Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

**A high repetition rate transverse beam profile diagnostic for laser-plasma proton sources** NICHOLAS DOVER, MAMIKO NISHIUCHI, HIRONAO SAKAKI, MASAKI KANDO, National Institutes for Quantum and Radiological Science and Technology, KEITA NISHITANI, Kyushu University — The recently upgraded J-KAREN-P laser can provide $\approx$ PW peak power and intensities approaching $10^{22}$ Wcm$^{-2}$ at 0.1 Hz. Scaling of sheath acceleration to such high intensities predicts generation of protons to near 100 MeV, but changes in electron heating mechanisms may affect the emitted proton beam properties, such as divergence and pointing. High repetition rate simultaneous measurement of the transverse proton distribution and energy spectrum are therefore key to understanding and optimising the source. Recently plastic scintillators have been used to measure online proton beam transverse profiles, removing the need for time consuming post-processing. We are therefore developing a scintillator based transverse proton beam profile diagnostic for use in ion acceleration experiments using the J-KAREN-P laser. Differential filtering provides a coarse energy spectrum measurement, and time-gating allows differentiation of protons from other radiation. We will discuss the design and implementation of the diagnostic, as well as proof-of-principle results from initial experiments on the J-KAREN-P system demonstrating the measurement of sheath accelerated proton beams up to 20 MeV.

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Date submitted: 15 Jul 2016 Electronic form version 1.4