

Abstract Submitted  
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**2-Dimensional, Second-Harmonic, Dispersion Interferometer for Plasma-Density Imaging**<sup>1</sup> FRANK J WESSEL, L-Egant Solutions, LLC, FERNANDO BRANDI, ILIL, CNR-INO, L-EGANT SOLUTIONS TEAM — 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 CO<sub>2</sub> laser. We compared the performance of these SHDI's to that of a conventional  $\mu$ -wave interferometer, finding the Nd:YAG to be the most stable and least complex system design.<sup>2</sup> 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  $\mu$ m resolution, 1 ns sampling time, and 100 Hz frame rate, in a 0.6-cm diameter beam,<sup>3</sup> suitable for a line-integrated plasma density,  $\int n \cdot dl > 10^{14} \text{ cm}^{-2}$ .

<sup>1</sup>US DoE SC0019789

<sup>2</sup>F. 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.

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

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