

The Fermi Prize 2023 of the Italian Physical Society to Particle Accelerator Physics and Technology

Awarded to Massimo Ferrario, Lucio Rossi and Frank Zimmermann

The 2023 “Enrico Fermi” Prize of the Italian Physical Society (SIF) has been awarded ex-aequo to **Massimo Ferrario** (INFN, National Laboratory of Frascati), **Lucio Rossi** (University of Milan) and **Frank Zimmermann** (CERN, Geneva), *for their outstanding developments in various advanced particle acceleration technologies, ranging from plasma acceleration to the realisation of ultra-high energy particle colliders.*

The Prize was established by the Society in 2001, to mark the centenary of Fermi's birth, and is awarded annually to one or more members who have particularly honoured physics with their discoveries. A Commission of experts appointed by SIF and major Italian research institutions, namely CNR, INAF, INFN, INGV and INRIM, chooses the winners from a shortlist of candidates, and then forwards its judgement to the Society's Presidency Council for approval.

The Commission deserves credit for having identified the three illustrious winners of this year's Fermi Prize in the extraordinary and vast world of particle accelerators.

Massimo Ferrario is the author of formidable contributions in the field of high-brightness photoinjectors, FEL (Free Electron Laser) photon sources and particle acceleration by plasma. He currently leads the EuPRAXIA project at INFN's Frascati National Laboratory. This is the project, which is being developed as a European research infrastructure, of an accelerator based on plasma technology. The innovative idea, compared to conventional particle accelerators, is to use an ionised gas, or plasma, to maintain the high electric fields required to accelerate particles. The advantage of plasma accelerators is that their acceleration fields can be much stronger than those of conventional RF (radio frequency) accelerators. The use of this new particle accelerator technology will find great application in science, medicine and industry.

Lucio Rossi has played and continues to play a key role in research and development activities for large superconducting ultra-high-field magnets and was responsible for their production for the Large Hadron Collider (LHC) at CERN in Geneva, the world's largest accelerator that enabled the discovery of the Higgs boson in the ATLAS and CMS experiments in 2012. The LHC's superconducting system, operating at 8 tesla magnetic field and approximately -271°C temperature (lower than that of outer space), is still the largest applied superconductivity achievement in the world. Rossi also proposed, founded and initially directed the project to upgrade the LHC, called the High Luminosity HL-LHC, aimed at increasing its luminosity (i.e. collision frequency) by a factor of 10 through the introduction of frontier technologies.

Frank Zimmermann is one of the most prolific and creative authors in accelerator physics, author of seminal discoveries that have made it possible to realise the most modern high-luminosity, high-energy colliders. He has made fundamental and pioneering contributions to the understanding and modelling of various effects related to accelerated electron beams. He has also contributed to the design of particle (not just electron) colliders, especially by understanding the critical interactions of beams and their instabilities in circular accelerators. His results have been of utmost importance for all electron accelerators on the one hand, and on the other, they have been decisive for the operation and subsequent upgrade of particle colliders such as the LHC, and for the launch of the gigantic FCC (Future Circular Collider), a project of the highest priority for the future of CERN and ultra-high energy physics.

The award ceremony will take place at the opening session of the 109th National Congress of the Society, in Salerno, Italy, on 11 September 2023.

To the three winners, the warmest congratulations of SIF!

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For more information:

<https://www.sif.it>

https://en.sif.it/activities/fermi_award

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