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Accessing gluon saturation at electron-ion colliders seen via dissociative production of vector mesons

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We present a model with which we predict the cross sections for exclusive and dissociative photo and electro-production of light and heavy vector mesons off protons; the model describes correctly available experimental data. The model is based on the color-dipole approach and incorporates geometric fluctuations of the target-proton partonic structure in the impact-parameter plane. The number of fluctuations grows with decreasing Bjorken- x and they are generated as event-by-event randomly placed areas of high gluonic density, so-called hot spots. A striking feature of the model is the prediction of a maximum of the dissociative cross section as a function of the center-of-mass energy $W_{\gamma p}$, followed by a steep decrease as the hot spots start to overlap with increasing energy. We use these maxima to define a geometric saturation scale which grows linearly with energy as a function of the scale of the process. This phenomenon can be measured at the proposed electron-ion colliders such as eRHIC or LHeC. We present a comparison of their envisioned kinematic reach with the geometric saturation scale.

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