

Abstract Submitted
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2-Dimensional, Second-Harmonic, Dispersion Interferometer for Plasma-Density Imaging¹ FRANK J WESSEL, L-Egant Solutions, LLC, FERNANDO BRANDI, CNR-INO — Conventional optical interferometers, used for plasma-density measurements, are typically robustly mounted, two-arm, high-cost installations. The Second-Harmonic Dispersion Interferometer (SHDI) is an exception, utilizing a common path, single-laser source frequency doubled before, and after, the sample, which allows the dispersive-phase shift of the SH beams to be measured in a simple, low-cost system. Present SHDI's provide a 1-D (line-of-sight) measurement, usually configured with a CW Nd:YAG, or CO₂ laser. We compared the performance of these SHDI's to that of a conventional μ -wave interferometer, finding the Nd:YAG to be the most stable and least complex system design.² Recently, we upgraded the SHDI for 2-Dimensional, time-resolved imaging, using a pulsed Nd:YAG laser, beam-expansion optics, digital cameras, and image-processing s/w, providing: >10 mRad phase change, 100 μm resolution, 1 ns sampling time, and 100 Hz frame rate, in a 0.6-cm diameter beam,³ suitable for a line-integrated plasma density, $\int n \cdot dl > 10^{14} \text{ cm}^{-2}$.

¹US DoE SC0019789

²F. Brandi, F.J.Wessel, C.Lohff, J.R.Duff, Z.O.Haralson, Expt. Study of SHDI's for Plasma Density Measurements, Applied Optics, to appear.

³F.Brandi and F.J.Wessel, 2D-SHDI, Optics Letters, to appear.

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