Inclusive Jet Cross Sections in pp Collisions at $\sqrt{s} = 200$ and 510 GeV

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The cross section for inclusive jet production in high-energy pp collisions is well described by pQCD in the collinear factorization framework, which, together with its high rate and clear signal, makes it a key observable to study the proton structure. For pp collisions at RHIC at a center-of-mass energy of $\sqrt{s} = 200$ GeV, the STAR detector provides jet measurements at $0.07 \lesssim x_T \equiv \frac{2p_{\mathrm{T;jet}}}{\sqrt{s}} \lesssim 0.5$. An additional measurement at $\sqrt{s} = 510$ GeV covers $0.02 \lesssim x_T \lesssim 0.3$. At these kinematics, the direct scattering on gluons inside the colliding protons contributes at least half of the total jet production cross section. Measurements of the inclusive jet cross section at RHIC, together with the past Deep Inelastic Scattering measurements, can provide improved constraints on the gluon Parton Distribution Function at high x.

Compared to the previous measurement from 2006, improvements in the new measurements include: employing the anti-k_T jet algorithm, a full barrel and endcap electromagnetic calorimeter acceptance, unfolding of the detector response, and correcting jet properties for underlying event contributions. This talk will discuss recent analysis updates pertaining the measurement, as well as challenges in its interpretation.