

Abstract Submitted
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Two-dimensional laser interferometry analysis LEO MEHR¹, RICKY CONCEPCION², ROBERT DUGGAN³, HANNAH MOORE⁴, ASHER NOVICK⁵, LAUREN RANSOHOFF⁶, PIERRE-ALEXANDRE GOURDAIN, DAVID HAMMER, BRUCE KUSSE, Cornell University — The objective of our research was to create a two-dimensional interferometer which we will use to measure plasma densities at the Cornell Research Beam Accelerator (COBRA). We built two shearing interferometers and mounted them on an optics table. They intercept the probe laser beam which travels directly through the plasma and is captured by a 16-bit CCD camera. In comparing the interferometer images before the shot and during the plasma shot, we observed both lateral and vertical shifts in the interference pattern caused by the change of the refractive index due to the plasma electrons. We developed a computer program using Matlab to map a vector field depicting the shift between the two images. This shift is proportional to the line integral of electron density through the plasma chamber. We show this method provides a reliable way to determine the plasma electron density profile. Additionally, we hope this method can improve upon the diagnostic capabilities and efficiency of data collection used with standard one-dimensional interferometry.

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