

European Astronomical Society prizes 2022

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The European Astronomical Society (EAS) awarded its most prestigious prizes during its annual meeting held in Valencia, Spain. After two virtual meetings, astronomers attended in-person or watched some of the sessions remotely.

From 27 June to 1 July 2022, emerging slowly from the COVID-19 crisis, close to 1,700 astronomers from all over the world took the opportunity to meet colleagues, after two years of virtual-only annual meetings of the European Astronomical Society (EAS). The 2022 attendance surpassed the previous largest in-person gathering in 2019 in Lyon, France by more than 20%. About 150 astronomers registered for online connection only. In future, the EAS will aim to offer a fully hybrid meeting.

A number of plenary sessions were devoted to the Fritz Zwicky Prize for Astrophysics & Cosmology, to the Tycho Brahe Medal, and to the Lodewijk Woltjer Lecture. In addition, the Foundation MERAC (Mobilising European Research in Astrophysics and Cosmology) – a non-profit foundation created in 2012 to recognize and support young European astronomers – awarded its three annual prizes.

Fritz Zwicky Prize for Astrophysics & Cosmology

The 2022 Fritz Zwicky Prize for Astrophysics & Cosmology was awarded to Ewine F. van Dishoeck (Leiden University, the Netherlands) for her groundbreaking, decades-spanning work in observational astrochemistry and molecular spectroscopy, revealing the secrets of molecules from interstellar clouds to star and planet formation, and for her leadership within the astronomical community.

Van Dishoeck has devoted her career to understanding how these molecules shape the Universe around us. With her unique and comprehensive approach encompassing quantum chemical calculations, laboratory studies and astronomical modelling and observations, she has pioneered and led the field of astrochemistry and revolutionized our understanding of the physical processes leading to the formation of stars and planets by studying the



Fig. 1 | The 2022 MERAC Prize winners. From left to right: Helmer Koppelman, Lucio Mayer (MERAC Foundation representative), Ewelina Obrzud and Núria Miret-Roig.

trail of molecules from star-forming clouds to protoplanetary disks.

A big mystery in the early days of astrochemistry was how large molecular clouds could exist in space when the ultraviolet parts of stellar light can easily destroy them. Van Dishoeck's famous and much-cited PhD thesis showed how abundant molecules like molecular hydrogen and carbon monoxide (CO) could protect the interior of a cloud through a process called self-shielding. This research led to several seminal papers on the chemical structure of diffuse interstellar clouds.

For her research, van Dishoeck has frequently exploited cutting-edge observational facilities, especially in the infrared and (sub-) millimetre wavelength ranges. She pioneered mid-infrared spectroscopy in star-forming interstellar clouds and discovered the presence of key organic molecular species locked in ices on grains. Her research revealed that icy grains are effective factories of pre-biotic organic molecules, ensuring that these species are present in significant amounts when terrestrial planets are formed.

In addition to her groundbreaking scientific work, van Dishoeck has been an active and vital member of the astronomical community. As president of the International Astronomical Union, she led the celebrations for its centenary in 2019; the more than 5,000 public and scientific activities reached millions of people worldwide. She also co-curated that year an exhibition on Cosmos: Art & Knowledge. She has been a strong advocate for a number of

large billion-euro ground- and space-based observational facilities that push the studies of the molecular Universe to unprecedented levels. These include ALMA and the Herschel and JWST satellites. Her science vision, leadership and political skills enabled her to play key roles in all phases of these projects. The trust that the community has in her judgement is also apparent from her memberships of the deciding bodies of ESA and review committees of top astronomical research institutes.

Tycho Brahe Medal

The 2022 Tycho Brahe Medal was awarded to Jean-Luc Starck (CEA Paris Saclay, France) for the development of novel and fundamental astrostatistics methods and open-source analysis tools. These have enabled optimal scientific exploitation of astronomical data obtained from space- and ground-based facilities, leading to major discoveries in extragalactic astrophysics and cosmology.

Modern telescope facilities produce large amounts of data and require advanced analysis techniques to achieve their scientific goals. Thus, astrophysicists have been increasingly relying on statisticians to develop sophisticated and mathematically robust methods to reduce and interpret their data, leading to this new interdisciplinary field. Starck is among a handful of scientists leading this dynamic field. His CEA group has been at the forefront of advancing astrostatistics, providing sophisticated methods and software tools to tackle 'big data' management and analysis. For example, his group has been the first to investigate the concept of compressed sensing in the astrophysical field, leading to the striking results that interferometry radio-image resolution can, in this way, see their spatial resolution improved by a factor of four.

In addition, Starck has put substantial effort into the advancement of astrostatistics through the training of the next generation of scientists. He has supervised more than 30 PhD students and postdocs and he organized 24 astrostatistics conferences and three summer schools. He has also published three books in the field of signal processing and astrophysical data analysis geared towards advanced undergraduate and graduate students as well as researchers entering the field.

Meeting report

He is heavily involved in the major Euclid space mission of ESA, to be launched in 2023.

Lodewijk Woltjer Lecture

The 2022 Lodewijk Woltjer Lecture was awarded to Bożena Czerny (Center for Theoretical Physics, Polish Academy of Sciences, Poland) for her contributions to our understanding of the physics of accretion disks and the broad line regions in active galactic nuclei, as well as for her application of quasars to constrain the cosmological model at high redshift and open a window on the role of dark energy.

Czerny has focussed on modelling the physical processes close to black holes in the centres of active galaxies and in stellar binary systems. She was among the pioneers in studying the X-ray variability of active galactic nuclei and of the vertical stratification of the accretion disks. She modelled the accretion disk instabilities, comparing their consequences to the observational data.

MERAC Prizes

The MERAC prizes were awarded this (even) year for the Best Doctoral Thesis (Fig. 1). The three prizes corresponded to the three following categories: Theoretical Astrophysics, Observational Astrophysics and New Technologies (Instrumental/Computational/Multi-Messenger). Each prize came with a bursary of 25,000 euros, which may be supplemented by additional MERAC research grants.

Best Doctoral Thesis in Theoretical Astrophysics. The 2022 MERAC Prize for the Best PhD Thesis in Theoretical Astrophysics was awarded to Helmer Koppelman for his multi-faceted approach to the field of galactic archaeology, which transformed our understanding of the history and dynamics of the Milky Way.

Koppelman studied astrophysics at the University of Groningen, where he obtained in 2020 his PhD on the formation and dynamics of the Galactic halo. The outstanding thesis offers insights into how the Milky Way formed based on the latest datasets available and presents innovative modelling efforts and also provides a new characterization on the properties of the dark matter halo of the Milky Way. Using Gaia DR2 data he discovered a blob of stars that make up the local Galactic halo, which has been interpreted in terms of a large merger event that took place about 10 Gyr ago.

He further pushed the boundaries by fully exploiting the whole Gaia DR2 dataset, using the 1.3 billion stars with proper motion information to construct the biggest sample of halo stars currently available. Using data-mining tools, Koppelman obtained the most precise lower limit to the mass of the Milky Way. He further investigated the use of orbital frequencies to understand the gaps in narrow stellar streams, to put limits on the presence and properties of dark matter clumps in the Galactic halo.

Best Doctoral Thesis in Observational Astrophysics. The 2022 MERAC Prize for the Best PhD Thesis in Observational Astrophysics was awarded to Nùria Miret-Roig (University of Vienna, Austria) for the [discovery](#) of many new free-floating planets, which illuminated the origin of these exotic nomadic celestial bodies.

Miret-Roig received an MSc in Astrophysics from the University of Barcelona and obtained her PhD in 2020 from the University of Bordeaux, France. This work presents the discovery of about a hundred new free-floating planets (FFPs) in the region encompassed by the Upper Scorpius stellar OB association and the Ophiuchus star-forming region. This sample is the largest ever discovered and constitutes an important step in setting the FFPs class and uncovering the origins and characteristics of these mysterious galactic nomads. It enabled her to demonstrate that the gravitational collapse of small clouds alone cannot explain the large fraction of observed FFPs: an important fraction of them formed like planets but were ejected due to dynamical interactions.

She led an international team to combine images in public astronomical archives with new deep wide-field observations obtained with the best infrared and optical telescopes in the world, to measure proper motions and photometry of tens of millions of sources in a significant area of the sky (171 square degrees). Using modern statistical and data mining techniques, Miret-Roig identified the few thousand stars and planets belonging to the young stellar association against the millions of background stars and galaxies. She presented innovative methodology to determine the ages of young stellar associations based on their kinematics, in particular stemming from Gaia data.

Best Doctoral Thesis in New Technologies (Instrumental). The 2022 MERAC Prize for the Best PhD Thesis in New Technologies (Instrumental) was awarded to Ewelina Obrzud for the development of novel laser frequency combs for accurate calibration and extreme radial velocity-precision of astronomical spectrographs.

Obrzud graduated from the Department of Astronomy of the University of Geneva, Switzerland and obtained in 2019 an interdisciplinary doctoral thesis (extrasolar planets and instrumentation) from the same university in collaboration with the Centre Suisse d'Electronique et de Microtechnique (CSEM), focussing on building and demonstrating alternatives for the existing laser frequency comb systems for astronomy. She developed two novel laser frequency combs for precise and accurate calibrations of radial velocities. This technique offers interesting solutions and concrete perspectives for the improvement of existing and future high-precision spectrographs for astronomy.

While guided by the astronomical application, Obrzud's work also attracted the attention of a wider interdisciplinary community including, in particular, those concerned with optical precision spectroscopy and nonlinear microphotonics.

Nominations for all 2023 EAS prizes

All astrophysicists are encouraged to nominate their best colleagues for any of the 2023 EAS prizes, namely, the Tycho Brahe Medal, the Jocelyn Bell Burnell Inspiration Medal, and the three MERAC Prizes. The submission deadline is 31 October 2022. Whenever possible, resubmissions of previous nominations are welcome. All necessary information is available on the EAS main webpage (<https://eas.unige.ch>) and any further questions should be directed to Nabila Aghanim (nabila.aghanim@universite-paris-saclay.fr), a new member of the EAS Council and the new chair of the EAS Prize Selection Committee.

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Competing interests

The author declares no competing interests.