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Effects of energy straggling in timing detector foils on mass resolution of the St. George detector system[1] JACQUES LAURENCE, LUIS MORALES, SUNIL KALKAL, JERRY HINNEFELD, Indiana University South Bend, HYO SOON JUNG, MANOEL COUDER, University of Notre Dame — Many questions remain regarding nucleosynthesis during stellar helium burning. The recoil mass separator St. George at the University of Notre Dame has been designed to investigate low energy (α, γ) reactions for heavy ions in inverse kinematics to answer such questions. St. George is expected to achieve beam suppression of the order $\geq 10^{15}$ by the time the beam and reaction products reach the detection system, but further background reduction of unreacted beam particles is required in the detection system itself. Indiana University South Bend, in collaboration with Notre Dame, has developed a detection system for St. George that takes advantage of energy and timing measurements to differentiate recoiling reaction products from the much more abundant unreacted beam. The timing detection system requires beam and recoil products to pass through two thin foils before energy measurements are made with a silicon detector, and energy straggling in these foils can degrade the mass resolution of the detection system. The Geant4 toolkit has been used to construct a simulation of the St. George detection system to investigate the effects on mass resolution of energy and position straggling of unreacted beam and reaction products through various foil materials.

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