

Abstract Submitted
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Development of novel optics for X-ray phase-contrast imaging applications in ICF research DAN STUTMAN, MICHAEL FINKENTHAL, Johns Hopkins University — Differential phase-contrast (DPC) imaging with X-rays from a few keV to a few tens of keV is attractive for ICF diagnostic due to its sensitivity to density gradients in low-Z matter. DPC radiography could help characterize the ICF pellet from its pre-implosion, through its early and late implosion stages. To separate the absorption and refraction contributions to ICF radiography we explore using shearing interferometry with micro-periodic optics. For X-ray energies below 25 keV we investigate using phase and absorption gratings in the Talbot-Lau configuration. Absorption and phase gratings of 10 μm periods were tested for phase-contrast imaging of ICF pellet-like objects using a small-focus X-ray source and a high resolution X-ray CCD. For DCP measurements at higher X-ray energies we propose a novel type of X-ray optics, consisting of lithographically made grazing incidence micro-periodic mirrors [1]. Prototype mirrors of 5-100 μm period fabricated with this method showed promising characteristics in laboratory tests. Work supported by DoE Grant DE-FG02-99ER54523.

[1] D. Stutman, M. Finkenthal, and N. Moldovan, to appear in Rev. Sci. Instrum.

Dan Stutman
Johns Hopkins University

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