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Probing Sea Quark and Gluon Polarization at STAR

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One of the primary goals of the spin program at the Relativistic Heavy Ion Collider (RHIC) is to determine the sea quark and gluon polarization distributions of the proton. The polarization of the sea quarks is probed through the production of $W^{-(+)}$ bosons via the annihilation of $\bar{u} + d$ ($\bar{d} + u$), at leading order. Measurements of the single-spin asymmetry, A_L , for W and Z/γ^* production at $\sqrt{s} = 500$ GeV will be presented, including the new constraints these results place on the antiquark helicity distributions. Recent results on the longitudinal double-spin asymmetry, A_{LL} , for inclusive and di-jet production at $\sqrt{s} = 200$ GeV will also be presented. The inclusive jet results provide the first experimental indication of non-zero gluon polarization in the x range probed at RHIC.

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