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Analysis of pion production data in electron-hadron scattering at JLAB using the TMD Parton Model Formalism TAMUNO-NEGIYEOFORI WARMATE, LEONARD GAMBERG, ALEXEI PROKUDIN, Penn State University Berks — I have performed a phenomenological analysis of pion production data from Jefferson Laboratory in semi-inclusive deep inelastic scattering of electrons on unpolarized nucleons and deuterium using the transverse momentum dependent (TMD) parton model formalism. We parameterize the data in terms of TMD parton distribution functions that describe the three-dimensional (3-D) partonic structure of the nucleon. One of the main enigmas of data analysis is how to reliably estimate the errors of the parameters that describe some particular physical process. A common method is to use Hessian matrix or vary the delta chi-square of the corresponding fits to the data. In this particular project we use the so-called bootstrap method that is very robust for error estimation. This method has not been extensively used in the description of the TMD distributions that describe the 3-D nucleon structure. The reliable estimate of the errors and thus reliable predictions for future experiments is of great scientific interest. We are using Python and modern methods of data analysis in this project. The results of the project will be useful for understanding the effects of internal motion of quarks and gluons inside of the proton and will be reported in a forthcoming publication.

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