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Measurements to characterize Alfven eigenmode induced critical gradient conditions using a new FIDA diagnostic on DIII-D[1] CLAUDIO MARINI, Oak Ridge Associated Universities, C.S. COLLINS, General Atomics, W.W. HEIDBRINK, UCI, C.C. PETTY, M.A. VAN ZEELAND, General Atomics, D. LIN, UCI, L. STAGNER, ORISE — A new high resolution fast ion D-alpha (FIDA) diagnostic with reduced channel-to-channel uncertainty for detailed energetic particle (EP) transport model validation has been installed on DIII-D. The system measures co-passing EPs profiles with outstanding spatial resolution and it is composed of simultaneous 2D imaging FIDA (I-FIDA) and a full spectrum (650-662 nm) system (S-FIDA). The I-FIDA sub-system generates a 2D image of the blue-shifted FIDA signal, integrated in the spectral region 650-652 nm (E$\simeq$40-80 keV), with spatial resolution $\leq$2 mm for precision in EP gradient computation, asymmetry assessment, and detection of EP interactions with MHD modes. The S-FIDA sub-system shares the I-FIDA input optics to allow for the same viewing geometry, with 15 chords between R=1.55-2.0 m at 3 cm resolution. Previous experiments show that Alfven eigenmodes cause critical gradient EP transport, resulting in stiff profiles for EP distribution functions above the critical gradient threshold. New measurements of the time evolution of EP gradient will be used to build an empirical database of the critical gradient in a variety of conditions of magnetic shear, fast-ion fraction, and fast-ion profiles using DIII-Ds recently upgraded off-axis neutral beam.

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