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Entanglement entropy in high energy collisions of electrons and protons

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We investigate the proposal by Kharzeev and Levin of a maximally entangled proton wave function in Deep Inelastic Scattering of electrons and proton in the region of low Bjorken x . Using their proposed relation between parton number and entanglement entropy, we determine the latter using both conventional parton distribution functions and parton distribution functions obtained from an unintegrated gluon distribution subject to next-to-leading order Balitsky-Fadin-Kuraev-Lipatov (BFKL) evolution as well as from a dipole cross-section, subject to running coupling Balitsky-Kovchegov (rcBK) evolution. We compare our results to hadronic entropy obtained from final state hadron multiplicity.

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