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Measurement of the anti-quark flavor asymmetry in the proton at FNAL-SeaQuest

Wednesday, 20 October 2021 11:15 (30 minutes)

The flavor asymmetry of the unpolarized distributions of light anti-quarks (i.e. $\bar{u}(x)$ and $\bar{d}(x)$) in the proton was observed by several deep-inelastic muon scattering experiments. The ratio $\bar{d}(x)/\bar{u}(x)$ was measured by Drell-Yan experiments NA51 at CERN and E866 at Fermilab and a large asymmetry was reported.

The mechanism of this asymmetry has been studied via various theoretical models. The asymmetry of unpolarized distributions can be correlated with that of helicity distributions, e.g. the statistical model predicts the similar magnitude with the opposite sign; $\bar{d}(x) - \bar{u}(x) \approx -(\Delta\bar{d}(x) - \Delta\bar{u}(x))$. Therefore a comparison between the unpolarized and helicity distributions of the sea quarks is appropriate.

SeaQuest at Fermilab is a fixed-target experiment designed to detect the Drell-Yan process in $p + p$ and $p + d$ reactions. The goal is to measure precisely the ratio $\bar{d}(x)/\bar{u}(x)$ in a wide Bjorken x region up to 0.45. Results from SeaQuest on the anti-quark flavor asymmetry will be presented.

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