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Studying gluon saturation effects in forward photon+jet production in proton-proton and proton-lead collisions

In this study, we employ the small- x Improved Transverse Momentum Dependent (ITMD) factorization framework to investigate the gluon saturation in the production of photon+jet in pp and pPb collisions. The ITMD factorization framework is based on the Color Glass Condensate theory and is suitable for particle production at relatively large transverse momenta, still being sensitive to saturation effects. We analyze the transverse momentum distributions, azimuthal correlations, and other key observables at varying center-of-mass energies. The ITMD factorization framework implemented in the Monte Carlo tool KaTie serves as a powerful tool and the findings from this study contribute to our understanding of gluon saturation, shedding light on the fundamental aspects of Quantum Chromodynamics (QCD) at high energies.

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