

Gluon Saturation Effects On Single Spin Asymmetries

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Single spin asymmetries (SSA) in hadronic reactions, such as $p^\uparrow p \rightarrow \pi X$ or $pp \rightarrow \Lambda^\uparrow X$, are spin-orbit coupling effects which can be described in terms of transverse momentum dependent parton distribution functions (TMDs) if the energy scales involved are large enough to allow for a factorized partonic description. The phenomenology of such TMDs, which was developed over the last decade, has already been quite successful. A full understanding of such SSA in terms of TMDs can turn them into tools for probing changes in underlying physics. For example, SSA in proton-nucleus collisions at large energies and high baryon number can be sensitive to gluon saturation effects and in nucleus-nucleus collisions to the formation of a quark-gluon plasma.

In this talk the effects of gluon saturation on SSA will be discussed. Classical and quantum saturation effects on the process $pA \rightarrow \Lambda^\uparrow X$ will be discussed. This is based on results by D. Boer & A. Dumitru, published in Phys. Lett. 556 (2003) 33, and on new results. Possible saturation effects in forward pion production in $p^\uparrow p$ will also be discussed. The latter work is done in collaboration with A. Dumitru and A. Hayashigaki (in preparation). The relevance for ongoing and future collider experiments will be discussed.