Longitudinal double spin asymmetry of Λ, $\overline{\Lambda}$, K^0_S and inclusive jets with high-z $\pi^{\pm}$ tagging in polarized proton-proton collisions at $\sqrt{s} = 200$ GeV at STAR

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Unraveling the proton spin composition, comprising intrinsic spins and angular momenta of quarks and gluons, stands as one of the most fundamental and challenging questions in QCD. Much progress has been made since the first surprising result by the EMC experiment in the late 1980s. However, the helicity distributions of strange quarks and anti-quarks inside the proton are still not well constrained by the experimental data. Measurement of the longitudinal double spin asymmetry, A_{LL}, of Λ, $\overline{\Lambda}$ and K^0_S in the longitudinally polarized proton-proton collisions can shed light on the strange quark and anti-quark helicity distributions. In addition, the A_{LL} of the inclusive jets tagged with a π^+/π^- carrying high jet momentum fraction, z, in proton-proton collisions can provide further constraints on the gluon helicity distribution in the proton.

In this talk, we will present the preliminary results of the A_{LL} for Λ, $\overline{\Lambda}$ and K^0_S, and the inclusive jets tagged with a high-z $\pi^{\pm}$ from the longitudinally polarized proton-proton collisions at $\sqrt{s} = 200$ GeV collected by the STAR experiment with an integrated luminosity of about 52 pb^{-1}.