European Astronomical Society
2018 Prizes

Tycho Brahe Prize

The 2018 Tycho Brahe Prize is awarded to ***Prof. Andrzej Udalski (University of Warsaw, Poland)*** in recognition of the role as driving force behind OGLE (Optical Gravitational Lensing Experiment), one of the most successful and longest running sky-variability surveys ever undertaken. OGLE has made a significant impact on many fields in modern astrophysics.

Lodewijk Woltjer Lecture

The 2018 Lodewijk Woltjer Lecture is awarded to ***Prof. Conny Aerts (KU Leuven, Belgium and Radboud University Nijmegen, the Netherlands)*** for outstanding work in stellar physics, in particular in the field of asteroseismology.

MERAC Prizes

The 2018 MERAC Prizes for the Best Doctoral Thesis are awarded in

Theoretical Astrophysics

to ***Dr Sandrine Codis (IAP, France)*** for the study of the imprint of the large-scale structure of the Universe on galaxy formation and cosmology.

Observational Astrophysics

to ***Dr Renske Smit (University of Cambridge, UK)*** for the observational characterisation of the physical properties of the galaxies that formed in the first billion years of cosmic time.

New Technologies

to ***Dr Martin Pertenais (DLR, Germany)*** for a PhD thesis on cutting-edge concepts of compact polychromatic spectropolarimeters adapted to astrophysical space mission requirements in the UV domain.

All five awardees will give a plenary lecture at the European Week of Astronomy and Space Science (EWASS) to be held in Liverpool, United Kingdom, on 3 – 6 April 2018.

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. Roger Davies, president-eas@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.

Tycho Brahe Prize

The 2018 Tycho Brahe Prize is awarded to **Prof. Andrzej Udalski (University of Warsaw, Poland)** in recognition of the role as driving force behind OGLE (Optical Gravitational Lensing Experiment), one of the most successful and longest running sky-variability surveys ever undertaken. OGLE has made a significant impact on many fields in modern astrophysics.

Andrzej Udalski was born in Łódź, Poland. He graduated in 1980 from the Faculty of Physics at the University of Warsaw and obtained there his PhD thesis in 1988. He then moved to York University in Toronto, Canada as a postdoc and returned to Poland after two years. He obtained his habilitation at the University of Warsaw in 1995 and became professor in 2000. He directed the Astronomical Observatory from 2008 to 2016. Prof. Udalski has won several awards, including the prize of the Foundation for Polish Science in 2002, the highest for a Polish scientist, an ERC IDEAS Advanced Grant in 2009, and the Dan David Prize in 2017 in recognition to his role as a pioneer in the field of time-domain astronomy. He is a member of the Polish Academy of Sciences and the Polish Academy of Arts and Sciences since 2004 and a Foreign Associate of the US National Academy of Sciences since 2012. Prof. Udalski is the driving force behind OGLE (Optical Gravitational Lensing Experiment), one of the most extensive and longest running sky-variability surveys ever undertaken. He leads all aspects of OGLE, from the scientific goals, construction of the detectors and the dedicated 1.3m Warsaw Telescope (Chile), developing sophisticated data analysis software, and interpretation of the results. Prof. Udalski's work continues to have a considerable impact on many fields in modern astronomy, such as gravitational microlensing, extrasolar planets, variable stars, stellar astrophysics, structure of the Milky Way and the Magellanic Clouds, calibration of the cosmic distance scale, and discovery of Kuiper Belt objects.

Professor Andrzej Udalski's scientific career has been connected with the OGLE survey since the early 1990s. He put into practice the early idea by Bohdan Paczyński to regularly monitor millions of stars to search for sudden brightening caused by gravitational lensing by hypothetical dark massive objects in the halo of the Milky Way. OGLE has produced top ranked discoveries across many fields of modern astrophysics for almost three decades.

Andrzej Udalski designed and constructed detectors for consecutive phases of the OGLE project. The current phase (OGLE-IV) uses a large new generation CCD mosaic camera with 32 detectors, one of the largest scientific instruments of this type worldwide. Prof. Udalski designed and assembled all aspects of this camera – the mechanical parts, electronics, software, and the interface with the Warsaw Telescope, located at the Las Campanas Observatory in Chile. He also implemented the data pipeline software and the efficient real-time data analysis systems, including the Early Warning System, very successfully used for the real time detection of gravitational microlensing events since 1994.

The application of such massive photometry went well beyond the detection of microlensing events, making OGLE one of the largest sky-variability surveys ever undertaken. A vast quantity of data on stellar variability was collected, analysed and made freely available to the astronomical community. The OGLE collection of well characterised periodic variables is the largest in modern astrophysics.

Prof. Andrzej Udalski is the author or co-author of close to 500 publications in peer-refereed journals (including about a dozen articles in “Nature” and “Science”), which totalise more than 20,000 citations so far.

The Lodewijk Woltjer Lecture honours astronomers of outstanding scientific distinction.

Lodewijk Woltjer Lecture

The 2018 Lodewijk Woltjer Lecture is awarded to **Prof. Conny Aerts (KU Leuven, Belgium and Radboud University Nijmegen, the Netherlands)** for outstanding work in stellar physics, in particular in the field of asteroseismology.

Prof. Conny Aerts graduated as mathematician from Antwerp University in 1988 and defended her PhD thesis in astrophysics at KU Leuven in 1993. She continued her career as Postdoctoral Fellow of the Research Foundation Flanders until 2001, defining an independent research track and performing numerous stays abroad in Europe, Chile and the USA to achieve it. She was appointed as Lecturer (2001), Associate Professor (2004), and Full Professor (2007) at KU Leuven. Since 2011, she is Director of the Institute of Astronomy in Leuven. Since 2004, she also leads the Chair in Asteroseismology at the Radboud University Nijmegen. She is the recipient of 2 ERC Advanced Grants (2009 and 2016) and was awarded the Francqui Prize in 2012. Conny Aerts is an Honorary Fellow of the Royal Astronomical Society since 2010, and Commander in the Order of Leopold since 2016, the highest civilian recognition offered through Royal Decree by His Majesty King Philippe for services to the Kingdom of Belgium.

Prof. Conny Aerts is a stellar astrophysicist, working on stellar structure & evolution, with a focus on variable stars. She is a pioneer in the research domain of asteroseismology. This topic received an immense boost thanks to recent space missions, delivering high-precision uninterrupted space photometry. This kind of data brought her to the cores of stars and in particular to their interior rotation and mixing. Conny Aerts and her team developed rigorous mathematical methods to detect and identify non-radial pulsation modes in stars from high-precision spectroscopy and space photometry. Her team also designed and applied supervised and unsupervised statistical clustering methods for big data sets to find variable and binary stars of various kinds, as starting point for follow-up campaigns for asteroseismology. These methods recently led to the discovery and interpretation of numerous gravity-mode pulsators, opening new probing power for stellar interiors. Thanks to her appointment as Chair in Asteroseismology at the Radboud University Nijmegen in 2004, Conny introduced herself to the topic of subdwarf stars, their binarity and pulsations.

In 2009, Prof. Conny Aerts was awarded an ERC Advanced Grant, PROSPERITY to evaluate stellar models from CoRoT and *Kepler* space asteroseismology. Under her leadership, her PhD students made major contributions, such as the discovery of non-radial pulsation modes, dipole mixed modes, and non-rigid rotation in red giants, following her earlier detections of core overshooting and core rotation in massive stars. This culminated in the prestigious 2012 Francqui Prize, also termed Belgian Nobel Prize. Conny Aerts was the first woman to receive this prize in the option Science & Technology since its creation in 1933. The ERC offered her a second Advanced Grant, MAMSIE, in 2016 to bridge stellar physics and 3D hydrodynamics with the aim of remedying shortcomings in stellar evolution theory of massive stars.

Conny Aerts supervised more than 40 Master students, 25 PhD students, and 15 externally recruited postdocs. She also took part in more than 50 PhD examination committees. She teaches various courses in the Master Astronomy & Astrophysics at Leuven & Nijmegen universities, while she also gives training on gender-related, mentor-mentee and science communication & outreach topics. Conny Aerts is member of numerous international committees and boards. As Belgian Principal Investigator, she is heavily involved in the ESA M3 space mission PLATO that should get launched by 2026.

Text based on https://fys.kuleuven.be/ster/staff/conny-aerts

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 pleased by the high quality of the nominated candidates for the three MERAC Prizes of 2018.

Best Doctoral Thesis in Theoretical Astrophysics

The 2018 MERAC Prize for the Best Doctoral Thesis in Theoretical Astrophysics is awarded to **Dr Sandrine Codis (IAP, France)** for the study of the imprint of the large-scale structure of the Universe on galaxy formation and cosmology.

Sandrine Codis graduated from the Ecole Normale Supérieure (Paris) in Mathematics and Theoretical Physics. She obtained her PhD at the Institut d'Astrophysique de Paris (IAP) from September 2011 to September 2015. She then became a CITA post-doctoral fellow in Toronto. She is now a CNRS permanent researcher at IAP, France. Sandrine Codis works on the theoretical modelling of the large-scale structure of the Universe and is particularly interested in cosmology, weak lensing, cosmic web and galaxy formation. She is also a member of the Euclid consortium, an ESA's space mission dedicated to mapping Dark Matter in the Universe and characterising the equation of state of the Dark Energy, potentially responsible for the acceleration of the expansion of the Universe.

Photo credit: Jean Mouette / IAP-CNRS-SU

Sandrine Codis' PhD thesis focused on the theoretical understanding and modelling of the large-cale structure of the Universe. She was particularly interested in addressing some of the challenges that the field of large-scale structure studies needs to overcome to extract the marrow of the gigantic precision datasets that will be produced by future galaxy surveys like ESA's cornerstone Euclid mission and LSST. She successfully developed innovative tools to probe (from first principles) the non-linear regime of structure formation and tackle systematic effects such as redshift space distortion and intrinsic alignment of galaxies which compromise high precision large-scale structure measurements. For that purpose, she developed new mathematical models and was involved in the post-processing and scientific analysis of massive N-body and hydrodynamical simulations. Her publications are already references in the field and span a wide range of topics from cosmology to galaxy formation. The quality of her thesis was recently honoured as the best PhD in astronomy by the Société Française d'Astronomie et d'Astrophysique.

The PhD thesis of Sandrine Codis was conducted at the Institut d'Astrophysique de Paris (IAP), with a degree delivered by the Université Pierre et Marie Curie - Paris VI, under the supervision of Christophe Pichon (IAP) and Dmitri Pogosyan (University of Alberta).

Best Doctoral Thesis in Observational Astrophysics

The 2018 MERAC Prize for the Best Doctoral Thesis in Observational Astrophysics is awarded to **Dr Renske Smit (University of Cambridge, UK)** for the observational characterisation of the physical properties of the galaxies that formed in the first billion years of cosmic time.

Renske Smit earned her undergraduate and PhD degrees at Leiden University in the Netherlands. During her master thesis she secured a scholarship to pursue part of her degree at the University of California, Berkeley. For her PhD she conducted research into the formation and evolution of the first galaxies using cutting-edge observational facilities. She then began her postdoctoral career at the Centre for Extragalactic Astronomy at Durham University. In 2016 she was awarded a Rubicon grant by the Netherlands Organisation for Scientific Research (NWO) based on her thesis work. She is currently working as an independent research fellow at the Kavli Institute for Cosmology at the University of Cambridge, UK.

Renske Smit's doctoral research focused on the study of very distant galaxies, seen in the first few billion years of cosmic history, using the Hubble and Spitzer Space Telescopes. Her studies were among the first to obtain genuine insight into the physical conditions of these galaxies, paving the way for detailed follow-up studies with ground-based instrumentation. Her research established that emission lines associated with the formation of massive, young stars often dominate the broadband flux of distant galaxies. This work resolved a major discord between observations and theoretical models of the evolution of galaxies in the early Universe. Renske Smit's innovative work also enabled her to identify new galaxies in the Epoch of Reionisation; spectroscopic follow-up of these sources with the Atacama Large Millimeter Array allowed her to obtain the first measurement of velocity structure in galaxies at this early epoch. She participated in efforts to detect even more distant ($z \approx 8$-9) galaxies, spectroscopic follow-up of which yielded spectacular confirmation of their redshifts via the Lyman- alpha emission line, breaking two consecutive records for the most-distant galaxy known to science. As a member of the NIRSpec Guaranteed Time Observations (GTO) Galaxy Assembly team, Renske Smit is now preparing for the forthcoming revolution promised by the launch of the James Webb Space Telescope.

The PhD thesis of Renske Smit was conducted at the University of Leiden, under the supervision of Dr. Rychard Bouwens.

Best Doctoral Thesis in New Technology

The 2018 MERAC Prize for the Best Doctoral Thesis in New Technology is awarded to **Dr Martin Pertenais (DLR, Germany)** for a PhD thesis on cutting-edge concepts of compact polychromatic spectropolarimeters adapted to astrophysical space mission requirements in the UV domain.

Martin Pertenais has obtained an optical engineer degree from the prestigious Engineer School Institut d'Optique Graduate School (IOGS) in Paris and a Master in photonics from the University of Jena. He then undertook a PhD thesis in instrumentation for astrophysics at the Institut de Recherche en Astrophysique et Planétologie in Toulouse and at the Paris Observatory on "Stellar UV and Visible spectropolarimetry from space". This allowed him in particular to successfully lead the Arago Payload consortium and to innovate in new technologies for spectropolarimetry. After his PhD thesis, he moved on a position at DLR as the Optical System Engineer for PLATO. In parallel, he keeps working on new spectropolarimeter designs and co-supervises a PhD student on this topic for the NASA mission LUVOIR.

The goal of Martin Pertenais' PhD thesis was to find innovative concepts of spectropolarimeters, to build the first ever space mission equipped with a high-resolution spectropolarimeter working on a wide wavelength range including the UV domain. In Toulouse, he performed theoretical calculations and simulations for two different original concepts of polarimeters that he formulated. The first one is an inventive static polarimeter using birefringent wedges as polarisation spatial modulator. The second concept used a classical rotating polarimeter, albeit optimised to get constant efficiencies for the extraction of the Stokes parameters from 123 to 888 nm. The result is an ingenious very compact polarimeter working with the same polarimetric efficiency over a very large spectral range, including the UV. While in Paris Martin Pertenais created prototypes of both concepts to demonstrate experimentally his very encouraging theoretical results. He built and tested both prototypes, which showed excellent experimental results, increasing the Technology Readiness Level for these innovative technologies. Martin Pertenais also tested one of the two prototypes on the sky on real stars. In October 2015 he received the "Young Researcher Award" granted by the French CNES agency. Martin Pertenais was an essential member of the core team of the Arago international space mission project, a M4 and M5 ESA candidate mission.

The PhD thesis of Martin Pertenais was conducted at the Institut de Recherche en Astrophysique et Planétologie in Toulouse and at the Paris Observatory in Meudon, with a degree delivered by the Université Toulouse 3 Paul Sabatier, under the supervision of Coralie Neiner and Pascal Petit.