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First measurements with the Array for Nuclear Astrophysics and Structure with Exotic Nuclei

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The Array for Nuclear Astrophysics and Structure with Exotic Nuclei (ANASEN) is an array of charged-particle detectors designed for efficient studies of nuclear reactions using radioactive ion beams. ANASEN includes about 1000 square cm of silicon strip detectors backed with CsI scintillators. ANASEN also includes an array of gas proportional and gas ionization counters that allows ANASEN to be used as an extended active gas target/detector. Positions of ions are measured in the gas and the vertex of each reaction is reconstructed on an event-by-event basis allowing good energy resolution to be achieved with thick gas targets. ANASEN targets direct measurements of (α ,p) reactions with radioactive nuclei that are important for understanding X-ray bursts and studies of the structure of nuclei through scattering and transfer reactions. The first measurements with ANASEN in active target mode were performed at the John D. Fox Superconducting Linear Accelerator Laboratory at Florida State University and included measurements using beams of ^6He , ^{18}Ne and ^{19}O produced by the in-flight technique using RESOLUT. ANASEN has also been used in a number of fixed target experiments including one of the first experiments with a reaccelerated beam from the ReA3 accelerator facility at the National Superconducting Cyclotron Laboratory. Results from this first series of measurements will be presented, along with capabilities and future plans with ANASEN. Support for the construction of ANASEN was provided by the U.S. National Science Foundation's Major Research Instrumentation Program. The experimental program with ANASEN is supported by the U.S. National Science Foundation and the U.S. Department of Energy's Office of Science, Office of Nuclear Physics through Award DE-FG02-96ER40978.

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