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Studying Two Nucleon Interactions through ρ^0 photoproduction at Jefferson Lab

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Short Range Correlations (SRCs) are a phenomenon found in all nuclei where two nucleons form a strongly interacting, close-proximity pair in the nucleus, leading to a large relative momentum between the nucleons. Electron-scattering experiments, many of them conducted at Jefferson Lab, have determined that the prevalence of SRCs increase with nuclear size, and furthermore that most SRCs form between a neutron and a proton, a property called 'np-dominance.' Since these observations have largely come from the same type of experiment, it is possible that they are biased by reaction-specific effects, for example, final state interactions and specific kinematic regimes. To test this, an experiment was conducted in Hall D in Fall 2021 using a photon beam on deuterium, helium, and carbon targets to probe SRCs through photoproduction reactions to test the validity of many previous SRC observations. To benchmark the results of this experiment, I use a theoretical prescription called Generalized Contact Formalism (GCF) to simulate photoproduction from nucleons in SRCs using various models of the nucleon-nucleon interaction potentials. I have performed a study that compares predictions of these different models for ρ^0 photoproduction and have propagated my predictions through the GlueX simulation and reconstruction software. I will show the results of this study and compare to preliminary results from data.

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