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Development of the Detector Array for Photons, Protons, and Exotic Residues

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DAPPER has been designed, developed, and commissioned at Texas A&M University to measure (d,p) reactions in inverse kinematics, allowing for measurements using radioactive nuclei. The array consists of a third of a ton of highly segmented BaF₂ scintillator (TAMU/ORNL) to measure individual gamma ray energies as well as the total gamma ray energy with high efficiency. An annular silicon detector measures the ejected proton's energy and angle to determine the excitation energy of the heavy residue independently of the gamma ray energy. For low-rate (radioactive beam) experiments, a fast segmented axial-field ionization chamber (GODDESS IC) can be used to measure atomic number of reaction products around zero degrees. Reactions of ⁵⁷Fe(d,p) @ 7.5 MeV/u in inverse kinematics were studied in the DAPPER commissioning experiment to extract the photon strength function of ⁵⁸Fe. Reactions of ⁵⁴Fe(d,p) @ 7.5 MeV/u in inverse kinematics have recently been measured in DAPPER. In this talk, the performance of the array will be highlighted, results will be summarized, and future prospects will be mentioned.

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