Abstract Submitted for the DPP16 Meeting of The American Physical Society

Optically Levitated Targets as a Source for High Brightness Xrays and a Platform for Mass-Limited Laser-interaction Experiments SAMUEL GILTRAP, NICK STUART, TIM ROBINSON, Imperial College London, CHRIS ARMSTRONG, University of Strathclyde, GEORGE HICKS, SAM EARDLEY, Imperial College London, ED GUMBRELL, AWE, ROLAND SMITH, Imperial College London — Here we report on the development of an optical levitation based x-ray and proton source, motivated by the requirement for a debris free, high spatial resolution, and low EMP source for x-ray radiography and proton production. Research at Imperial College has led to the development of a feedback controlled optical levitation trap which is capable of holding both solid (Glass beads) and liquid (silicon based oil) micro-targets (3 -10um). The optical levitation trap has been successfully fielded in a high-intensity laser interaction experiment at Imperial College London and at the Vulcan Petawatt Laser system at the Rutherford Appleton Laboratory (RAL). Here we report on the results from that RAL run including; an x-ray source size of 10-15um with very good spherical symmetry when compared to wire targets, secondly very low EMP signal from isolated levitated targets (9 times less RF signal than a comparable wire target). At Imperial College we were also able to record an x-ray energy spectrum which produced an electron temperature of 0.48KeV, and performed interferometry of a shock evolving into a blast wave off an optically levitated droplet which allowed us to infer the electron density within the shock front.

> Samuel Giltrap Imperial College London

Date submitted: 20 Jul 2016

Electronic form version 1.4