Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Generating and diagnosing turbulence in pulsed-power driven magnetised plasmas[1] JACK HARE, G C BURDIAK[2], S N BLAND, T CLAYSON, J W D HALLIDAY, S MERLINI, D R RUSSELL, R A SMITH, N STUART, L G SUTTLE, E R TUBMAN, S V LEBEDEV, Blackett Laboratory, Imperial College, London, SW7 2AZ, UK — Turbulence is a ubiquitous phenomena in fluids, which allows velocity fluctuations to cascade down to smaller spatial scales until they are dissipated by viscosity. In a magnetised plasma, these velocity fluctuations also drive fluctuations in the temperature, density and magnetic field, which are an important driver of plasma phenomena throughout the universe. We generate turbulence inside a diverse range of pulsed-power driven plasmas, including a reverse shock formed at a target by an exploding tungsten wire array, and the precursor inside an imploding carbon wire array. We study these plasmas using a fast-framing camera, laser interferometry, shadowgraphy and schlieren imaging, Faraday rotation imaging and multi-point collective Thomson scattering. We have developed new diagnostics for studying turbulent plasmas in unprecedented detail, such as an imaging refractometer, which directly measures the spectrum of deflection angles in a probing laser beam, and multi-angle, multi-point collective Thomson scattering using 48 optical fibres. Finally, we will discuss the new PUFFIN generator, which will be built at MIT, and will sustain turbulent magnetised HED plasmas over microsecond timescales.

[1]This work was supported in part by the U.S. Department of Energy (DOE) Awards No. DE-F03-02NA00057 and No. DE-SC-0001063.
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Date submitted: 26 Jun 2020 Electronic form version 1.4