Abstract Submitted
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Incremental chemical etching of CR-39 detectors for nondispersive proton spectroscopy with high resolution[1] CHAO GONG, SERGEI TOCHITSKY, DAN HABERBERGER, CHAN JOSHI, University of California Los Angeles, Los Angeles, CA, USA 90095 — Experiments on shock wave proton acceleration in a hydrogen gas plasma using multi-terawatt CO_2 laser have produced $\sim$20MeV proton beams with a narrow energy spread [D.Haberberger et al, Proceedings of PAC2011, New York, Paper TuOBN6]. The laser-accelerated proton beam is detected by a stack of 1 mm thick CR-39 with a 100×100 mm^2 area. This nondispersive imaging spectrometer, located at 150 mm from the plasma,provided a superb spatial resolution but its spectral resolution was limited due to the 1 mm CR-39 thickness. In order to increase the spectral resolution, the incremental layer etching technique has been developed and tested using a computer control system for proton pits counting and analysis. Using this etching technique we reached spectral resolution $\leq$ 60KeV per etching step and confirmed the generation of mono-energetic proton beam centered around 20MeV with an energy spread dE/E around 1%. Results on bulk etching rate and proton related track size evolution as well as limitations of this method will be presented.

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