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Talbot-Lau X-ray Moiré deflectometry Diagnostic for High Energy Density Plasmas[1] MARIA PIA VALDIVIA LEIVA, DAN STUTMAN, MICHAEL FINKENTHAL, Johns Hopkins University — A Talbot-Lau (TL) x-ray interferometer measures beam angular deviations due to refraction index gradients within objects along its path. By tilting one of the gratings in the interferometer by small angles, Moiré patterns which enable the detection of density gradients in low-Z matter are obtained. In addition to the detection of both sharp and smooth density gradients this technique makes also possible the identification of micro structures within an object. The sensitivity and spatial resolution is adequate to characterize High Energy Density Laboratory Plasmas (HEDLP). The technique allows for the simultaneous acquisition of x-ray attenuation, refraction, and scatter information from a single x-ray image. Experimental and simulated results acquired show a clear advantage of the TL Moiré single image based phase-retrieval technique over the attenuation and propagation methods. Additionally, the method makes use of extended, polychromatic, incoherent, line and continuum x-ray sources, thus allowing for less demanding backlighters than those typically used in HEDLP radiography.

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