

Abstract Submitted
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A combined phase contrast imaging-interferometer system for the detection of multiscale density fluctuations on DIII-D¹ E.M. DAVIS, J.C. ROST, M. PORKOLAB, A. MARINONI, MIT PSFC, M.A. VAN ZEELAND, General Atomics — A heterodyne interferometer channel has been added to the DIII-D phase contrast imaging (PCI) system. Both measurements share a single $10.6 \mu\text{m}$ probe beam. Whereas the PCI excels at detecting medium- to high- k fluctuations ($1.5 \text{ cm}^{-1} \leq k \leq 20 \text{ cm}^{-1}$), the interferometer extends the system sensitivity to low- k fluctuations ($k \leq 5 \text{ cm}^{-1}$), allowing simultaneous measurement of electron- and ion-scale instabilities with sub-microsecond resolution. Further, correlating measurements from the interferometer channel with those from DIII-Ds pre-existing, toroidally separated interferometer ($\Delta\theta = 45^\circ$) allows identification of low- n modes. This new capability has been corroborated against magnetic measurements and may allow novel investigations of *core – localized* MHD that is otherwise inaccessible via external magnetic measurements, with potential applications to fast particle transport and disruptions.

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