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**Direct Reactions with MoNA-LISA**[1]

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Nuclear reactions can be used to probe the structure of nuclei. Direct reactions, which take place on short time scales, are well-suited for experiments with beams of short-lived nuclei. One such reaction is nucleon knockout where a proton or neutron is removed from the incoming beam from the interaction with a target. Single nucleon knockout reactions have been used to study the single-particle nature of nuclear wave functions. A recent experiment at the National Superconducting Cyclotron Laboratory was performed to measure cross sections from single nucleon knockout reactions for several p-shell nuclei. Detection of the residual nucleus in coincidence with any gamma rays emitted from the target allowed cross sections to ground and excited states to be measured. Together with input from reaction theory, *ab initio* structure theories can be tested. Simultaneously the accuracy of knockout reaction models can be validated by detecting the knocked out neutron with the Modular Neutron Array and Large multi-Institutional Scintillator Array (MoNA-LISA). Preliminary results from this experiment will be shown. Knockout reactions can also be used to populate nuclei which are neutron unbound, thus emit neutrons nearly instantaneously. The structure of these nuclei, therefore, cannot be probed with gamma ray spectroscopy. However, with large neutron detectors like MoNA-LISA the properties of these short-lived nuclei are able to be measured. Recent results using MoNA-LISA to study the structure of neutron-rich nuclei will be presented.

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