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A New Study of Parton Energy Loss Mechanisms in $p+A$ Collisions at Fermilab E906 Experiment

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Jet quenching in heavy ion collisions is considered to be one of the important tools to study the QGP properties at RHIC and LHC. However, at present there are several competing models to describe the jet energy loss processes in heavy ion collisions, and current heavy ion data cannot clearly discriminate between them, thus the interpretation of QGP data is very model dependent. High energy $p+A$ collisions may provide control of various cold nuclear matter effects, and with the proper kinematics, provide a clear determination and calibration of various parton energy loss models, thereby helping to improve the calculations for $A+A$. Past efforts to extract the effects of parton energy loss in $p+A$ resulted in a large uncertainty due to ambiguities from competing effects, such as parton shadowing.

E906/SeaQuest is a new fixed-target dimuon experiment using 120 GeV proton beams from the Fermilab main injector. E906 measures J/Ψ and Drell-Yan production in the dimuon channel in $p+p$ and $p+A$ collisions over a wide range of x_F , and employs fixed targets of D, C, Fe, and W. The kinematic coverage is ideal for parton energy loss studies for 20~60 GeV "incoming" quarks, and shadowing effects are expected to be minimal. E906 had its first engineering run in early 2012 and successfully observed the J/Ψ mass peak in the dimuon channel. E906 is currently taking high statistics data since the beginning of this year. We expect the new data will help clarify the nature of parton energy loss in the nuclear medium. In this talk, we will briefly review the latest progress in parton energy loss study in $p(d)+A$ collisions and present the current status and the prospects from the E906/SeaQuest experiment at Fermilab.

On behalf of collaboration:

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