

Reflectometry and correlation ECE measurements in Wendelstein 7-X and comparison to electron heat transport measurements

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The optimized stellarator Wendelstein 7-X (W7-X) [1] is designed to have an approximately quasi-isodynamic magnetic field with reduced neoclassical transport [2]. Consequently, anomalous transport is expected to dominate the electron heat transport across the majority of the minor radius. Electron temperature and plasma density fluctuations are a sensitive indicator of drift wave driven turbulence and correlation radiometry and reflectometry diagnostics are used to measure and identify Ion Temperature Gradient (ITG) and Trapped Electron Mode (TEM) driven drift wave turbulence on W7-X.

Two correlation radiometers are used to measure electron temperature fluctuations, while a poloidal correlation reflectometer and three Doppler reflectometers are used to measure plasma density fluctuations and flows in W7-X. In this work, electron temperature and plasma density fluctuation measurements will be presented in the optimized magnetic configurations of W7-X. These results will be compared to local power balance analysis and neoclassical expectations to determine the level of anomalous electron heat transport, and the experimental results will be compared to gyrokinetic simulations to disentangle the contribution of ITG and TEM driven turbulence.

[1] T. Klinger *et al.* *Plasma Phys. Control. Fusion* **59** 014018 (2017).

[2] J. Nührenberg and R. Zille, *Phys. Lett. A* **129** 113 (1988).