

Precise measurements of the single and double spin-flip asymmetries in CNL region in elastic proton-proton scattering at $\sqrt{s}=13.7$ GeV and $\sqrt{s}=21.9$ GeV at RHIC HJET polarimeter.

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The Polarized Atomic Hydrogen Jet Target polarimeter (HJET) is employed by Relativistic Heavy Ion Collider (RHIC) to measure absolute polarization of the colliding proton beams. In RHIC Runs 2015 ($E_{\text{beam}}=100$ GeV) and 2017 ($E_{\text{beam}}=255$ GeV) we accumulated large statistics of about 10^9 events per beam per run for elastic polarized proton scattering on polarized target (HJET) protons for the momentum transfer range $0.0015 < -t < 0.018$ GeV². Such statistics allowed us to measure single spin, A_N , and double spin, A_{NN} , analyzing powers with unprecedented statistical accuracy and very low systematic uncertainty (of order of statistical errors). For the first time hadronic single spin-flip r_5 and double spin-flip r_2 amplitudes were reliably isolated at these energies. The preliminary results (statistical errors only) are $Rer_5 = (-16.4 \pm 1.1) \times 10^{-3}$, $Imr_5 = (3.1 \pm 4.0) \times 10^{-3}$, $Rer_2 = (-3.58 \pm 0.28) \times 10^{-3}$, $Imr_2 = (-0.09 \pm 0.12) \times 10^{-3}$ for $\sqrt{s}=13.7$ GeV and $Rer_5 = (-6.7 \pm 0.5) \times 10^{-3}$, $Imr_5 = (19.2 \pm 2.4) \times 10^{-3}$, $Rer_2 = (-2.37 \pm 0.22) \times 10^{-3}$, $Imr_2 = (0.38 \pm 0.08) \times 10^{-3}$ for $\sqrt{s}=21.9$ GeV. Measurements at 2 beam energies allowed us to separate Pomeron and Regge-pole contributions to the hadronic single- and double- spin-flip amplitudes. No indication of Odderon contribution was found. Extrapolation of the measured $A_N(t,s)$ to $\sqrt{s}=200$ GeV is in a good agreement with STAR measurements at this energy.

Primary author: Dr POBLAGUEV, Andrei (Brookhaven National Laboratory)

Presenter: Dr POBLAGUEV, Andrei (Brookhaven National Laboratory)

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