SIDAR: A Silicon Detector Array for Astrophysics Studies With Radioactive Beams *

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Beams of radioactive nuclei are used at ORNL's HRIBF to study nuclei and measure cross sections of interest to astrophysics. In particular, proton-rich beams are used in scattering and transfer reaction studies in order to understand important reaction rates in explosive environments such as novae and x-ray bursts. Because radioactive beams are usually of low intensity, it is important that the detector system used cover a large solid angle. Furthermore, beams are often contaminated with stable isobars, and it is therefore desirable to perform kinematically-complete measurements to distinguish the events of interest. A high-efficiency segmented detector system is a necessity to perform such measurements with a reasonable efficiency and to verify the correct kinematical relationships are satisfied. We have developed the SIDAR silicon detector array using detectors manufactured by Micron Semiconductor [1] and pulse shaping electronics from Edinburgh University [2]. We have, in addition, developed a preamplifier system in collaboration with RIS Corporation [3]. This array has been used in conjunction with a gas ionization counter in several experiments [4,5,6] with radioactive beams at the HRIBF. Design and performance characteristics of the array will be presented along with future plans.

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