Abstract Submitted
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Development of a heterodyne Phase Contrast Imaging system for Ion Cyclotron Emission detection on DIII-D[1] ALESSANDRO MARINONI, Massachusetts Institute of Technology, CHARLES P. MOELLER, General Atomics, MIKLOS PORKOLAB, JOHN C. ROST, Massachusetts Institute of Technology, DIII-D TEAM TEAM — The Phase Contrast Imaging diagnostic on DIII-D has been upgraded with a novel optical heterodyne detection scheme to measure the spatial structure of Ion Cyclotron Emission (ICE), thus extending the purely temporal measurements available so far. The PCI is an absolutely calibrated internal-reference interferometer that creates an image of line-integrated electron density fluctuations. Due to technological limitations in manufacturing arrays of cryogenically cooled detectors, worldwide PCI systems operate with a 2 MHz bandwidth (BW) which, although suitable for turbulence and low-f waves, precludes the study of faster phenomena such as ICE, which occurs at frequencies of tens of MHz. The laser beam power is modulated in such a way that the frequency of the wave of interest is within the PCI detector BW, thus making the imaging method applicable at higher frequencies. A transverse Pockels cell made of a water cooled CdTe birefringent crystal, driven by a matched oscillator that provides a 2 kV pk-pk voltage, is used for the beam modulation. Bench-top tests using a 10 MHz oscillator are in agreement with the expected response. Initial measurements will be presented using an upgraded oscillator at variable frequency, suitable for various values of the confining magnetic field.

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