Contribution ID: **59** Type: **Flash Plenary Talk**

Next generation muon facility: laser wakefield acceleration for muon production at ELI Beamlines

New-generation PW class lasers can be used to accelerate electrons up to tens of GeVs. The accelerated electrons can in turn produce muons when interacting with a high-Z target.
The European laboratory ELI Beamlines has already established itself as a leader in laser-driven electron acceleration. Multi-GeV electron beams have been already produced and provided to international academic users. Continuous work is being done to further increase electron energy. The first user experiment aiming at detecting muon produced from electrons accelerated with the already available 1 PW laser, is scheduled for spring 2025.
The laboratory is currently commissioning its 10 PW laser which could accelerate electrons up to several tens of GeV. Given the increased interest in the laser community and the potential multi-disciplinary applications, from high energy physics to muon imaging techniques, ELI Beamlines is considering to build in the near future a dedicated muon experimental station for 100 GeV scale muons.
This contribution will shortly present the status of the laser acceleration of high energy electron acceleration, the potential and the limitation of the technique, including the current status of the research on laser based muon production. Then, the focus will be on the preliminary work performed at ELI Beamlines laboratory on this subject and the plans being considered for future developments.

Muon dipole moments (magnetic and electric): theory, experiments and future perspectives

Charged lepton flavor violation: theory, experiment and future perspectives

New Physics opportunities with low and high energy muon beams

Neutrino physics with muon beams: theory, experiments and future perspectives

Muons beams technologies: production, cooling and acceleration at different energy

Advancements in Muon-based Facilities and Broader Applications

none

Muons in other fields: muography, muon spin spectroscopy, muon-catalyzed fusion

Primary author: VERSACI, Roberto (ELI-Beamlines)

Co-authors: Dr CIMMINO, Anna (ELI-Beamlines); RUS, Bedrich (ELI-Beamlines); REAGAN, Brendan (CSU); GRITTANI, Gabriele Maria (ELI-Beamlines); WILLIAMS, Jackson (LLNL); BULANOV, Sergei (ELI-Beamlines)

Presenter: VERSACI, Roberto (ELI-Beamlines)

Session Classification: Muon facilities