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Nuclear diagnostics utilizing robust CR-39 for OMEGA, OMEGA-EP, and the NIF N. SINENIAN, D.T. CASEY, M. MANUEL, H.G. RINDERKNECHT, M.J. ROSENBERG, F.H. SEGUIN, J.A. FRENJE, C.K. LI, R.D. PETRASSO, MIT — Harsh EMP/x-ray/gamma-ray environments such as those found at OMEGA and OMEGA-EP (and soon the NIF) hinder electronic detection schemes for sensitive measurements of charged particles and neutrons. This has made passive particle detectors such as CR-39 attractive, especially since they measure the position, energy, and species of individual charged particles. To enhance the accuracy of CR-39-based measurements, and to lay the groundwork for new applications, new measurements of CR-39 response to accelerator-generated protons (from 0.35 MeV to 11.7 MeV) and 2.5-MeV neutrons have been made using a variety of CR-39 types and CR-39 processing techniques. Results include determination of energy-measurement accuracy and the sensitivity of energy measurements to CR-39 thickness, vacuum exposure, heat exposure, and various processing parameters. Application to a new and sensitive neutron detector for OMEGA, OMEGA-EP, and the NIF will be presented. This work was supported in part by US DoE, LLNL, and LLE.

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