High parton density QCD effects expected at EIC

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January 4, 2002

In DIS at high energies and/or on large nuclei we expect to see manifestations of nonlinear evolution which arise since the density of partons becomes high. The typical momentum scale (saturation scale) in this kinematical region is hard and perturbative approach is justified. At the boundary of nonlinear region one can use semiclassical approach to calculate various observables. In particular, we calculate

1. the ratio $\frac{F_L}{F_T}(x, Q^2, A)$ of the longitudinal to transverse structure functions for inclusive DIS and for diffraction in DIS.

2. contribution of higher twists to the inclusive and diffractive structure functions,

3. energy, momentum and atomic number dependence of the diffractive to inclusive cross section ratio,

4. calculations mentioned above yield estimates of the saturation scale.

We also discuss energy dependence of the inclusive gluon production in various high energy regions in large N_c approximation. All those observables exhibit clear signatures of high parton density physics.