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Measuring the Refractive Index of a Laser-Plasma Optical System D. TURNBULL, C. GOYON, B.B. POLLOCK, D. MARISCAL, L. DIVOL, J.S. ROSS, S. PATANKAR, G.E. KEMP, J.D. MOODY, P.A. MICHEL, LLNL — We report the first complete set of measurements of a laser-plasma optical system's refractive index, as seen by an independent probe laser beam, as a function of the relative wavelength shift between the two laser beams. Both the imaginary and real refractive-index components are found to be in good agreement with linear theory using plasma parameters measured by optical Thomson scattering and interferometry; the former is in contrast to previous work and has implications for cross-beam energy transfer in indirect-drive inertial confinement fusion, and the latter is measured for the first time. The data include the first demonstration of a laser-plasma polarizer with 85% to 87% extinction for the particular laser and plasma parameters used in this experiment, complementing the existing suite of high-power, tunable, and ultrafast plasma-based photonic devices. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

D. Turnbull
LLNL

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