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Suppression of ITG Turbulence Due to Spectral Shift During Biasing Induced H-mode on HBT-EP[1]

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This study marks the first achievement of confirmed biasing H-modes on HBT-EP, as well as the first characterization of the edge turbulence as ion temperature gradient mode (ITG) dominated. Measurements of the radial wavenumber spectrum of floating potentials at the edge show that the turbulence intensity decreases with increasing shift in the spectrum average $\langle k_r \rangle$ when increasing amounts of bias probe voltage (and increasing amounts of flow shear) is applied. These measurements extend previous findings on EAST and TCABR, which support the spectral shift model proposed by Staebler et al.[2] for turbulence suppression via sheared flow, through detailed local measurements of L-H transitions on HBT-EP. A shift in the wavenumber spectrum occurs at applied electrode voltages and currents below the threshold needed for an L-H transition and furthermore, a dithering transition is obtained when biasing near the threshold. Additionally, the suppression of blob-filament turbulence in the scrape-off layer (SOL) precedes the L-H transition, and the SOL turbulence remains low throughout the entire dithering phase, despite the modulation of turbulence levels in the nearby edge. In this way, the SOL turbulence "decouples" from the edge turbulence. The shift in the measured radial wavenumber is corroborated by the direct measurement of eddy tilt angle using a novel time delay analysis technique[3] first developed for Doppler reflectometry but adapted here for floating potential measurements.

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[2]Staebler G. M. et al. 2013 *Phys. Rev. Lett.* **110** 055003

[3]Pinzón J. R. et al. 2019 *Plasma Phys. Control. Fusion* **61** 105009