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Lessons Learned on Saturation Physics at LHC and RHIC

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If a proton or a nucleus is accelerated to ultra-relativistic energy, due to the time dilation, the gluons that arise from quantum fluctuations are expected to last sufficiently long to be probed experimentally. At low Bjorken x, the gluon density becomes large and is expected to result in saturated gluon fields. These effects occur below a saturation scale, which is larger in nuclei by a factor of $A^{1/3}$ than in the proton, thus collisions involving nuclei are expected to reach the saturation regime at lower center-of-mass energy. Understanding the gluon dynamics in the initial state of nucleus-nucleus collisions is crucial for understanding of thermalization, the emergence of collective phenomena and near-perfect fluidity of the subsequent quark-gluon plasma, and the production and propagation of hard probes that are used to infer the QGP properties. Proton-nucleus and deuteron-nucleus collisions provide an opportunity for the study of the initial state of the nucleus at ultra-relativistic energies and search for signatures of saturation in the partonic densities. In this talk, recent results from RHIC and LHC will be presented and discussed in this context.