

*“Pion Valence Distribution using Hadronic “Lattice Cross Sections””***Raza Sufian (JLab)**

A detailed knowledge of parton distribution functions (PDFs) is vital to make predictions for both Standard Model and beyond the Standard Model processes at hadronic colliders. PDFs are nonperturbative matrix elements of quark-gluon fields at lightlike separations and cannot be directly calculated using Lattice QCD. On the other hand, extraction of PDFs such as from deep inelastic scattering experiments relies on the hard-scattering factorization based on the perturbative QCD framework. A recent proposal by Ma & Qiu [PRL 120, 022003 (2018); PRD 98, 074021 (2018)] based on collinear factorization, paves a way to extract PDFs from matrix elements of spatially-separated current-current correlations computable in LQCD. These matrix elements, called “good lattice cross sections”, have a well-defined continuum limit and share the same logarithmic collinear divergences as PDFs. I will present a calculation of the pion valence distribution on a lattice ensemble with a pion mass  $m_\pi \approx 413$  MeV and lattice spacing  $a = 0.127$  fm. One goal of this work is to have an understanding whether at large  $x$  the pion PDF falls off as  $(1 - x)$  or  $(1 - x)^2$  - an unresolved theoretical problem and a central goal of the upcoming JLab experiment C12-15-006.

