

The PHENIX Muon Trigger Upgrade

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The PHENIX Forward Spectrometer Upgrade adds nosecone calorimeters and Level-1 trigger detectors to existing forward muon spectrometers and will enhance the ability of the experiment to pursue a rich program of spin physics in polarized proton collisions at $\sqrt{s} = 500$ GeV. The additional muon trigger detectors and Level-1 trigger electronics will allow the experiment to select high momentum muons from the decay of W bosons and reject both beam-associated and low-momentum collision background, enabling the study of quark and antiquark polarization in the proton. The Muon Trigger Upgrade will add momentum and timing information to the present muon Level-1 trigger, which only makes use of tracking in the PHENIX muon identifier (MuID) panels. Signals from three new Resistive Plate Chambers (RPCs) and re-instrumented planes in the existing muon tracking (MuTr) chambers will provide momentum and timing information for the new Level-1 trigger. An RPC timing resolution of ~ 2 ns will permit rejection of beam related backgrounds while tracking information from the RPCs and MuTr station will be used by the trigger to select events with high momentum muon candidates. The RPC and MuTr hit information will be sent by optical fibers to a set of Level-1 trigger processors that will make use of cutting edge FPGA technology to provide very high data densities in a compact form factor. The layout of the upgrade, details of the RPC design, Level-1 electronics and simulations of background from beam scraping and hadron decays will be presented.