# European Astronomical Society
# 2019 Prizes

## Tycho Brahe Medal

The 2019 Tycho Brahe Medal is awarded to ***Prof. Guy Monnet (CRAL, Université Claude Bernard Lyon 1, France)*** for fundamental contributions to the development and implementation of 3D spectroscopy on optical and infrared telescopes and for his international leadership of observatory instrumentation programmes.

## Lodewijk Woltjer Lecture

The 2019 Lodewijk Woltjer Lecture is awarded to ***Prof. Licia Verde (ICREA at University of Barcelona, Spain)*** for outstanding work in cosmology, especially in the study of the cosmic microwave background and the large-scale structure of the Universe.

## MERAC Prizes

The 2019 MERAC Prizes for the Best Early Career Researcher are awarded in

### Theoretical Astrophysics

to ***Dr Nikku Madhusudhan (University of Cambridge, United Kingdom)*** for pioneering contributions to exoplanetary science, particularly in advancing the frontiers of atmospheric characterisation of exoplanets.

### Observational Astrophysics

to ***Dr Evan Keane (SKA Organisation, United Kingdom)*** for investigations of the Transient Radio Sky and the discovery of the second Lorimer burst, now known as Fast Radio Bursts.

### New Technologies (Multi-Messenger)

to ***Prof. Irene Tamborra (University of Copenhagen, Denmark)*** for pioneering contributions to understanding the role of neutrinos in astronomy and astrophysics.

All five awardees will give a plenary lecture at the European Astronomical Society Annual Meeting, the European Week of Astronomy and Space Science (EWASS), to be held in Lyon, France, on 24 – 28 June 2019.

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The European Astronomical Society (EAS) promotes and advances astronomy in Europe. As an independent body, the EAS can 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 Medal is awarded in recognition of the development or exploitation of European instruments or major discoveries based largely on such instruments.*

## Tycho Brahe Medal

The 2019 Tycho Brahe Medal is awarded to **Prof. Guy Monnet (CRAL, Université Claude Bernard Lyon 1, France)** for fundamental contributions to the development and implementation of 3D spectroscopy on optical and infrared telescopes and for his international leadership of observatory instrumentation programmes.

Guy Monnet was born in Lyon, France. After a diploma of engineer from the Ecole Polytechnique in 1962, he obtained a Master in Physics and Mathematics from the University of Paris in 1963, followed by a PhD from the University in Marseille in 1968. as Astronomer, becoming its Director from 1971 to 1976. Guy Monnet then moved to his natal city, serving as Director of the Observatoire de Lyon from 1976 to 1987, while becoming member of the Academy of Sciences of Lyon in 1978. He became the Associate Director (1987-1990) and then Director (1990-1993) of the Canada-France-Hawaii Telescope (CFHT), until his return in 1993 in Lyon. He became Head of the ESO Instrumentation Division from 1995 to 2003, and Head of the ESO Telescope Systems (2004-2006). From 2006 to 2009, Guy Monnet worked for the ESO Extremely Large Telescope, as Project Scientist. He travelled further to Australia, becoming Head of Instrumentation of the Australian Astronomical Observatory from 2010 to 2011. Guy Monnet is now Professor Emeritus at CRAL (formerly Observatoire de Lyon).

Prof. Guy Monnet further developed the 3D spectrographic capability, beyond the scanning Fabry Perot. He took the concept of integral field spectroscopy, invented by Georges Courtès, and led the development of the first working instrument (TIGER) at CFHT with Roland Bacon and Yvon Georgelin. This lenslet array based facility demonstrated the unique capabilities of this approach and produced a number of key scientific results such as the first ever contiguous two-dimensional stellar velocity field of a galaxy. This opened the road for a long list of very successful development of integral field spectrographs, e.g., SAURON (WHT) and MUSE (VLT). Today most major observatories around the world, and

key space missions, have integral field spectrometers as essential components of their instrument complement.

Prof. Guy Monnet took responsibility for the organisation and management of science. He became director of the Marseille Observatory at age thirty. He went on to become director of Lyon Observatory, director of CFHT, head of ESO Instrumentation Division and head of AAO Instrumentation. His vision has successfully impacted the development of ground based instrumentation world-wide. For example, most of the first and second generation VLT instruments were developed under his stewardship. He also guided the development of Adaptive Optics at ESO producing what is now the Adaptive Optics Facility. Guy Monnet has a deep knowledge of all aspects of instrumentation driven by his passion for astronomy. Recently Guy Monnet has disseminated his knowledge of 3D instrumentation by writing the first textbook on this subject together with Roland Bacon.

Guy Monnet's contributions have propelled European ground based astronomy into the forefront of astronomical research. Today, thanks to the VLT and its very successful suite of instruments, Europe has a world leading programme in ground based astronomy, and Prof. Guy Monnet has been an essential piece of this success story.

*The Lodewijk Woltjer Lecture honours astronomers of outstanding scientific distinction.*

## Lodewijk Woltjer Lecture

The 2019 Lodewijk Woltjer Lecture is awarded to **Prof. Licia Verde (ICREA at University of Barcelona, Spain)** for outstanding work in cosmology, especially in the study of the cosmic microwave background and the large-scale structure of the Universe.

Licia Verde was born in Venice, Italy in 1971; she graduated in physics from the University of Padova (1996) and defended her PhD thesis at the University of Edinburgh in 2000. She then moved for postdoctoral appointments at Rutgers University and Princeton University where she was Chandra Fellow and Spitzer fellow. There she seized the opportunity to join the WMAP science team. She became faculty at University of Pennsylvania (2004) and then, in the fall of 2007, a professor at ICREA (Institució Catalana de Recerca i Estudis Avançats) in Barcelona. Since 2010 she leads the Cosmology and Large Scale Structure Group at the Instituto de Ciencias del Cosmos of University of Barcelona. She is the recipient of two ERC IDEAS grants: Starting (2009) and Consolidator (2016). She has shared with the WMAP team the Gruber Cosmology prize (2012) and the 2018 Breakthrough prize for Fundamental Physics. She was among the Thompson Reuters ISI Highly cited researchers in 2015. She was awarded the 2017 Narcis Monturiol medal and the 2018 Premi Nacional de Recerca, that recognises a researcher who has recently contributed significantly and internationally to the advancement of a scientific discipline in any of its fields: human and social sciences, life sciences and health, engineering and technology and experimental sciences. She is a member of the Young Academy of Europe.

Prof. Licia Verde is a cosmologist who addresses questions such as origin, composition and evolution of the Universe, with special attention to statistical methodology.

Shortly after graduating from her PhD, Verde made her mark by analysing a powerful but incredibly challenging statistical property of galaxy surveys related to higher-order

correlations. She showed that galaxies of the Anglo Australian Two-degrees galaxy redshift survey (the largest three-dimensional galaxy survey available then) trace the distribution of the elusive yet ubiquitous dark matter (which makes up to about 80% of the mass of the Universe). This result indicated that the galaxy distribution can be used to study the dark matter one.

Prof. Verde then joined the science team of the Microwave Anisotropy Probe (later renamed Wilkinson Microwave Anisotropy probe WMAP). Verde participated in analysis and interpretation of the Cosmic Microwave Background data from the WMAP satellite. This analysis was pivotal in establishing what is today the standard cosmological model. In this model, the Universe is composed of dark matter and dark energy and the standard matter, as we know it, makes up to only about 5% of the Universe. The galaxies and large scale structure we see today arose from tiny initial quantum fluctuations that got amplified by gravity over 13.7 billion years of evolution.

Prof. Licia Verde then turned her attention to developing rigorous statistical tools to analyse surveys of the Universe and thus connect theoretical models to the observations. Thanks to two ERC grants she has established a vibrant and highly international research group in physical cosmology at the University of Barcelona. Under her lead, the group has contributed to some of the most important results from the Baryon Acoustic Oscillations Survey, part of the Sloan Digital Sky Survey: measurements of the expansion history of the Universe and the formation of cosmological structures as well as constraint on cosmological parameters describing structure and detailed composition of the Cosmos. Her group is now involved with two forthcoming surveys: the Dark Energy Spectroscopic Instrument survey and the Euclid mission. These surveys will provide detailed three dimensional maps of galaxies and large-scale cosmological structures covering unprecedented volume: the survey volume being a sizeable fraction of the entire observable Universe. If WMAP marked the inception of precision cosmology, the advent of such large surveys is propelling cosmology in the “big data” era.

Prof. Licia Verde has supervised 7 master students, has or is supervising 7 PhD students and mentoring 20 externally recruited postdocs. She is a promoter of Girls in Science, Technology, Engineering, and Mathematics disciplines, she is passionate about outreach and science communication especially to young ages, diversity and inclusion in the work place and the future of scholarly communication.


## 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 25'000 € are for each of the three categories:

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

The prizes alternate by year for:

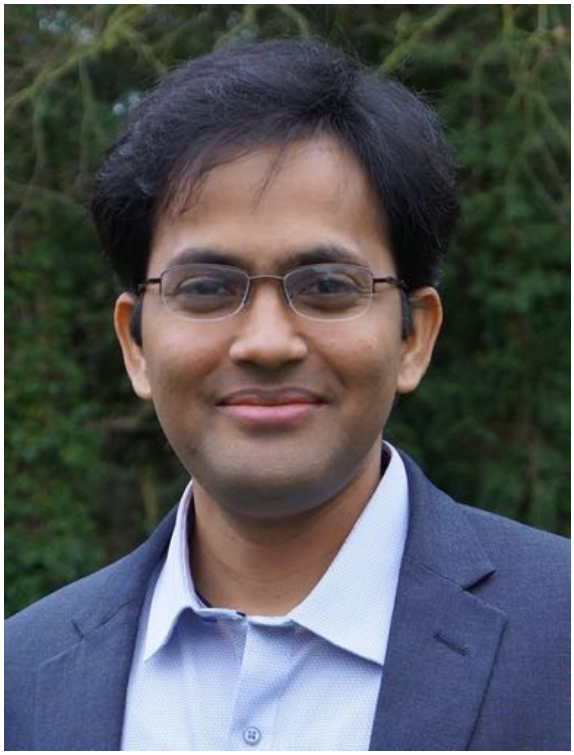
- ★ Best Early Career Researcher Prizes (on odd years)
- ★ Best Doctoral Thesis Prizes (on even years)

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

The MERAC Prize Committee was pleased by the high quality of the increasing number of nominated candidates for the three MERAC Prizes of 2019.

## Best Early Career Researcher in Theoretical Astrophysics

The 2019 MERAC Prize for the Best Early Career Researcher in Theoretical Astrophysics is awarded to **Dr Nikku Madhusudhan (University of Cambridge, UK)** for pioneering contributions to exoplanetary science, particularly in advancing the frontiers of atmospheric characterisation of exoplanets.



Nikku Madhusudhan is a Reader in Astrophysics and Exoplanetary Science at the Institute of Astronomy of the University of Cambridge. He pursued his undergraduate studies in Engineering at the Indian Institute of Technology, Banaras Hindu University, India. He moved to the Massachusetts Institute of Technology (MIT) where he obtained a master degree in engineering in 2004 and a PhD in Physics (astrophysics) in 2009. He then pursued postdoctoral research at MIT (2009-2010), Princeton University (2010-2011), and Yale University (2012-2013) where he was the Yale Center for Astronomy and Astrophysics Prize Postdoctoral Fellow. In October 2013, he joined the University of Cambridge as Lecturer, and was promoted in 2017 to Reader. He was awarded the prestigious Bappu Gold Medal in Astrophysics for 2014 by the Astronomical Society of India and the 2016 Young Scientist Medal of the International Union of Pure and Applied Physics Commission on Astrophysics. His research interests span a wide range of theoretical topics in exoplanetary science, including exoplanetary atmospheres, interiors, and planetary formation.

Nikku Madhusudhan has made pioneering contributions to exoplanetary science which include precise chemical characterization of exoplanetary atmospheres, detailed studies of atmospheric and interior processes, and using exoplanetary compositions as tracers of their formation mechanisms. His work has led to several new insights into exoplanetary atmospheres, including constraints on non-equilibrium chemistry, temperature inversions, molecular abundances, and C/O ratios. His recent studies have led to major advances in exoplanetary science in three frontier areas: (1) high-precision chemical characterisation of exoplanetary atmospheres using state-of-the-art observations, (2) detailed constraints on exoplanetary atmospheric processes, and (3) new approaches to constrain exoplanetary formation and migration pathways using their atmospheric abundances.

The pioneering work by Nikku Madhusudhan in the last five years (2014-2018) was conducted at the University of Cambridge, United Kingdom. Prior to 2014, his seminal research was carried out in the USA.

## Best Early Career Researcher in Observational Astrophysics

The 2019 MERAC Prize for the Best Early Career Researcher in Observational Astrophysics is awarded to **Dr Evan Keane (SKA Organisation, UK)** for investigations of the Transient Radio Sky and the discovery of the second Lorimer burst, now known as Fast Radio Bursts.

Evan Keane did his undergraduate studies at the National University of Ireland, Galway, before undertaking a Masters as a scholarship student at Trinity College at the University of Cambridge. He then did his PhD at the Jodrell Bank Centre for Astrophysics in the University of Manchester. His thesis won the Springer Thesis Prize. He then worked as a postdoctoral researcher at the Max Planck Institut für Radioastronomie in Bonn and later as Senior Postdoctoral Fellow and Dynamic Theme Scientist for CAASTRO (Australian Research Council's Centre of Excellence for All-Sky Astrophysics) at the Swinburne University of Technology. Since 2015 he is Project Scientist for the SKA Organisation. His research focuses on searching for radio transients and using them to understand fundamental questions of physics. He has discovered numerous pulsars and rotating radio transients and in 2011 discovered the second "Lorimer burst", events now known as "fast radio bursts" (FRBs). His current role involves ensuring the SKA will achieve all its scientific objectives in transient, pulsar, VLBI, solar and cosmic ray science.

Evan Keane has made significant contributions to developing and improving techniques to discover new pulsars, and determined timing solutions for challenging pulsars. He was part of the team that discovered the first Galactic Centre radio pulsar. Evan did the first systematic analysis of all known fast radio bursts, precipitating the Fast Radio Burst Catalogue (FRBCAT). Evan leads the Survey for Pulsars and Extragalactic Radio Bursts (SUPERB) project, a large-scale real-time accelerated pulsar and fast transient search programme with the Parkes telescope in Australia.

Evan Keane led the main SKA science case chapter for pulsars, describing the pulsar search yield, optimal search strategies and the science questions that can be addressed by the SKA, such as tests of General Relativity and alternative theories of gravity, gravitational wave astronomy with pulsar timing arrays and physics at super-nuclear density within neutron star interiors using pulsar timing.

This work has been conducted at the Square Kilometer Array Organisation, United Kingdom, and at the Max Planck Institut für Radioastronomie, Germany and Swinburne University of Technology, Australia.

## Best Early Career Researcher in New Technologies (Multi-Messenger)

The 2019 MERAC Prize for the Best Early Career Researcher in New Technologies (Multi-Messenger) is awarded to **Prof. Irene Tamborra (University of Copenhagen, Denmark)** for pioneering contributions to understanding the role of neutrinos in astronomy and astrophysics.

Irene Tamborra completed her (under-) graduate studies in Physics, all Cum Laude, at the University of Bari in 2011. Her PhD thesis focused on neutrinos in astrophysics and cosmology. She then won a prestigious Alexander von Humboldt Fellowship at the Max Planck Institute for Physics. She continued to work on neutrino flavour conversions in dense media while expanding towards astrophysics. In 2013, Irene joined the GRavitational AstroParticle Physics Amsterdam (GRAPPA) Center of Excellence at the University of Amsterdam. Close interactions with the astronomers guided her on the modelling of the microphysics of cosmic accelerators through multi-wavelength data. In 2016, Irene joined the Niels Bohr Institute in Copenhagen as Knud Højgaard Assistant Professor and won a Villum Young Investigator Grant. In 2017, Irene was promoted Associate Professor and awarded a career-development grant from the University of Copenhagen. More recently, she has received a competitive Sapere Aude grant from the Danish Council for Independent Research and a Distinguished Associate Professor Fellowship from the Carlsberg Foundation. She is also Mercator Fellow for the Collaborative Research Centre 1258 at the Max Planck Institutes for Physics and Astrophysics.

Irene Tamborra has made pioneering work in advancing our understanding of the role of neutrinos in extreme astrophysical sources. Among many examples, she has discovered the LESA instability, the first hydrodynamical instability occurring in core-collapse supernovae completely driven by neutrinos. She has proposed innovative ideas concerning the exploration of astrophysical transients by using neutrinos as probes, and has demonstrated a highly original research approach connecting the theoretical modelling of the microphysics of astrophysical transients to observations. This led to unravel fundamental properties of neutrinos in dense matter, to unveil the impact of neutrinos on the production of the heavy elements and the dynamics of transient astrophysical sources, as well as to highlight the promising approach of using neutrinos as probes of the inner working of extreme astrophysical sources.

The work of Irene Tamborra has been conducted at the Niels Bohr Institute, University of Copenhagen, Denmark, at Max Planck Institutes for Physics and Astrophysics, Germany, at GRAPPA, Center of Excellence of the University of Amsterdam, The Netherlands, and at the Department of Physics, University of Bari, Italy.