**Physics Seminar**

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*“*The SeaQuest Experiment at Fermilab”

Abstract

The nucleon is one the the fundamental building blocks of the visible universe. But many of its properties and how those properties can be deduced from its inner structure are not well understood. Deep-inelastic scattering (DIS) experiments have revealed that the inner structure of the nucleon consists of relativistic quarks that exchange gluons, and have established quantum chromodynanics (QCD) as the theory of the strong interaction between quarks and gluons. Due to the confinement feature of the strong interaction and the relativistic nature of the system, we cannot yet explain many properties of the nucleon from first principles. Our knowledge of the inner structure of the nucleon is to a large extent based on the measurement of electroweak processes such as DIS or the Drell-Yan process, which can be interpreted within QCD. The SeaQuest experiment at Fermilab continues a series of Drell-Yan measurements to explore the antiquark content of the nucleon and to study the modifications to nucleon structure when the nucleon is embedded into a nuclei. To extend existing measurements to larger values of Bjorken-x - the momentum fraction of a quark within a fast moving nucleon - a 120 GeV proton beam extracted from Fermilab’s main injector is used, resulting in 50 times more luminosity than previous experiments and enabling access to values of x up to 0.9. An overview will be presented of the key physics goals of the SeaQuest collaboration: These include investigation of the dramatic dbar(x)/ubar(x) flavor asymmetry in the nucleon sea and its behavior at high x; study of the EMC effect in Drell-Yan scattering and the unexpected absence of any antiquark excess in existing data; and measurements of the angular dependence of the Drell-Yan process, sensitive to spin-orbit correlations within the nucleon. Updates to the SeaQuest experiment with polarized beam (E-1027) and target (E-1039) will allow us to study the quarks' spin-orbit correlations within the nucleon and to provide complementary information to existing data from DIS. The talk will conclude with a status report on the ongoing data taking and analysis of this new experiment.

**Thursday, January 22, 2015**

**CEBAF F113 @ 11:00 am**