

Abstract Submitted
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Overview of Measurements from the Wendelstein 7-X Phase Contrast Imaging Diagnostic and Plans for the OP2 Campaign¹ ERIC EDLUND, SUNY Cortland, ZHOUI HUANG, MIKLOS PORKOLAB, MIT Plasma Science and Fusion Center, ADRIAN VON STECHOW, JAN-PETER BAHNER, OLAF GRULKE, Max Planck Institute for Plasma Physics, AND THE W7-X TEAM — A phase contrast imaging (PCI) diagnostic was implemented on the W7-X stellarator starting in the OP1.2 experimental campaign.¹ The PCI diagnostic creates an image of plasma density fluctuations using light from a CO₂ laser that passes through the plasma which captures the line-integral of the fluctuations along the optical path of the laser. The typical measurement range spans frequencies of about 2 kHz to 600 kHz, and wavenumbers of approximately 1 cm⁻¹ to 10 cm⁻¹, although the actual range depends on the optical magnifications used. PCI measurements of both coherent Alfvénic modes and broadband fluctuations will be presented. Changes to the PCI diagnostic for the OP2 campaign will be presented, with an outlook to possible future additions to the diagnostic including an optical heterodyne system for detection of ion-cyclotron resonance heating (ICRH) waves and an alternate optical design that allows for simultaneous measurement of the plasma image and the Fourier spectra of the fluctuations.

[1] E. M. Edlund et al, Rev. Sci. Instr. 89, 10E105 (2018).

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