Hadronization Dynamics in the Nuclear Medium: Preliminary Insights from the CLAS12 RGE Experiment at Jefferson Lab

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The study of hadronization—the process by which quarks and gluons transition into hadrons—is fundamental to understanding the strong interaction dynamics within quantum chromodynamics (QCD). Using the CLAS12 detector at Jefferson Lab, the Run Group E (RGE) experiment offers unprecedented insights into hadronization in the nuclear medium. This talk will present preliminary results from the experiment, focusing on the behavior of hadrons produced in 12 GeV electron-nucleus scattering.The experiment employs various nuclear targets, enabling a comparative study of medium effects on hadron formation and propagation. By analyzing observables such as hadron multiplicity ratios, transverse momentum broadening, and energy loss, we explore the interaction of quarks and hadrons with the nuclear environment. These measurements provide critical data for understanding color confinement and hadronization timescales, shedding light on QCD processes in dense media. The talk will also highlight the innovative Double-Target system developed for RGE, which facilitates rapid target switching to enhance data collection efficiency.
This work is supported in part by the Chilean FONDECYT award #1240904.