MEETING OF THE AMERICAN PHYSICAL SOCIETY DIVISION OF PARTICLES AND FIELDS

Contribution ID: **323** Type: **Presentation**

Refinement of the Pion PDF implementing Drell-Yan Experimental Data

Monday, 31 July 2017 11:35 (20 minutes)

The proton is more complex than a collection of three valence quarks. We realize that an abundance of "sea" quarks and gluons is crucial to understanding the mass and internal structure of the proton. The pion is intimately related with the proton as analyses indicate an effective pion cloud exists around the core valence structure. In the Drell-Yan (DY) process, two hadrons (such as protons or pions) collide, one donating a quark and the other donating an antiquark. The quark-antiquark pair annihilate, forming a virtual photon, which creates a lepton-antilepton pair. By measuring the cross-section of the dilepton pair, we obtain rich information about the parton distribution function (PDF) of the hadrons. The PDF is the probability of finding a parton (quark, antiquark, or gluon) at a momentum fraction of the hadron, x, between 0 and 1. Experiments performed at Fermilab such as E866 and SeaQuest collect data in the DY process. Determining the pion PDFs from the DY process stems from understanding the abundance of sea quarks. Complementary to the DY process is deep inelastic scattering (DIS). Here, a target nucleon is probed by a lepton, and we investigate the pion cloud of the nucleon. The experiments H1 and ZEUS done at HERA at DESY collect DIS data. Both DY and DIS processes can measure small and large x depending on kinematics. Numerically, we have implemented the DY cross-section and have obtained the result consistent with (Becher, et al. 2008). Now, we perform a double-Mellin transform on the hard-scattering kernel to easily evolve the PDFs over energy scales as in (Stratmann and Vogelsang, 2001). We present some preliminary fits of pion PDFs to DY datasets from Fermilab-E615 and CERN-NA10. We aim to perform a full NLO QCD global analysis and a state-of-the-art fitting technique to all available data for DY and DIS as in (McKenney, et al. 2016) to determine pion PDFs more accurately in all x regions.

Primary author: Mr BARRY, Patrick (North Carolina State University)

Co-authors: Prof. JI, Chueng-Ryong (North Carolina State University); Dr SATO, Nobuo (University of Connecticut); Dr MELNITCHOUK, Wally (Jefferson Lab)

Presenter: Mr BARRY, Patrick (North Carolina State University)

Session Classification: QCD

Track Classification: QCD