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### Exploring TMDs with kaon and pion SIDIS with CLAS12

A multidimensional study of the structure function ratio  $F_{LU}^{\sin(\phi)}/F_{UU}$  has been performed for pion and charged kaon semi-inclusive deeply inelastic scattering (SIDIS), based on the measurement of beam-spin asymmetries. It uses the high statistics data recorded with the CLAS12 spectrometer at Jefferson Laboratory. The 10.6 GeV longitudinally polarized electron beam interacted with an unpolarised liquid hydrogen target during the experiment.  $F_{LU}^{\sin(\phi)}$  is a twist-3 quantity that provides information about the quark-gluon-correlations in the proton.

The talk will present a study of the three pion flavours and a simultaneous analysis of two kaon channels ( $K^+$  and  $K^-$ ) using machine learning improved particle identification, over a large kinematic range with virtualities  $Q^2$  ranging from 1 GeV<sup>2</sup> to 8 GeV<sup>2</sup>. The precise multidimensional measurement was performed in a large range of  $z$ ,  $x_B$ ,  $p_T$  and  $Q^2$  for the first time in the valence quark region. Based on the precise multidimensional data, a comparison with different TMD based reaction models will be presented for the different kinematic regions. As an outlook the extraction of SIDIS cross-sections as well as  $\cos \phi$  and  $\cos 2\phi$  moments will be presented.

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