MERAC Prizes

FONDATION MERAC (Mobilising European Research in Astrophysics and Cosmology) is a non-profit foundation started in 2012 with headquarters in Switzerland to recognize 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 all the 29 nominated candidates for the three MERAC Prizes of 2013.

Best Early Career Researcher in Theoretical Astrophysics

The 2013 MERAC Prize for the Best Early Career Researcher in Theoretical Astrophysics is awarded to **Gabriella De Lucia** for her work on the theoretical modeling of galaxy formation and evolution. The models she has developed have reshaped our understanding of the physical processes that drive galaxy evolution, and in particular, of how these depend on the environment in which galaxies reside.

Gabriella De Lucia obtained a PhD in theoretical astrophysics at the Max-Planck Institute for Astrophysics (MPA, Garching, Germany) in 2004. In the same year, she was offered a 3-year (later extended to 5 years) postdoctoral position at MPA. In 2008, she was awarded a Starting Independent Researcher Grant from the European Research Council to set up a small research group at the Astronomical Observatory of Trieste, where she moved as a Senior Researcher in 2009. She is currently Astronomer of the Italian National Institute for Astrophysics at the Astronomical Observatory of Trieste.

Gabriella De Lucia has made key contributions to the connection between theoretical models of structure formation and the observed properties of galaxies at different cosmic epochs. She has explored this connection using several innovative techniques, which have brought important revisions to conventional interpretations of the observed properties of galaxies. The models she has developed have reshaped our understanding of the physical processes that drive galaxy evolution, and in particular, of how these depend on the environment in which galaxies reside.

The work has been carried out at the Max-Planck Institute for Astrophysics in Garching, Germany, and at the Astronomical Observatory of Trieste.

Best Early Career Researcher in Observational Astrophysics

The 2013 MERAC Prize for the Best Early Career Researcher in Observational Astrophysics is awarded to **Elisabetta Caffau** for the discovery of a very primitive low-mass star in our Galaxy whose chemical composition has changed our views on stellar formation in the early Galaxy and has spurred quite a number of innovative ideas about the formation of the first stars in the Early Universe.

After several years of work as professor in secondary schools in Italy, Elisabetta Caffau obtained a PhD in observational astronomy from Paris Observatory in 2009. After a one year post-doctoral position in Paris Observatory, E. Caffau obtained a three year "Gliese fellow grant" at the Zentrum für Astronomie of the University of Heidelberg. E. Caffau has developed a method to obtain high precision abundances of the elements from 3D hydrodynamical computations. With the infrared spectrograph CRIRES at ESO/VLT, she measured the phosphorus abundance of twenty cool stars in the Galactic disk for the first time.

Elisabetta Caffau applied her method to recognize the extremely metal poor stars in the crowd of low-resolution spectra provided by large spectroscopic surveys like the Sloan Digital Sky Survey. Thanks to this very efficient tool, she discovered in 2011 the most primitive star currently known (SDSS J1029+1729) and she defined its chemical composition. The discovery of a star with an extremely low abundance of all the elements from C to Zn, is considered as a key for our understanding of the formation of stars and chemical elements in the early history of the Milky Way.

The work has been carried out at the Centre for Astronomy of Heidelberg University (ZAH), at the Landessternwarte Königstuhl (LSW) and at the Department GEPI of Paris Observatory.

Best Early Career Researcher in New Technology

The 2013 MERAC Prize for the Best Early Career Researcher in New Technology is awarded to **Justin Read** for his high-impact research in computational astrophysics and cosmology by developing a new method, SPH-S, substantially improving the Smoothed Particle Hydrodynamics technique used, in particular, to model gas accretion in galaxy formation.

Justin Read obtained his PhD in theoretical astrophysics from Cambridge University, UK, in 2003. After a two-year postdoctoral research position, also in Cambridge, he moved to the University of Zürich to join the Institute for Theoretical Physics. In 2009, he joined the University of Leicester as a lecturer in theoretical astrophysics, and in October 2010 he was awarded an assistant professorship at ETH Zürich. Starting 2013 he took up a full Chair at the University of Surrey, Guildford, UK.

The MERAC Prize is awarded for his major achievements in the area of computational astrophysics. He has been able to improve substantially one of the two major computational methods adopted to model hydrodynamics in astrophysics, namely smoothed particle hydrodynamics (SPH). Since numerical simulations have become an essential part of astrophysics and cosmology over the past decade, often driving the interpretation of astronomical data, the impact of his work in the field is of primary importance, and will be even more so in the future. The method developed by Justin Read, called SPH-S, overcomes two related long-standing problems of standard SPH, namely its inability to resolve mixing in fluids and capture instabilities at fluid interfaces.

The work has been conducted at the University of Zürich and ETH Zürich, as well as in Leicester and Heidelberg.