

PRACE 2024 HPC Excellence Award goes to Professor Luciano Rezzolla



Prof. Luciano Rezzolla

PRACE is thrilled to announce that the 2024 edition of the PRACE HPC Excellence Award has been awarded to Professor Luciano Rezzolla, Chair of Theoretical Astrophysics at the Institute for Theoretical Physics, in Frankfurt am Main, Germany.

Prof. Rezzolla is awarded for his and his team's efforts to construct an entirely novel approach for the theoretical interpretation of the first images of a supermassive black hole taken by the international Event Horizon Telescope (EHT) Collaboration.

Producing for the first time a theoretical interpretation of images that have never been taken before is a scientific challenge that is an order of magnitude greater than 'merely' pushing a well-known technique beyond its previous limit. Prof. Luciano Rezzolla, supported by his group and his colleagues at ETH, rose to this challenge and met it with success through a 'never-attempted-before' approach consisting of three separate challenges.

The first was to develop a new infrastructure that would be able to provide - via general-relativistic magnetohydrodynamics (GRMHD) simulations - a realistic description of the plasma dynamics near an accreting black hole under a large variety of astrophysical and gravitational conditions. Following on that, the second challenge revolved around developing a new and distinct computational infrastructure that would import the results of the GRMHD simulations and produce a vast library of synthetic images as might be captured by an observer on Earth without knowing how this observer would be oriented, relative to the source. Finally, third and novel computational infrastructure needed to be developed: one that would compare the handful images obtained from the observations with the millions of theoretical images that are physically and mathematically consistent but not necessarily reflecting reality.

While all this sounds relatively straightforward when written down like above, for quite some time during the analysis, it was not clear whether the construction of this theoretical framework would eventually yield the results that Prof. Rezzolla and his team were aiming for.

High Performance Computing (HPC) been essential for this breakthrough: without top-tier European HPC resources analysis of the ETH images would not have been possible: the data captured by the ETH would have remained mere images, and the understanding that Prof. Rezzolla's work of five years has now brought, would have remained unattainable.

The [PRACE HPC Excellence Award 2024](#) will be presented to Prof. Rezzolla at the [PRACE Intersection Seminar](#), which will be held on 4 and 5 February 2025 in Brussels, Belgium. He will present his work in a keynote speech entitled 'How HPC made it possible to take a photo of a black hole' at that event.



“Producing an image of a supermassive black hole is an epic effort made it possible by the joint work of scientists across the planet. Interpreting the physical significance of such an image and determining the its implications on our understanding of black holes is, in great part, the result of advanced theoretical modelling and the availability of HPC facilities. I feel privileged in having been able to access these facilities and I am deeply honoured by this prize. I consider it a humble example of the numerous European efforts aimed at using supercomputers to deepen our understanding of the Universe,” said Prof. Rezzolla.

Edouard Audit, Chair of the Prize Committee and Vice-Chair of the PRACE Council Science Section, concluded: *“The first images of supermassive black holes made by the international Event Horizon Telescope (EHT) Collaboration are a very impressive scientific achievement. Luciano Rezzolla and his team were instrumental in making the numerical simulations and building the theoretical framework that allows to interpret these images.”*

About the PRACE HPC Excellence Award

Awarded for the first time in 2022, the PRACE HPC Excellence Award recognises an outstanding individual or team for ground-breaking research, through the usage of high-performance computing, that leads to significant advances in any research field. The award can be given to any individual or team that demonstrates that the work has been communicated and peer-reviewed within five years preceding the nomination deadline.

The Prize Committee, composed of six well-renowned international scientists, evaluate the nominations from the point of view of their outstanding contribution to addressing challenges in all fields of science and engineering – particularly those enabled by innovative methodological and algorithmic advances – and appreciating the role of, and need for, advanced high-performance computing in addressing the given challenges.

About PRACE

The Partnership for Advanced Computing in Europe (PRACE) is an international non-profit association with its seat in Brussels. Our mission is to represent the interests and identify the needs of users of HPC and related technologies – artificial intelligence, quantum computing, cloud computing, data science etc – in Europe, and to pursue actions to enable high-impact research and innovation across all disciplines and industrial applications, thereby enhancing European scientific, technological and economic competitiveness for the benefit of society. PRACE aisbl is funded by the PRACE Members. Various activities of PRACE are (partially) funded through our participation in several EU-funded projects.

For more information and to subscribe to our mailing lists, go to www.prace-ri.eu

Marjolein Oorsprong, Head of Communications: Telephone: +32 2 613 09 27 E-mail: [communication\[at\]prace-ri.eu](mailto:communication[at]prace-ri.eu)