

Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Impact of x-ray dose on the CR-39 response to 1-9 MeV protons with application to proton spectroscopy at OMEGA and NIF J. ROJAS-HERRERA, H.G. RINDERKNECHT, M. GATU JOHNSON, A. ZYLSTRA, M. ROSENBERG, H. SIO, MIT — CR-39 is a clear plastic nuclear track detector utilized in many nuclear diagnostics fielded in large-scale inertial confinement fusion (ICF) facilities. Large x-ray fluences in ICF experiments may impact the CR-39 response to incident charged particles. A thick-target bremsstrahlung x-ray machine was used to expose CR-39 to various x-ray doses to determine their impact on the CR-39 response to protons. This x-ray machine emits Cu- α line-radiation at 8 keV and has been absolutely calibrated using radiochromic film. The CR-39 detectors were then exposed to D³He-protons generated by the MIT Linear Electrostatic Ion Accelerator. The regions of the CR-39 exposed to x-rays showed a smaller track diameter than those not exposed to x-rays. For example, a dose of 60 ± 1.3 Gy results in a decrease of 53% in the track diameter, while a dose of 5 ± 0.1 Gy causes a decrease of 7.5% in the track diameter. Doses of approximately 5Gy are typical on CR-39 detectors used to diagnose ICF implosions at OMEGA and the NIF. The resulting data will be used to evaluate how x-ray doses received by CR-39 in OMEGA and NIF experiments affect the recorded data. This undergraduate research was supported in part by the U.S. DOE, NLUF, LLE, and LLNL.

Fredrick Seguin
MIT

Date submitted: 10 Jul 2014

Electronic form version 1.4