Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

X-ray Enhancement of Etch Parameters of Nuclear Tracks in CR-39[1] MICHEAL GIORDANO, KRYSTALYN SADWICK, KURT FLETCHER, SUNY Geneseo, MICHELLE BURKE, T. CRAIG SANGSTER, Laboratory for Laser Energetics, University of Rochester — The nuclear track detector CR-39 is a polymer used to measure charged particles produced in inertial confinement fusion experiments. Alpha particles stopping in CR-39 produce nanometer-scale damage sites. When the CR-39 is etched in 6-N sodium hydroxide at 80 $^\circ$ C for six hours, the difference in etch rates between the damage sites and the bulk material results in the formation of pits 20 to 25 microns in diameter. These can be characterized and counted using optical microscopy. A modest increase in the pit diameter is observed when the CR-39 detector is irradiated by x-rays from a tungsten cathode after exposure to charged particles and before etching. This enhancement of the diameter increases as the total x-ray dose increases, with enhancements of about 1.10 for 1000 Gy doses. Controlled experiments show that the effect is due to the x-ray dose rather than a difference in the handling or the environment. The ratio of the track-etch rate to bulk-etch rate seems to be independent of x-ray dose. The mechanism for this effect is currently under investigation. These results show that modest increases in pit diameters can be obtained through irradiation with x-rays.

[1]Funded in part by a grant from the US DOE through the Laboratory for Laser Energetics.

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Date submitted: 11 Jul 2012 Electronic form version 1.4