Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Experimental investigation of parametric decay instability in Wendelstein 7-X ANDREA TANCETTI, STEFAN KRAGH NIELSEN, JESPER RASMUSSEN, Technical University of Denmark, DMITRY MOSEEV, TORSTEN STANGE, STEFAN MARSEN, HARALD BRAUNE, MARCO ZANINI, CARSTEN KILLER, Max Planck Institute for Plasma Physics (Greifswald), IVANA ABRAMOVIC, Eindhoven University of Technology, MIKLOS VECSEI, Wigner Research Center for Physics, HEINRICH PETER LAQUA, Max Planck Institute for Plasma Physics (Greifswald), W7-X TEAM TEAM — Stellarators such as Wendelstein 7-X (W7-X) rely on microwave heating (ECRH) to reach high performance scenarios. However, if the injected power exceeds a critical threshold, non-linear interactions, like Parametric Decay Instability (PDI), may take place, where the injected pump microwave decays into a pair of daughter waves. Besides reducing the efficiency of the ECRH system, daughter waves may cause severe damage to microwave diagnostics and to plasma-facing probes. Here, we investigate the properties of the anomalous signal detected via the Collective Thomson Scattering diagnostic during the last W7-X experimental campaign, OP1.2(b), and explore the hypothesis of excitation due to PDI along the ECRH beams. The signal may occur as sideband peaks, symmetrically arranged around the pump frequency, or as a broadband structure, continuously stretched 500 MHz below the pump frequency. We describe the main physical quantities affecting the occurrence and the structure of the signal, and identify an experimental power threshold for the instability. We further discuss similarities with anomalous signals detected in ASDEX Upgrade that can be explained by PDI.

Andrea Tancetti
Technical University of Denmark

Date submitted: 29 Jun 2020 Electronic form version 1.4