

*A project of the Politecnico di Milano explores new techniques of particle acceleration*

Is it possible to bring together, in one single research team, plasma physics, relativity, nuclear physics and engineering, nanostructured material science and the technology to create superintense ultrashort laser pulses? The Ensure project, funded by the European Research Council (Erc-2014-CoG No. 647554) with 1.9 million euros at Politecnico di Milano, tries to give a positive answer, by exploring new techniques of particle acceleration. “High-energy particle beams are exploited in various scientific and technological fields, both for research and applications, for example in nuclear medicine or radiotherapy”, explains Matteo Passoni, associate professor in Theoretical Physics of Matter and head of the project. “But conventional techniques have certain limits: a completely

new approach is possible, thanks to the developments in high power, ultrashort laser technology”. Interacting with matter, these pulses produce the most intense electric fields ever made in a lab environment (thousands of billions of volts per meter) and to accelerate charged particles (protons and other ions) up to high energies, within very small space regions. The acceleration process can be controlled and enhanced by creating suitable nanostructured materials, with properties impossible to be obtained in conventional materials. “The project allows therefore to investigate, at the theoretical and experimental level, both fundamental physical processes, like the collective behavior of matter in the relativistic regime, and potential applications of interest for the society”.

