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Jury report
Funding from the 'Pieter Langerhuizen Lambertuszoon Fonds' 2023 - Astronomy

K.B. (Katharine) Mulrey PhD
Detecting cosmic rays with LOFAR 2.0
Department of Astronomy (IMAPP), Radboud University

The jury for the Langerhuizen Bate 2023, in the field of Astronomy, decided to award and allocate funding to Dr Katharine Mulrey. Dr Mulrey is Assistant Professor at the Department of Astronomy (IMAPP) of Radboud University. The award will allow her to implement so-called 'Transient Buffer Boards' at LOFAR 2.0 for the detection of high-energy cosmic rays.

Katharine Mulrey leads the research into cosmic rays through their detection in low-frequency radio waves with the Dutch LOFAR telescope. Cosmic rays consist of very high energy elementary particles and atomic nuclei that are accelerated in astrophysical sources nearing the speed of light. Cosmic rays provide astronomers and physicists with a unique opportunity to study the physics and composition of particles at these energies, as well as to trace where and how in the universe these particles acquire their acceleration.

The collision of a cosmic ray particle with particles in the Earth's atmosphere leads to a cascade of secondary particles, many of which are charged, and which, due to their deflection in the Earth's magnetic field, radiate in the low-frequency radio wave regime.

Combining LOFAR with particle detectors results in a very sensitive instrument for the study of cosmic rays. The LOFAR telescope is currently being expanded to LOFAR 2.0. The 'Transient Buffer Boards' essential for controlling cosmic rays were not yet part of LOFAR 2.0, and are now made possible by the Langerhuizen Bate.

The jury has selected Katharine Mulrey's research proposal on the basis of its clarity, the scientific excellence of the radio wave detection technique for cosmic rays (developed in the Netherlands), the excellence of Dr Mulrey as the leader of this research within the LOFAR community, as well as the perfect match between the requested and the available resources.

The jury consisting of Prof Ewine van Dishoeck and Prof Paul Groot met via Zoom on March 20, 2023 under the leadership of KHMW societal member Drs. B.R. (Bart) Combee and was also attended by KHMW secretary of natural and medical sciences Prof A.P. (Ad) IJzerman.