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Influence of 3D magnetic fields on turbulence at the L-H transition and across magnetic islands in DIII-D[1] DAVID KRIETE, GEORGE MCKEE, RAYMOND FONCK, DAVID SMITH, ZHENG YAN, University of Wisconsin-Madison, LUCAS MORTON, Oak Ridge Associated Universities, MORGAN SHAFER, Oak Ridge National Laboratory, LOTHAR SCHMITZ, University of California Los Angeles — Measurements of long-wavelength density fluctuations using beam emission spectroscopy (BES) reveal the significant impact of 3D magnetic fields on turbulence amplitudes and characteristics. Fluctuations are measured across an applied static m,n = 2,1 magnetic island that is rotated toroidally through the BES sightlines, providing quasi-3D measurement capability. A single unstable broadband turbulence mode is observed near the O-point, but near the X-point, this mode is accompanied by a second mode propagating in the opposite direction; fluctuation amplitudes are also much higher near the X-point than the O-point. 2D fluctuations are also measured in the L-mode edge leading up to L-H transitions with applied resonant and non-resonant magnetic perturbations. Normalized fluctuation amplitudes are ˜4 times larger with resonant fields than with non-resonant fields. Additionally, dual counter-propagating modes are observed with resonant fields, while only a single mode is observed with non-resonant fields. These measurements may reveal how magnetic perturbations raise the L-H power threshold by altering turbulence-flow dynamics leading up to the transition.

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