

SCET Workshop 2022



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An EFT derivation of the saturation scale (remote)

Wednesday 20 April 2022 12:00 (20 minutes)

I will talk about an EFT formulation for understanding the physics of saturation in Deep Inelastic scattering using the Glauber EFT for forward scattering. I'll show how to derive a factorization formula that manifestly decouples the physics of the probe, the Quark-antiQuark Dipole, from the universal physics of the medium, namely a hadron or a large nucleus, by treating the probe as an Open quantum system.

Using this framework, I will, for the first time give the definition of the Saturation scale for small x DIS in terms of a matrix element of a gauge invariant operator in the proton state. The saturation scale can be directly related to an emergent length scale in the EFT- the mean free path for the probe, which yields two emergent expansion parameters. These parameters becoming $O(1)$ can be respectively interpreted as the onset of saturation and the breakdown of independent scattering in the medium. I'll also briefly speculate about how the nonlinear regime of the JIMWLK/BK equations can be recovered in this EFT framework.

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