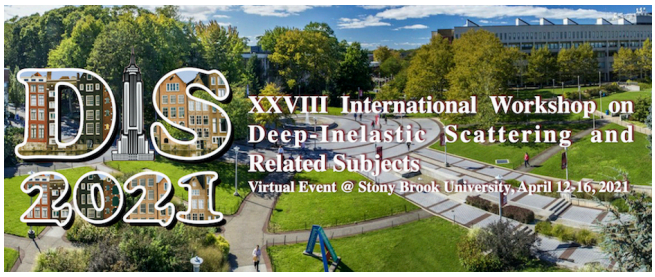

Contribution ID: **570** Type: **Contributed Talk**

Systematic Extraction of Pion Parton Distributions Using Threshold Resummation and Applications to Pion TMDs

Thursday, 15 April 2021 13:15 (20 minutes)

Following our recent Monte Carlo determination of the pion's PDFs from Drell-Yan (DY) and leading neutron electroproduction data from the Jefferson Lab Angular Momentum (JAM) collaboration, we extend the analysis by including effects from threshold resummation. At higher orders in the strong coupling, α_S, soft gluon emissions cause large logarithmic corrections, which become important in the $q\bar{q}$ channel of the DY partonic cross section near threshold. These corrections can be summed over all orders of α_S. However, different prescriptions exist for how the threshold resummation is implemented, for instance, using varying levels of approximation in the Minimal Prescription with cosine, expansion, and double Mellin methods. We present the Monte Carlo results of the first simultaneous fit of the valence, sea, and gluon distributions in the pion taking into account the ambiguities in the resummation calculations. The wide ranges of valence distributions at large x and the effective behavior of the valence distribution as x approaches 1 is discussed. While the PDFs are extracted through collinear factorization, we additionally present a dedicated study to the low and large lepton pair transverse momentum distributions (TMDs) in the same DY experimental data. By adjusting the nonperturbative TMD components, we analyze the degree of compatibility between data and theory across all regions of transverse momentum dependence. We attempt to match the description of the low transverse momentum region using Collins-Soper-Sterman (CSS) formalism and the large transverse momentum region, which is best described using collinear factorization.

Primary authors: BARRY, Patrick (Jefferson Lab); SATO, Nobuo (Jefferson Lab); MELNITCHOUK, Wally (Jefferson Lab); Prof. JI, Chueng (North Carolina State University); HILLER BLIN, Astrid (Thomas Jefferson National Accelerator Facility); GAMBERG, Leonard (Penn State)

Presenter: BARRY, Patrick (Jefferson Lab)

Session Classification: Structure function and parton densities

Track Classification: Structure Functions and Parton Densities