



TECHNOLOGICAL RESEARCH

HIGH-QUALITY ELECTRONS ACCELERATED WITH PLASMA AT SPARC_LAB

One of the factors that most limits the application of plasma accelerators is the energy spread that the beam accumulates during acceleration in the plasma module. Recently, an experiment conducted by researchers of the SPARC_LAB group at the INFN Frascati National Laboratories demonstrated, for the first time, that it's possible to solve this problem and thus accelerate a beam of high-quality electrons. The results, [recently published in Nature Physics](#), were obtained using an innovative technique that consists in imprinting the beam with an energetic correlation, with particles at the head having greater energy than those at the tail, before it enters the plasma. The energy spread induced by the plasma is, thus, pre-compensated, so that it is almost totally reduced upon exit from the module. This progress in the production of high-quality electron beams is fundamentally important because it makes the accelerated beam “usable” for applications such as, for example, Free-Electron Lasers (FEL). The work published describes, in addition, how the same method can be extended and applied to different energies and contexts, such as [EUPRAXIA](#): a future, multidisciplinary, experimental research facility. These results thus represent an important goal, including for the use of plasma acceleration for applications dedicated to users in other scientific fields. ■