Abstract Submitted
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Runaway electron beam dynamics in DIII-D: energy distribution, current profile, and RE-driven instabilities[1] A. LVOVSKIY, ORAU, C. PAZ-SOLDAN, N.W. EIDIETIS, Y.Q. LIU, K. THOME, GA, P. ALEYNIKOV, IPP, A. DAL MOLIN, M. NOCENTE, U-Milano-Bicocca, W.W. HEIDBRINK, UCI, R. MOYER[2], UCSD — Novel measurements of the post-disruption runaway electron (RE) beam energy distribution function show potential for kinetic instabilities and provide a constraint on the internal current profile. The RE energy distribution measured by inverting bremsstrahlung spectra has a non-monotonic feature at 5 MeV supporting the presence of free energy to drive kinetic instabilities. The RE current profile is reconstructed for the first time using the spatially resolved RE energy distribution. It is found to be more peaked than the pre-disruption current, with higher internal inductance, suggesting preferential formation of REs in the core plasma or potentially a radially inward motion of REs. The accessed relatively low-current (180 kA) RE beam is found to be stable, likely due to its elevated safety factor profile. From this base stable equilibrium, instability is accessed by applying large loop voltage. Under an accelerating loop voltage, an internal kink mode is observed. It leads to sawtooth-like relaxation of the RE current profile, but drives no RE loss. Under a decelerating voltage, frequency chirping correlated with RE loss is detected. This work yields unique opportunities for validating models that predict RE physics in ITER.

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