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[ ] Theory [X] Experiment

Does a Critical Gradient Exist for Alfvén Eigenmode Induced Fast-Ion Transport?* C.S. Collins, W.W. Heidbrink, *UCI*; M.A. Van Zeeland, C.C. Petty, D.C. Pace, *GA*; B.A. Grierson, *PPPL* –In the critical gradient model, if local energetic particle (EP) drive exceeds the Alfvén eigenmode (AE) stability limit, particles diffuse to flatten the pressure profile until marginal stability is maintained. A key signature is a sudden increase in transport above the critical gradient. In DIII-D, the onset of AE-induced EP transport is examined by modulating the EP pressure profile using an off-axis neutral beam while AE activity gradually diminishes during the current ramp. The time evolution of the EP density profile is measured with fast-ion Dα (FIDA) spectroscopy. During quiescent periods, the FIDA intensity rises and decays approximately linearly during and after the beam pulse, whereas during strong AE activity, the modulated FIDA intensity amplitude and decay rate decrease, suggesting additional AE-induced radial diffusion. Hardware upgrades are underway to increase spatial resolution and accommodate the full Dα spectrum, providing better constraints when comparing to predictive models.

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