Abstract Submitted
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An Analysis of Laser Deflection in a Turbulent Plasma using Synthetic Diagnostics[1] S. MERLINI, J. D. HARE, Blackett Laboratory, Imperial College London, G. C. BURDIAK, First Light Fusion Ltd, S. V. LEBEDEV, AJ CRILLY, J. CHITTENDEN, T. CLAYSON, J. W. D. HALLIDAY, D. R. RUSSELL, L. G. SUTTLE, R. A. SMITH, N. STUART, Blackett Laboratory, Imperial College London — We have established a synthetic pipeline to investigate laser deflection in turbulent High Energy Density (HED) Plasmas using a combination of ray-tracing and ray-transfer-matrix techniques. This has been done to support the development of a new diagnostic system which measures directly deflection angles in one direction. The spectrum of deflection angles is directly linked to the spectrum of density perturbations within a turbulent plasma. Conventional shadowgraphy and schlieren techniques retrieve the spectrum of deflection angles using a digital Fourier transform of an image, which leads to a limited dynamic range and is ineffective when caustics are present. A 3-Dimensional Gaussian field with a given power law is used to generate synthetic plasma electron density perturbations which allows us to compare conventional shadowgraphy and schlieren imaging techniques with the new diagnostic system. We analyse the angular deflections of the probing laser beam in order to assess the performance of these imaging systems for HED Plasma turbulence applications..

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