Abstract ID : **54**

Machine learning-assisted measurement of multi-differential lepton-jet correlations in deep-inelastic scattering with the H1 detector

Content

The lepton-jet momentum imbalance in deep inelastic scattering events offers a useful set of observables for unifying collinear and transverse-momentum-dependent frameworks for describing high energy Quantum Chromodynamics interactions. A recent first measurement was made [1] of this imbalance in the laboratory frame using positron-proton collision data recordedf with the H1 experiment at HERA in the years 2006-2007. Using a new machine learning method, the measurement was performed simultaneously and unbinned in eight dimensions. The first results were presented as as set of four one-dimensional projections onto key observables. This work extends over those results by making use of the multi-differential nature of the unfolded result. In particular, distributions of lepton-jet correlation observables are studied as a function of the kinematic properties of the scattering process, i.e. as a function of the momentum transfer $Q^2 > 150$ GeV^2 and the inelasticity $0.2 < y < 0.7$.

H1prelim-22-031
[1] arxiv:2108.12376, submitted to PRL

Submitted on behalf of a Collaboration?

Yes

Primary authors: H1, Collaboration (DESY); SCHMITT, Stefan (Deutsches Elektronen-Synchrotron (DE))

Presenter: H1, Collaboration (DESY)

Track Classification: WG4: QCD with Heavy Flavours and Hadronic Final States; WG5: Spin and 3D Structure

Contribution Type: Parallel talk

Comments:

This talk is on behalf of the H1 collaboration.

Submitted by **SCHMITT, Stefan** on **Tuesday, 1 February 2022**

Abstract ID : **373**

Jet azimuthal anisotropy in ep collisions

Content

We study back-to-back lepton-jet production in lepton-proton collisions. This process defines two azimuthal angles, the transverse momentum imbalance q_T of the lepton and the jet, and the azimuthal angle of the jet transverse momentum itself. In this work, we study the azimuthal anisotropy for the azimuthal angle difference φ between these two angles. In particular, we provide the theoretical origins for these azimuthal dependence from a factorization formalism derived within the SCET framework. In addition, we find that the directed flow component related to $\cos(\phi)$ azimuthal asymmetry is dominant. We present the numerical results of such azimuthal anisotropy for both EIC and HERA kinematics with Pythia simulations, showing that these are promising observables for studying lepton-jet correlations in future experiments.

Submitted on behalf of a Collaboration?

No

Primary authors: ESHA, Roli (Center for Frontiers in Nuclear Science, Stony Brook University); KANG, Zhongbo (UCLA); LEE, Kyle; SHAO, Dingyu (Fudan University (CN)); ZHAO, Fanyi (UCLA)

Presenter: ZHAO, Fanyi (UCLA)

Track Classification: WG5: Spin and 3D Structure

Contribution Type: Parallel talk

Submitted by **ZHAO, Fanyi** on **Sunday, 20 February 2022**