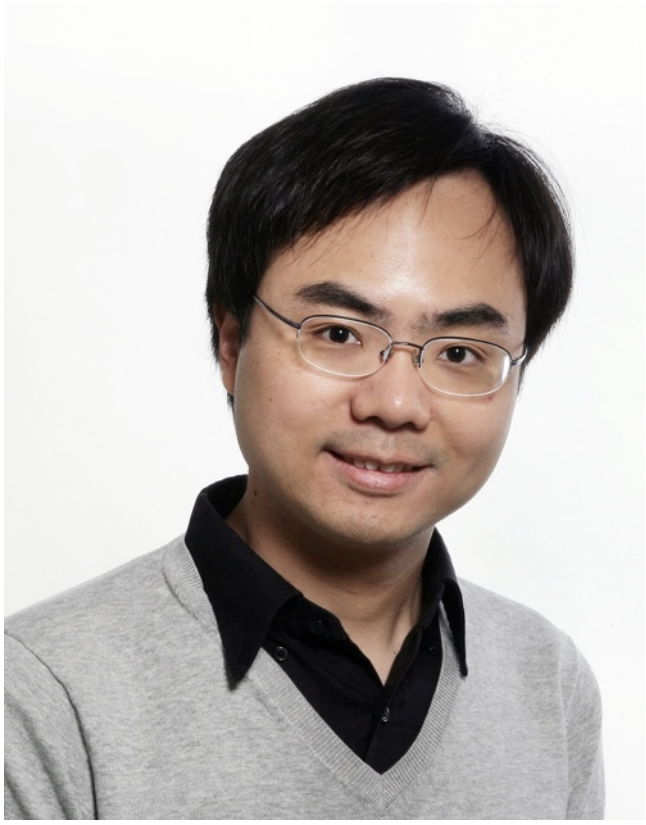
Maria Petropoulou received her Bachelor Degree in Physics (2008), Master Diploma in Astrophysics (2010) as well as her PhD Degree in Physics (2013) from the National and Kapodistrian University of Athens, Greece. Her PhD project was funded by a co-financed European-Greek Grant (HERACLEITUS II). She has been awarded the "Best PhD Thesis Prize 2015" from the Hellenic Astronomical Society. Just before her PhD Thesis defence, she has been awarded the NASA Einstein Fellowship for Post Doctoral research (2013–2016) on the subject of "High energy radiation, neutrino and cosmic ray production from relativistic outflows". She has published 20 articles in refereed journals, which reflect her research interests in emission processes and neutrino production from active galactic nuclei and gamma-ray bursts. She is now a Post Doctoral Einstein Fellow at Purdue University, West Lafayette, USA.

Maria Petropoulou's PhD thesis has a main focus on the theoretical study of plasma properties in compact energetic sources such as Active Galactic Nuclei (AGNs) and Gamma Ray Bursts (GRBs). Such extremely luminous sources in remote galaxies emit gamma-rays originating in a relativistic jet powered by a black hole. While most studies consider only the electrons in the jet and neglect the influence of the protons, Maria Petropoulou developed equations for a full treatment of plasmas containing magnetic field, relativistic protons and electrons, and photons. She then solved these equations via both numerical and analytical methods to describe the radiative instabilities in the ejected plasmas, which exhibit a rich temporal behaviour of prey-predator type. As a final step, she confronted her model to observations of the archetypical gamma-ray emitting blazar 3C 279. A theoretical study of the spectral and timing emission of GRB afterglows complements her PhD work.

The PhD thesis of Maria Petropoulou was entirely conducted at the University of Athens, Greece, under the supervision of Prof. Apostolos Mastichiadis.

Best Doctoral Thesis in Observational Astrophysics

The 2016 MERAC Prize for the Best Doctoral Thesis in Observational Astrophysics is awarded to **Dr Yingjie Peng** for his thesis on the simplicity of the evolving galaxy population and the origin of the Schechter form of the galaxy stellar mass function.



Yingjie Peng is born in the Sichuan province in the southwest of China, near Tibet. Being ranked first in his city in the national evaluation, he was admitted by Beijing Normal University to study astrophysics as an undergraduate student. During this study, he spent one year in Tokyo Gakugei University in Japan to study Japanese history and culture. From 2005 to 2007, he was awarded the prestigious Erasmus Mundus Fellowship from European Commission to join the double-master degree program, studying Space Technology at Julius Maximilian University of Würzburg in Germany, Luleå University of Technology in Sweden, and astrophysics at the university Paul Sabatier Toulouse III in France. Then he joined the PhD program in observational cosmology at ETH Zurich in 2007 under the supervision of Prof. Simon Lilly, and obtained his PhD in 2013. He was awarded the ETH Medal for his outstanding PhD Thesis. He then moved to the UK as a research associate at Cavendish Laboratory, University of Cambridge and was awarded the prestigious Royal Astronomical Society Research Fellowship in 2015 for his high-impact research in observational cosmology. In October 2015, he moved from Cambridge to Beijing, China, joining the Kavli Institute for Astronomy and Astrophysics at Peking University, as a tenure-track Assistant Professor.

Yingjie Peng's PhD thesis focused on the analysis of high quality data from large sky surveys both locally and at high redshift, and introduced a novel phenomenological, observationally-based approach to study the formation and evolution of the galaxy population. The goal was to use the observational material as directly as possible in order to identify the simplest empirical "laws" for the evolution of the population. This approach has successfully explained the origin of the Schechter form of the stellar mass function and reproduced many observed essential features of the evolving galaxy population over cosmic time. The associated papers (Peng et al. 2010 & 2012) describing this simple and innovative approach have become some of the most highly cited papers in galaxy formation and evolution.

The PhD thesis of Yingjie Peng was carried out at the Institute for Astronomy at ETH Zurich, Switzerland between October 2007 and September 2012, under the supervision of Prof. Simon Lilly.

Best Doctoral Thesis in New Technologies

The 2016 MERAC Prize for the Best Doctoral Thesis in New Technologies is awarded to **Dr Oliver Pfuhl** for his thesis on an innovative design of two subsystems for the VLTI instrument GRAVITY: the fibre coupler and the guiding system.

Oliver Pfuhl studied at the Technical University Munich and joined the Max-Planck-Institute for extraterrestrial physics (MPE) for his Diploma Thesis. He worked on optimizing the performance of the Very Large Telescope Interferometer (VLTI) instrument PRIMA. He then completed his PhD at MPE and the Ludwig Maximillian University under the supervision of Prof. Reinhard Genzel and Dr. Frank Eisenhauer. For his dissertation, "The GRAVITY Interferometer and the Milky Way's Nuclear Star Cluster", Oliver designed and built two key subsystems, the fiber coupler and the guiding system, for the second generation VLTI instrument GRAVITY. He also constrained the star formation history of the stellar cluster around the massive black hole in the Milky Way using an integral field spectroscopic sample of stars. He was awarded the Universe PhD Award for the best experimental dissertation by the Excellence Cluster for Astronomy in the Munich area. After his PhD in July 2012, Oliver Pfuhl took a postdoctoral position at MPE. He is currently seconded to ESO Chile for one year to ensure that GRAVITY is successfully commissioned at the VLTI.

Oliver Pfuhl started his PhD in 2008 on the GRAVITY project and contributed to the overall design of this new VLTI instrument. He developed two key-components, the fibre coupler and the guiding system, which are key for enabling waveguide based stellar interferometry and for achieving the required astrometric accuracy and stability. The fibre coupler he designed is unique for its compactness, elegance, and innovative use of modern technology. The unit offers all the functions necessary for precision control of the optical path, including tip/tilt-, pupil-, and piston control, field de-rotation, and polarisation control. He also made an innovative design for the guiding system, which actively corrects for tilt- and pupil errors resulting from numerous reflections over 100m of optical path between the telescopes and the instrument. The astrophysical part of Oliver Pfuhl's thesis is a spectroscopic study of more than 500 stars in the nuclear star cluster at the Galactic centre, which shows that this cluster formed most of its stars more than 5 billion years ago.

The PhD thesis of Oliver Pfuhl was carried out under the Supervision of Prof. Reinhard Genzel and Dr. Frank Eisenhauer at the Max-Planck-Institute for extraterrestrial Physics, Garching, Germany, and the Ludwig-Maximilian University, Munich, Germany.