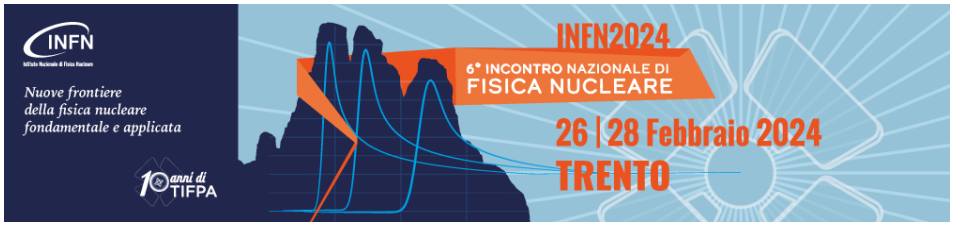

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Jefferson Labs secondary beams for nuclear physics

Tuesday, 27 February 2024 15:40 (5 minutes)

Intense secondary beams of muons, neutrinos, and (hypothetical) dark scalar particles result from the interaction of the CEBAF 10 GeV high-current electron beam O(100 uA) and the Hall-A beam dump. While most radiation (gamma, electron/positron) is contained in the thick absorber, deep-penetrating particles (muons, neutrinos, and light-dark matter particles) propagate over a long distance, generating high-intensity secondary beams that can be used for several studies. High-intensity muon beams have applications in many research fields spanning from fundamental particle physics to materials science or inspection and imaging (e.g. elastic muon-proton scattering offers an alternative method to measure the proton charge radius). Decay at rest neutrinos are suitable for studying coherent elastic neutrino-nucleus scattering (CEvNS). Experiments designed to observe CEvNS events provide a unique opportunity to precisely measure the weak mixing angle as well as other nuclear properties (e.g. the neutron skin of heavy nuclei). Similarly, light-dark matter searches could take advantage of the large electron charge dumped on the Beam-Dump competing with leading experiments planned at CERN or FNAL.

Primary author: GRAZZI, Stefano (Istituto Nazionale di Fisica Nucleare)

Presenter: GRAZZI, Stefano (Istituto Nazionale di Fisica Nucleare)

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