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Exporting LHCb GPU-based trigger to NA64 fixed-target experiment

NA64 is a fixed target experiment at CERN Super Proton Synchrotron accelerator using complementary high-energy beams: $e^{-/+}$, muon, and hadron beams. The experiment performed the first search for dark sectors using a high-energy muon beam and the novel missing-momentum technique, relying on a scintillator-based trigger. The signal signature consists of an outgoing muon that has lost a significant fraction of its initial momentum. In this talk, we will present ongoing studies towards online momentum reconstruction and the development of a Graphics Processing Unit (GPU)-based trigger, carried out in collaboration with ETHZ and inspired by the Allen framework developed for LHCb. This approach aims to enable efficient event selection at beam intensities up to a factor of 20 higher than those used in the first search.

Primary author(s) : MOLINA BUENO, Laura (IFIC (CSIC/UV))

Presenter(s) : MOLINA BUENO, Laura (IFIC (CSIC/UV))

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