Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

Non-Perturbative Model of Valence Quark Distributions in the Nucleon[1] CHRISTOPHER LEON, MISAK SARGSIAN, Florida International University — We develop a non-perturbative model for valence parton distribution functions (PDFs) in the nucleon to explain quark interactions in the mean field of the nucleonic interior. The main motivation for the model is to obtain a mean field description of the valence quarks as a baseline upon which to study the short-range quark-quark interactions that generate the high x tail of valence PDFs. Our non-perturbative model is based on assumption of a factorization of the short-range valence quark and long-range dynamics in the residual system. The nucleon structure functions are calculated using light-front dynamics and the effective Feynman diagrammatic approach is used to introduce valence quark and residual wave functions. The parameters of these wave functions are fixed by the position of the peak of $xf(x)$ fixed at an initial Q^2 equal to the mass of the charm quark. With a few parameters we achieved a very reasonable description of the up and down valence quark distributions in the moderate x region ($x < 0.5$), where one expects the mean field dynamics to dominate. The model, however, systematically underestimates the high x region where we expect enhanced contribution from partonic correlations. A review of PDFs is also presented, with attention given to the evolution of the

[1]U.S. DOE Research Grant DE-FG02-01ER41172.

Christopher Leon
Florida International University

Date submitted: 26 Jun 2020 Electronic form version 1.4