Contribution ID: **17** Type: **not specified**

The Hydrogen Jet Target polarimeter performance in RHIC Run 22

Thursday, 29 September 2022 15:00 (25 minutes)

Since 2005, the Polarized Atomic Hydrogen Gas Jet Target polarimeter (HJET) is used to precisely measure absolute polarization of the proton beams at the Relativistic Heavy Ion Collider (RHIC). In Run 22, the polarized proton beams were resumed at RHIC after four years of heavy ion beam operation. Here we compare HJET performance in the 255 GeV proton Runs 17 and 22. Regardless some changes in the HJET electronics and larger beam related background, the measured average analyzing powers in Runs 17 and 22 appeared to be the same within $\sim 0.2\%$ (relative) statistical uncertainty. Therefore, using *calibrated*, i.e. including systematic corrections (determined in the offline analysis of the Run 17 data) analyzing power allowed us to online determine the beam polarization with low systematic uncertainties $\sigma_P^{\rm syst}/P \sim 0.5\%$.
To summarize, in RHIC Run 22 we confirmed that HJET provides stable and accurate determination of the proton beam absolute polarization at RHIC energies. Precision of the online measurements in Run 22 fully satisfied the requirements for absolute calibration of the proton beam polarization at RHIC.

Category

Polarimetry

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Session Classification: Polarimetry