Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Accelerating CR-39 Track Detector Processing by Utilizing UV[1]
JONATHAN SPARLING, STEPHEN PADALINO, JAMES MCLEAN, State Univ of NY at Geneseo, CRAIG SANGSTER, SEAN REGAN, Lab for Laser Energetics, University of Rochester — The use of CR-39 plastic as a Solid State Nuclear Track Detector is an effective technique for obtaining data in high energy particle experiments including inertial confinement fusion. To reveal particle tracks after irradiation, CR-39 is chemically etched in NaOH at 80°C, producing micron-scale signal pits at the nuclear track sites. It has been shown that illuminating CR-39 with UV light prior to etching increases bulk and track etch rates, especially when combined with elevated temperature. Spectroscopic analysis for amorphous solids has helped identify which UV wavelengths are most effective at enhancing etch rates. Absorption peaks found in the near infrared range provide for efficient sample heating, and may allow targeting cooperative IR-UV chemistry. Avoiding UV induced noise can be achieved through variations in absorption depths with wavelength. Vacuum drying and water absorption tests allow measurement of the resulting variation of bulk etch rate with depth.

[1]Funded in part by the NSF and an Department of Energy grant through the Lab of Laser Energetics.

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Date submitted: 14 Jul 2017 Electronic form version 1.4