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Detection system for the St. George recoil mass separator¹

S. KALKAL, J. HINNEFELD, L. MORALES, Indiana University, South Bend, IN 46634, USA, D. ROBERTSON, E. STECH, G.P.A. BERG, J. GORRES, M. COUDER, M. WIESCHER, The Joint Institute for Nuclear Astrophysics, University of Notre Dame, Notre Dame, IN 46556, USA — The St. George recoil mass separator is designed for the study of low energy (α, γ) reactions of astrophysical interest in inverse kinematics. The energy range of recoils will be 0.07 to 0.9 MeV/nucleon. A detection system is being developed for separating the recoils from the residual scattered beam at the focal plane. The detection system will consist of two position sensitive microchannel plate (MCPs) timing detectors separated by 50cm followed by a single sided silicon strip detector. Simulations were performed using the codes SIMION and GEANT4. Different designs for guiding the secondary electrons emitted from a thin carbon foil to the MCP were studied in the simulations. Good timing and position resolution and minimization of transmission loss due to grids were key factors in selecting the final design. Time of flight will be recorded between the two MCPs. The delay line technique will be used for extracting the position information from the MCPs. The energy of the recoils will be recorded by the Si detector. A dedicated vacuum chamber and the modular design of the detection system will facilitate future improvements and customization for particular experiments.

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