Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Investigation of resistive guiding of fast electrons in ultra-intense laser-solid interactions JAMES GREEN, NICOLA BOOTH, ALEX ROBINSON, Central Laser Facility, STFC, KATE LANCASTER, CHRIS MURPHY, CHRIS RIDGERS, University of York — A key issue in realising the development of a number of high-intensity laser-plasma applications is the critical problem of fast electron divergence. Previous experimental measurements have indicated that the electron divergence angle is considerable at relativistic intensities ($> 10^{18} W cm^{-2}$) and that self-pinching of the electron beam will not be sufficient to produce the collimated propagation that is required for applications such as WDM studies or bright, short-pulse X-ray sources. A number of concepts have been proposed to improve fast electron collimation, with one promising approach being to exploit resistivity gradients inside targets to magnetically guide fast electrons. Here we present experimental work using a novel conical target geometry that uses a high/low Z interface to produce such guiding. A range of target designs have been tested using the Vulcan Petawatt laser to investigate improvements in fast electron transport and collimation. Preliminary results will be presented from a number of complementary diagnostics in order to assess the degree and robustness of the focusing mechanism.

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Date submitted: 22 Jul 2015 Electronic form version 1.4