

RPC based Muon Trigger Upgrade for the PHENIX Experiment at RHIC

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The PHENIX experiment is located at the Relativistic Heavy Ion Collider at Brookhaven National Laboratory on Long Island, New York. RHIC collides heavy ion beams at energies up to $\sqrt{s_{NN}} = 200$ GeV and proton beams at energies up to $\sqrt{s} = 500$ GeV.

One of the major physics goals at RHIC is the exploration of the origin of proton spin. RHIC provides the unique capability of accelerating polarized protons to high energies and makes it possible to study proton spin structure through polarized proton-proton collisions in the perturbative QCD region. In the future observation of inclusive lepton asymmetries from W-boson decays at $\sqrt{s} = 500$ GeV will make it possible to measure flavor separated quark and anti-quark helicity distributions for the proton.

The current first level trigger of the PHENIX muon spectrometers does not have the capability to filter out high momentum muons from W-decays from the dominant background of low momentum muons resulting from hadron decay. An upgrade of the PHENIX first level muon trigger is underway and has the following two components:

1. The addition of fast trigger front-end electronics to the existing muon tracking system.
2. The introduction of bakelite double gas gap RPCs upstream and downstream of the existing muon detection system.

In combination, these upgrades will make it possible to select high momentum muon tracks from decays of W-bosons in the level-1 trigger. The RPC based new trigger will provide rejection against backgrounds from both beam and collision related by more than a factor 10000.

In this talk, we present the status of the PHENIX muon trigger upgrade including the status of the new muon tracker front-end electronics. We further present results from RPC prototypes operated during RHIC run 2009 and finally we report the progress made recently on the RPC detector assembly and installation.

Primary author: Dr KIM, Young Jin (University of Illinois at Urbana Champaign)

Presenter: Dr KIM, Young Jin (University of Illinois at Urbana Champaign)

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