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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,pg) @ 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,pg) @ 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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