Contribution ID: **110** Type: **Oral**

One-Point energy correlator inside jets

In this work, we introduce a new jet observable, the one-point energy correlators (EC), designed to characterize the in-jet energy flow distribution by measuring energy deposition at a specific angle relative to the jet axis. Building upon the transverse momentum dependent physics, we aim for the EC to provide novel insights into jet substructure and offer a new approach to study TMD physics, particularly gluon transverse momentum dependent fragmentation functions (TMDFFs) which are notoriously difficult to extract. We obtain the factorization of the EC jet function within Soft-Collinear Effective Theory and leverage the framework of semi-inclusive TMD fragmenting jet functions. We resum large global logarithms and non-global logarithms (NGLs) and show that the normalized EC jet function exhibits significantly reduced dependence on the factorization scale and is primarily sensitive to the jet scale. Finally, after incorporating non-perturbative effects, we present numerical calculations up to NNLL accuracy for global logarithms and LL accuracy for NGLs, and we compare these predictions with PYTHIA 8 simulations.

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Session Classification: Parallel

Track Classification: Three-dimensional structure of the nucleon: transverse momentum dependent parton distributions