European Astronomical Society
2017 Prizes

Tycho Brahe Prize

The 2017 Tycho Brahe Prize is awarded to ***Mr Bernard Delabre*** in recognition of his leading role in the optical design of astronomical telescopes, cameras and spectrographs over the past 40 years.

Lodewijk Woltjer Lecture

The 2017 Lodewijk Woltjer Lecture is awarded to ***Prof. Bengt Gustafsson*** for his rich scientific career on the theory of stellar atmospheres, the interpretation of stellar spectra, and the chemical evolution of galaxies.

MERAC Prizes

The 2017 MERAC Prizes for the Best Early Career Researcher are awarded in

Theoretical Astrophysics

to ***Prof. Selma E. de Mink*** for her major contributions to our understanding of the role of binarity as one of the dominant physical parameters for massive stars.

Observational Astrophysics

to ***Prof. Kevin Schawinski*** for his groundbreaking work on the galaxy/black hole connection and innovative use of citizen science in astrophysics.

New Technologies

to ***Dr Emmanuel Hugot*** for his unique and pioneering work on innovative astronomical instrumentation, based on active systems, freeform optics and curved focal planes.

All five awardees are invited to give a plenary lecture at the European Week of Astronomy and Space Science (EWASS) to be held in Prague, Czech Republic, on 26 – 30 June 2017.

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, 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.

Tycho Brahe Prize

The 2017 Tycho Brahe Prize is awarded to **Mr Bernard Delabre** in recognition of his leading role in the optical design of astronomical telescopes, cameras and spectrographs over the past 40 years.

Bernard Delabre is a French optical engineer born in 1952. He was largely raised in Algeria and received a diploma in Optics in 1974 at the Ecole d'Optique de Morez in France. He worked for a few years at the Société SEIMA (now VALEO) designing car headlights before joining ESO in 1977 where he has been employed ever since. During his 40 years of service at ESO, Bernard Delabre has made profound contributions to optical and infrared ground based astronomy, which benefit the entire astronomical community. Three of the ten pioneering spectrographs of the twentieth century are attributed to him. He has been the chief optical designer of a number of telescopes, from the NTT to the E-ELT and beyond. His genius has been in the optimisation of the instrument designs and a clear vision of what astronomers need and how the details of an optical design can be merged with the mechanical constraints at optimal performance. It has been normal to find astronomers, mechanical engineers, control engineers, system analysts all sitting next to him in his office discussing, negotiating and evolving designs and constraints.

The first major achievement of Bernard Delabre was the design of the ESO Faint Object Spectrograph and Camera (EFOSC) in the 1980s. EFOSC revolutionised astronomy by providing a wide achromatic field and a collimated beam for spectroscopic elements. His design for EFOSC exploited the development of new glass materials and novel optical components. With the ability to simply insert a grism or a waveplate to perform spectroscopy or polarimetry, astronomers had a direct view of the object through the slit while reconfiguring the instrument for another mode. This saved thousands of hours of observing time by making target acquisition a robust process. EFOSC has been widely copied both directly and as a concept to be further evolved for instruments in many ground based observatories worldwide. Another ingenious design of Bernard Delabre was the ESO Multi-Mode Instrument (EMMI), which was the first truly multi-mode camera

combining low, intermediate resolution and cross-dispersed echelle spectroscopy with imaging.

Bernard Delabre's innovation in optical design routinely exploited the new developments in optical materials and manufacturing. In the 1990s, the new manufacturing technique of diamond turning of optical surfaces lead to the development of the powerful three-mirror anastigmat, which was used initially for the Infrared Spectrometer And Array Camera (ISAAC) of the Very Large Telescope (VLT) and now became ubiquitous. The usage of a white pupil system for the UV-Visual Echelle Spectrograph (UVES) at the VLT, reducing the size of the instrument and increasing its efficiency, was another example of Bernard Delabre's ability to exploit novel optical concepts. In 1989, he developed the concept of Collimator Compensation of Camera Chromatism (4C) for astronomical spectrographs. His designs extend to the latest optical instrumentation with novel pupil slicing in ESPRESSO, fixed format large wavelength coverage systems in MUSE and super compact cameras for MOONS. In recent years, Bernard Delabre has also taken a leading role in the development of optical designs of instruments using curved detectors.

The design of telescopes, long confined to one of Cassegrain, Gregorian or Ritchey-Chretien solutions, was another challenge for Bernard Delabre. For the European Extremely Large Telescope (E-ELT), he invented a beautiful five-mirror solution to meet the stringent constraints for such a 1000-m^2 class telescope. This design made a 42-m E-ELT technically feasible by providing an aberration-free field, an adaptive mirror conjugated close to the ground, and an intermediate focus. It is also telecentric at all locations of the focal plane without the need for a corrector.

Bernard Delabre has made his expertise available in a great collaborative spirit to institutes all over the world. He has helped review, redesign and evolve many of the instruments that are currently used in astronomy. He has been a true innovator in optical design for instrumentation during the transformational transition to large format two-dimensional detectors. As the telescopes and the detectors increased in size and improved in performance, the challenge was for the optical design to ensure that the best image quality was delivered with the fewest elements. Bernard Delabre exemplifies the tradition of working at the forefront of technological evolution and the use of novel technologies enabling new capabilities for astronomy. Attested by nearly 200 publications and more than 4000 citations, his work benefited to thousands of European astronomers, who used for their science an optical system designed by him.

The Lodewijk Woltjer Lecture honours astronomers of outstanding scientific distinction.

Lodewijk Woltjer Lecture

The 2017 Lodewijk Woltjer Lecture is awarded to **Prof. Bengt Gustafsson** for his rich scientific career on the theory of stellar atmospheres, the interpretation of stellar spectra, and the chemical evolution of galaxies.

Bengt Gustafsson is a renowned Swedish astrophysicist born in 1943 in Uppsala, Sweden. He started his studies at Uppsala University, then spent two years at the Nordic Institute for Theoretical Physics (Nordita) in Copenhagen before obtaining his PhD degree at Uppsala University in 1974. He became professor of astrophysics at Stockholm University and, in 1987, professor of theoretical astrophysics at Uppsala University. He has also been guest professor at the University of Maryland (USA), at the University of Asmara (Eritrea), and at the University of Texas (USA). After an extremely active and fruitful career, Bengt Gustafsson is now professor emeritus at Uppsala University and affiliated professor at Nordita (now in Stockholm).

Bengt Gustafsson has worked extensively on the theory of stellar atmospheres, the interpretation of stellar spectra, on the chemical evolution of galaxies, and, more recently, on the early history of the Sun. He has published about 400 scientific papers some of them related to seminal studies leading to significant advances as attested by some 15'000 citations. He has also written a number of popular articles and books, and has contributed on philosophical and science-policy issues. He has served in various prestigious national and international committees, such as the Nobel Committee of Physics, the ESO Council, and the astronomy/space science panel of the European Research Council (ERC). He was the chairman of the Committee on Freedom and Responsibility in the conduct of Science in the framework of the International Council for Science (ICSU).

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 2017.

Best Early Career Researcher in Theoretical Astrophysics

The 2017 MERAC Prize for the Best Early Career Researcher in Theoretical Astrophysics is awarded to **Prof. Selma E. de Mink** for her major contributions to our understanding of the role of binarity as one of the dominant physical parameters for massive stars.

Selma de Mink completed her graduate studies in physics and math all Cum Laude at Utrecht University in the Netherlands. She continued with a PhD in theoretical astrophysics completed in 2010. She was then awarded the prestigious NASA Hubble fellowship, which she used to start her independent line of research at the Space Telescope Science Institute and Johns Hopkins University in Baltimore, Maryland. In 2013 she was awarded numerous fellowships and she chose to combine NASA's Einstein fellowship with the Princeton Lyman Spitzer fellowship, allowing her to spend her time between Carnegie Observatories, the TAPIR institute for theoretical astrophysics and relativity at the California Institute of Technology and Princeton University. In 2014 she returned to Europe to start to build her own research group as a MacGillavry assistant professor at the University of Amsterdam. Since then she was awarded a Marie Curie Fellowship (2015) and an ERC starting grant (2016).

Selma de Mink made a very large impact across different sub-disciplines in astrophysics by pushing our understanding of the role that binarity and rotation play in the complicated lives of massive stars. Her work has been absolutely crucial in changing the long held “single star paradigm” for massive stars. Although it was known before that massive binaries are common and give rise to various exciting phenomena, she and her collaborators showed that this property is necessary for a complete explanation of the main-sequence properties of massive stars, their diverse explosion channels and their various compact object remnants. Her theoretical work had large impact on the debate about the origin of merging binary black holes, as recently detected by the LIGO gravitational wave detector. Her early detailed simulations allowed her to explore new theories for the evolution of very close compact binary systems where the stars experience internal mixing processes. Selma de Mink is also recognised for her refreshing ideas challenging long-held beliefs, in particular on the possible role of massive binaries in explaining multiple populations in globular clusters.

The work of Selma de Mink has been conducted at the Anton Pannekoek Institute for Astronomy at the University of Amsterdam, The Netherlands, at the Carnegie Observatories and California Institute of Technology, Pasadena, USA, at the Space Telescope Science Institute and Johns Hopkins University, Baltimore, USA, at the Argelander Institut in Bonn, Germany, and at the Utrecht University, The Netherlands.

Best Early Career Researcher in Observational Astrophysics

The 2017 MERAC Prize for the Best Early Career Researcher in Observational Astrophysics is awarded to **Prof. Kevin Schawinski** for groundbreaking work on the galaxy – black hole connection and innovative use of citizen science in astrophysics.

Kevin Schawinski was a graduate student at Oxford University from 2004-2008 during which time he co-founded the Galaxy Zoo citizen science project. For his thesis on the role of black holes in the quenching of star formation in early-type galaxies, Kevin received the Royal Astronomical Society's Michael Penston prize for the best thesis in astronomy in the UK. He remained in Oxford for several months as the Henry Skynner Junior Research Fellow at Balliol College, Oxford before moving to Prof. C. Megan Urry's group at Yale University. He was awarded a NASA Einstein Fellowship and remained at Yale until 2012, working with the latest deep field observations from the Hubble, XMM-Newton and Chandra space telescopes. He moved to ETH Zurich in Switzerland as an Assistant Professor with a Swiss National Fund professorship grant where he now leads the black hole astrophysics group. He is strongly engaged in citizen science, recruiting large numbers of people from the general public to engage with science.

Kevin Schawinski has made major advances in the observational understanding of the feedback exerted on a galaxy by outflows from an active, super-massive back hole at its centre. He also used stellar evolution to build phenomenological models of galaxy evolution. Using stars as “cosmic clocks”, he constrained the phases in the evolution of galaxies during which their central black holes become active as quasars. He showed using observations that while many disk galaxies – like our Milky Way – cease their star formation activity very slowly over billions of years, some galaxies whose morphology was transformed by a major galaxy merger to an elliptical shape shut down their star formation very quickly. The most plausible cause for this sudden end of star formation is that a very brief active phase by the black hole destroys the gas reservoir used as fuel for star formation. As a co-founder of the Galaxy Zoo project he involved several hundred thousand citizen scientists to classify nearly a million galaxies from the Sloan Digital Sky Survey. The discovery of the famous “Hanny’s Voorwerp” by a Dutch school teacher taking part in Galaxy Zoo became a prototypical system for quasar ionisation echoes tracing the past energetic output of central black holes. Kevin Schawinski showed that such echoes limit the duration of a typical quasar phase to only a few hundred thousand years.

The work of Kevin Schawinski has been conducted at Oxford University in the United Kingdom (2004-2008), Yale University (2008-2012) and ETH Zurich in Switzerland (2012-2016).

Best Early Career Researcher in New Technologies

The 2017 MERAC Prize for the Best Early Career Researcher in New Technologies is awarded to **Dr Emmanuel Hugot** for his unique and pioneering work on innovative astronomical instrumentation, based on active systems, freeform optics and curved focal planes.

Emmanuel Hugot is a French astrophysicist, expert in innovative instrumentation and, since 2015, leader of the Research and Development Group at the Laboratoire d'Astrophysique de Marseille (LAM). In 2004, he completed his Master Thesis on “Optics, Image and Signal” at the Aix Marseille University (AMU) and started a PhD Thesis completed in 2007 at the LAM. He has been awarded the young researcher prize of the French Society of Astronomy and Astrophysics in 2014, and received in 2017 the CNRS bronze medal delivered to early career scientists. He defended his accreditation Thesis at AMU in 2016. Besides his management activities with the science team at LAM, he is now leading an ERC-funded programme to enable compact, high-quality and affordable instrumentation for the future giant observatories, based on the revolutionary combination of freeform optics and curved detectors.

Emmanuel Hugot’s interests in instrumentation are broad, from the manufacturing of super-polished freeform optics for cutting-edge instrumentation, to the development of a new type of focal planes using variable curvature detectors, thus leading to compact and cost-effective instrumentation, crucial for the E-ELT or the post-JWST generation such as the LUVOIR obsvatory currently under study at NASA. Over the past ten years, he has been leading cutting-edge R&D projects for high angular resolution and high contrast imaging, based on the synergies between active and adaptive optics, materials science and innovative focal plane architectures. His work has also a multi-disciplinary impact, as it involves imaging science with applications in many fields, from bio-medical science to artistic projects. One of his main achievement is the concept and building of the first active mirror ever used in an extreme adaptive optics system. Installed in 2015 on the Spectro-Polarimetric High-Contrast Exoplanet REsearch (SPHERE) instrument of ESO’s Very Large Telescope (VLT), this system demonstrates the gain of smart flexible optics for sharp and accurate astronomical observations and triggered worldwide interest on this technique.

The work of Emmanuel Hugot has been conducted entirely at the Laboratoire d'Astrophysique de Marseille, a world-leading lab in the field of astronomical instrumentation, but with international and industrial collaborations, clearly enhancing the impact of his activities.