

# Multi-differential Jet Substructure Measurement in High $Q^2$ ep collisions with HERA-II Data

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The radiation pattern within high energy quark and gluon jets (jet substructure) is used as a precision probe of QCD and for optimizing event generators. As compared to hadron colliders, the precision achievable by collisions involving electrons is superior, as most of the complications from hadron colliders are absent. Therefore jets are analyzed in deep inelastic scattering events, recorded by the H1 detector at HERA. This measurement is unbinned and multi-dimensional, making use of machine learning to unfold for detector effects. The fiducial volume is given by momentum transfer  $Q^2 > 150 \text{ GeV}^2$ , inelasticity  $0.2 < y < 0.7$ , jet transverse momentum  $p_{T,jet} > 10 \text{ GeV}$ , and jet pseudorapidity  $-1 < \eta_{jet} < 2.5$ . The jet substructure is analyzed in the form of generalized angularities, and is presented in bins of  $Q^2$  and  $y$ . All of the available object information in the events is used by means of graph neural networks. The data are compared with a broad variety of predictions.

## Alternate track

### I read the instructions above

Yes

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