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[ ] Theory [X] Experiment

Phase-space Characterization of Fast Ion Loss Detectors in the DIII-D Tokamak,* R.M. Pipes, *U. Hawaii at Hilo*; D.C. Pace, R.K. Fisher, *General Atomics* – Scintillator-based fast ion loss detectors (FILDs) measure the energy and pitch angle of lost energetic ions along the outer wall in DIII-D. The FILDs operate as magnetic spectrometers in which the escaping ions pass through a collimator and strike the scintillator surface according to their gyroradius and pitch angle with respect to the local magnetic field. The mapping of gyroradius/pitch across the scintillator surface, or strike map, is dependent on the primary magnetic field, plasma current, and potentially the toroidal field ripple or applied magnetic perturbations. These parameters vary during experiments, requiring unique Monte Carlo-calculated strike maps. The validity of strike map calculations is demonstrated through experiments in which neutral beams generate well described, and measurable, losses. A computational study of FILD phase-space sensitivity is performed, compared with measurements, and used to quantify uncertainties in the diagnostic. These results serve to constrain transport codes that simulate fast ion losses.

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