

Opportunities with Drell-Yan scattering: Probing sea quarks in the nucleon and nuclei.

Paul E. Reimer

The Drell-Yan mechanism offers a unique, selective probe of antiquarks in the nucleon. Fermilab has approved a new Drell-Yan experiment, E906, that will exploit this feature of Drell-Yan scattering. The large $\bar{d}(x)/\bar{u}(x)$ ratio observed by Fermilab E866/NuSea convincingly demonstrated that the sea is not simply a result of pQCD, but neither could meson cloud models fully explain the observed kinematic dependence. The data from E906 will probe this distribution more completely, especially into the large- x region which was inaccessible to earlier experiments. When the nucleon is contained in a nucleus, the nucleon's parton distributions appear to be modified; although this effect was not seen in the sea quark distributions by Fermilab E772 using Drell-Yan scattering. The upcoming E906 Drell-Yan experiment will be able to provide much more precise measurement over a wider kinematic range to guide and challenge the theoretical expectations. In addition to probing the properties of the target nucleon, Drell-Yan can be used to study properties of the partons in the incident beam, including high- x parton distributions and partonic energy loss. This talk will discuss the results of the previous Drell-Yan experiments, and then compare these results with what we will learn from Fermilab E906.

This work was supported by the U.S. Department of Energy, Office of Nuclear Physics, under Contract No. W-31-109-ENG-38.