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[ ] Theory [X] Experiment

Coherently Averaged Signals from Rotating Magnetic Islands in the DIII-D Tokamak,* K.J. Luh, *Harvey Mudd College;* F.A. Volpe, *UWisc.-Madison;* M.E. Austin, *UT-Austin;* R.J. La Haye, E.J. Strait, *GA* — Electron Cyclotron Emission (ECE) routinely provides radially and temporally resolved maps of electron temperature fluctuations associated with rotating magnetic islands. These measurements are equivalent to instantaneous horizontally cut images of the island, relevant to the study of its seeding, growth, saturation and stabilization. These images, however, suffer from radiometer noise, thermal fluctuations (wave noise) and non-thermal fluctuations (e.g., turbulence). To improve the signal-to-noise ratio, we coherently average over several ECE images using magnetic probe signals as a reference for the transit of the island. The technique is the software equivalent of analog lock-in amplification, and automatically accounts for rapid changes of rotation frequency, on the time-scale of a period. Results are compared with singular value decomposition and with a de-convolution technique in which ECE and magnetic probe Fourier-spectra are multiplied by each other and the results are anti-transformed.

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