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Ph.D. Seminar

of

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Single Spin Asymmetries in Charmonium Production and Gluon Sivers Function

The particles and their interactions have been studied systematically under standard model of particle physics. It has two ingredients- the electroweak theory which explains electromagnetic and weak interactions and other is Quantum Chromodynamics (QCD) which describes the strong interaction. One of the unanswered questions in strong interaction physics is spin structure of proton which is parametrized in terms of a number of spin dependent parton distribution functions. These functions are explored in scattering experiments involving polarized beams. Gluon Sivers function (GSF) is one such function which can be interpreted as the probability of finding partons inside transversely polarised proton.

In this thesis, I have discussed the possibility of probing GSF using an observable quantity, transverse single spin asymmetry (TSSA) which arises in the production of J/ψ in collision of electron or proton beams on a polarized proton target. Heavy quarkonium bound states and its production mechanism have an interesting feature that it has both perturbative and non-perturbative QCD regimes. In this thesis, I present the work done in calculation of TSSAs in J/ψ production using color singlet model (CSM) and color evaporation model (CEM) of J/ψ production. In this path I will present the work done in computation of TSSAs in electroproduction and hadroproduction of J/ψ . The calculations suggest that J/ψ production can be used as a clean probe to estimate Gluon Sivers function. I compare estimates of TSSAs with PHENIX and fsPHENIX data. The predictions and comparisons of asymmetries could be an important test to understand the production mechanism of heavy quarkonium.

Date: Wednesday, 12th June 2019

Time : 11:30 hrs.

Venue: Seminar Hall, Department of Physics, 3rd Floor, Tilak Bhavan.

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