



## 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 the nominated candidates for the three MERAC Prizes of 2015.

## Best Early Career Researcher in Theoretical Astrophysics

The 2015 MERAC Prize for the Best Early Career Researcher in Theoretical Astrophysics is awarded to **Dr. Michela Mapelli** for her eclectic theoretical and computational contributions to the dynamics of star clusters and galaxies, the reionization epoch, star formation in the Galactic centre, and the formation of massive stellar black holes from the collapse of metal-poor stars.

*Michela Mapelli studied Physics at the University of Milano Bicocca (1998-2002), where she received her Master degree in February 2003, with a Thesis on 'Four-body interactions in globular clusters'. In October 2006, she received her PhD at SISSA, with a Thesis on 'Relic signatures of reionization sources', for which she was awarded both the Gratton Prize 2007 and the Tacchini prize 2007. In 2007, she became postdoctoral fellow at the Institute for Theoretical Physics of the University of Zurich, Switzerland, where she studied the formation of giant low-surface brightness galaxies. She was awarded there the prestigious 'Forschungskredit' fellowship in 2008 before receiving an independent postdoctoral fellowship at the University of Milano Bicocca in 2009. In August 2011, she started a permanent research position at INAF – Padova Astronomical Observatory, where she created her independent research team.*



Michela Mapelli's main scientific achievements of the last five years are her studies on the formation of massive stellar black holes from the collapse of metal-poor stars and her contribution to understanding star formation in the Galactic centre. In 2009, she proposed that black holes of more than 20 and up to 80 solar masses can form in the local universe from the direct collapse of metal-poor stars. This can explain why ultra-luminous X-ray sources (ULXs) occur more frequently in galaxies of low-metallicity, with considerable implications for high-energy astrophysics and the search of gravitational waves. In 2012, she simulated the disruption of a molecular cloud by the tidal shear of the super-massive black hole in the Galactic centre and showed that a gaseous disc forms and then fragments into proto-stellar clumps, thus explaining the presence of young, massive stars at the centre of our Galaxy.

The work of Michela Mapelli has been conducted entirely in Europe. After graduating in 2006 at SISSA (Trieste), she developed the model of massive stellar black holes during the post-doctoral fellowship at the University of Zurich, Switzerland, and then at the University of Milano Bicocca, Milan, Italy (2009–2011). Since 2011 she is Researcher at INAF – Padova Astronomical Observatory, Italy, where she has continued investigating massive stellar black holes, and started working on the Galactic centre.

## Best Early Career Researcher in Observational Astrophysics

The 2015 MERAC Prize for the Best Early Career Researcher in Observational Astrophysics is awarded to **Dr. Saskia Hekker** for her ground-breaking contributions to the understanding of the internal structure of red-giant stars. She was first to establish non-radial oscillations in high-precision time-resolved spectroscopy of such stars and played a key role to confirm such modes in CoRoT space data. She also developed innovative techniques used to analyse and interpret Kepler observations of red giants.

*After receiving her PhD from the University of Leiden in the Netherlands in Sept. 2007, Saskia Hekker worked at the Royal Observatory of Belgium and the University of Birmingham. In 2011 she was awarded a personal 3-year Veni Fellowship from the Netherlands Organization for Scientific Research to conduct research at the Astronomical Institute 'Anton Pannekoek', University of Amsterdam. Since September 2013, she works in Göttingen at the Max Planck Institute for Solar System Research (MPS). In 2013 she obtained a European Research Council (ERC) Starting Grant to determine Stellar Ages through asteroseismology. In 2014, she was awarded a Max Planck Independent Research Group focusing on 'Asteroseismology and Galactic Evolution', which is an international node of the 'Stellar Astrophysics Centre', a Centre of excellence in research of the Sun, Stars and Extra-solar planets. Her career path and mobility is outstanding, particularly since Saskia is also a mother.*



Credits: Jan Willem Steenmeijer

Saskia Hekker announced, already during her PhD, non-expected, non-radial oscillations in red-giant stars which she then confirmed using data of the CoRoT satellite. She was also heavily involved in the discovery, identification, and analysis of mixed oscillation modes, which allow to probe the core region of the stars, in particular to disentangle hydrogen-shell- from helium-core-burning red giants. She discovered the first red giant in an eclipsing binary and developed methods to determine global asteroseismic parameters, which she then applied to Kepler data of planet-hosting stars.

Saskia Hekker performed her work at the School of Physics and Astronomy, University of Birmingham, United Kingdom (2009–2011); Astronomical Institute 'Anton Pannekoek', University of Amsterdam, the Netherlands (2011–2013) and the Max Planck Institute for Solar System Research, Göttingen, Germany (2013–present).

## Best Early Career Researcher in New Technologies

The 2015 MERAC Prize for the Best Early Career Researcher in New Technologies is awarded to **Dr. Sylvestre Lacour** for his development of pupil masking and pupil remapping observing techniques, which provide a unique combination of high contrast and high angular resolution to study the immediate environment of stars.

*After his graduation from Ecole Normale Supérieure in electrical engineering, Sylvestre Lacour worked at The Johns Hopkins University from 2000 to 2002 as software engineer for the FUSE satellite. He pursued with a PhD in astrophysics on a project combining pupil remapping and long-baseline optical interferometry. It consisted partly in building a single-mode pupil remapping prototype instrument (FIRST), and partly in acquiring and interpreting observations from the IOTA interferometric array (Mount Hopkins, Arizona). After the successful defence of his PhD in 2007, he obtained a Lavoisier fellowship to pursue his research in high angular resolution instrumentation at the University of Sydney. He developed there a strong expertise in the emerging technique of pupil masking. Over the last years, he benefits from a CNRS tenured position at the Observatory of Paris, allowing him to work on the application of the pupil masking technique to the study of young stellar objects. As an expert in high precision astrometry, he is also deeply involved in the GRAVITY instrument for the VLT Interferometer.*



Sylvestre Lacour is the leading European specialist in the pupil masking and pupil remapping observing techniques. These two techniques provide a unique combination of high contrast and high angular resolution that is key to studying the immediate environment of stars in all evolutionary stages. He also developed a complete pipeline to reduce this kind of observations, which are now performed by major astronomical facilities. This effort led to an important result on scattering dust around evolved stars and opened a new observational window on the inner structure of transition disks, where extrasolar planets are expected to form.

Sylvestre Lacour started working in the field of interferometry since his PhD at the Observatoire de Paris. He then fully developed the field aperture masking during the Lavoisier Fellowship at Sydney University and a second post-doctoral position at the Observatoire de Grenoble. Since 2009 he is affiliated with the Observatoire de Paris, France.