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Measuring polarization of proton beams with silicon detectors at RHIC (BNL)

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At the Relativistic Heavy Ion Collider (RHIC) the measurements of the proton beam polarization are carried out by polarimeters whose operation is based on the detection of recoil products from proton-proton (pp) and proton-Carbon (pC) elastic scattering. The pp polarimeter with a highly polarized hydrogen jet target provides an absolute scale for the polarization measurement; while the pC polarimeter is capable of providing a quick feedback on the beam intensity and polarization profiles. In the latter ultra thin carbon targets are quickly moved through the beam to measure profiles in horizontal and vertical directions.

In addition to providing the RHIC experiments with polarization numbers, the polarimeters also offer an essential knowledge of the analyzing power A_N in the kinematic region where the electromagnetic force is comparable in strength with the nuclear one (the Coulomb Nuclear Interference region).

For the 2011 run the readout system of the pC polarimeter has been upgraded to cope with the increased beam intensity. We discuss the energy calibration and losses in the dead layer of the silicon detectors. We also report on the performance and stability of the silicon detectors in the harsh environment.

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