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Advanced accelerator concepts for dark sector searches and fast muon acceleration

Monday, 20 May 2024 16:00 (2 hours)

Dielectric laser acceleration (DLA) is a promising approach to accelerator single electrons at a high repetition rate to GeV energies, for indirect dark matter searches. Relevant concepts include the integration of the dielectric structure inside the laser oscillator, deflecting DLAs combined with a segmented detector, high-rate source of single electrons, DLA structure alignment, and diagnostics.

To efficiently use muons for high energy physics applications they need to be accelerated rapidly, before they decay. Plasma acceleration achieves GV/m accelerating fields and could be ideal for accelerating to muon-collider energies. Amongst the challenges are the injection and preservation of the muons inside a plasma "bubble". Single muons could also be accelerated in DLAs for dark matter searches. They could be injected from existing low-intensity muon sources, such as the one at PSI. A workshop organized in the frame of the EU project "Innovation Fostering in Accelerator Science and Technology" (I.FAST) focused on GHz Rate & Rapid Muon Acceleration for Particle Physics to address these topics. We report workshop highlights and future research directions.

Footnotes

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