

Abstract Submitted  
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**Design of a compact, low energy charged particle spectrometer for stellar nucleosynthesis experiments at OMEGA and the NIF<sup>1</sup>**  
E. ARMSTRONG, J. FRENJE, M. GATU JOHNSON, C.K. LI, D. OROZCO, H. RINDERKNECHT, M. ROSENBERG, F.H. SÉGUIN, H. SIO, A. ZYLSTRA, R.D. PETRASSO, MIT — Simulations have been used to model an “Orange Spectrometer” for measuring alpha and proton energy spectra in the range  $\sim 1\text{-}5$  MeV for experiments at the OMEGA laser facility and the National Ignition Facility (NIF). An important application will be the study of stellar nucleosynthesis reactions, in particular  $3\text{He}+3\text{He} \rightarrow \alpha+p+p$ , which is a step in the solar proton-proton chain. Experiments to study this reaction have been undertaken at OMEGA before, but no diagnostics have been able to measure the low-energy, low-yield alpha particles generated in the reaction. Feasibility studies were performed with particle trajectory calculations utilizing magnetic field models from COMSOL, and several designs have been identified for testing and development. Ability to study the alpha particles in addition to the protons is essential for understanding the nuclear physics governing the final-state interactions between pairs of particles in the three-body final state.

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