Longitudinal double-spin asymmetry for inclusive jet and dijet production in pp collisions at $\sqrt{s} = 510$ GeV

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In the simple quark model, the proton consists of three valence quarks (u, u, d). Deep inelastic scattering (DIS) experiments such as lepton-proton scatterings revealed that in addition to the valence quarks, the proton structure at high energies is dominated by quark and anti-quark pairs, also known as sea quarks, and gluons that mediate the strong force. The famous proton spin puzzle was raised by polarized DIS experiments in the 1980s, which showed quarks contributed a small fraction of the total proton spin. However, the limited kinematics covered by these experiments were not able to probe the gluon contribution to the proton precisely. Fortunately RHIC, the world's only polarized hadron-hadron collider, provides direct access to the gluon contribution. The longitudinal double-spin asymmetry, A_{LL}, for jets measured at STAR is an ideal channel to study the gluon contribution as a function of the fraction of the proton's momentum carried by the gluon, x_g. Early measurements at center of mass energy $\sqrt{s} = 200$ GeV provided the first evidence of a positive gluon contribution. Higher $\sqrt{s} = 510$ GeV allows the exploration of gluons at smaller x_g, where the recent global analyses are extrapolated. In this talk, we will present the first measurements of inclusive jet and dijet A_{LL} at $\sqrt{s} = 510$ GeV, which constrain the magnitude of the gluon contribution, and its shape as a function of x_g, respectively.