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## **Ion acceleration by laser-matter interaction: status and perspective with the upcoming I-LUCE facility at INFN-LNS**

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In the framework of both EuAPS and SAMOTRACE projects funded by the PNRR Italian program, a new high-power laser facility called “I-LUCE”(INFN Laser induced radiation acCEleration) will be realized at LNS-INFN. Thanks to the use of the latest available technology, the system will be able to amplify light with a power of 500 TW, with a fs duration, and with a repetition rate of 1Hz. This will open the possibility to initiate and study new physics regimes for the production of high-intensity, high-energy radiation with exceptional spatio-temporal characteristics. With such a system INFN-LNS will bring together its scientific, engineering and medical missions for the benefit of industry and society alike. First of all, the system will open new possibilities in particle physics, nuclear physics, high energy beam science, nonlinear field theory, and ultrahigh-pressure physics. Besides its fundamental physics mission, a paramount objective of the new system will be to provide ultra-short energetic particles (10 to 100 GeV) and radiation (up to a few MeV) beams produced with compact laser plasma accelerators. In this work the status and perspectives of the I-LUCE facility will be presented.

**Primary authors:** Dr CIRRONE, Giuseppe (Istituto Nazionale di Fisica Nucleare); Dr PETRINGA, Giada (Istituto Nazionale di Fisica Nucleare ); Dr CATALANO, Roberto (Istituto Nazionale di Fisica Nucleare); CUTTONE, Giacomo (Istituto Nazionale di Fisica Nucleare); TUDISCO, Salvatore (Istituto Nazionale di Fisica Nucleare)

**Presenter:** Dr CIRRONE, Giuseppe (Istituto Nazionale di Fisica Nucleare)

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