

Abstract Submitted
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Enabling High Fidelity Measurements of Energy and Pitch Angle for Escaping Energetic Ions with a Fast Ion Loss Detector¹ R. CHABAN, CWRU, D.C. PACE, G.R. MARCY, D. TAUSSIG, GA — Energetic ion losses must be minimized in burning plasmas to maintain fusion power, and existing tokamaks provide access to energetic ion parameter regimes that are relevant to burning machines. A new Fast Ion Loss Detector (FILD) probe on the DIII-D tokamak has been optimized to resolve beam ion losses across a range of 30 - 90 keV in energy and 40° to 80° in pitch angle, thereby providing valuable measurements during many different experiments. The FILD is a magnetic spectrometer; once inserted into the tokamak, the magnetic field allows energetic ions to pass through a collimating aperture and strike a scintillator plate that is imaged by a wide view camera and narrow view photomultiplier tubes (PMTs). The design involves calculating scintillator strike patterns while varying probe geometry. Calculated scintillator patterns are then used to design an optical system that allows adjustment of the focus regions for the 1 MS/s resolved PMTs. A synthetic diagnostic will be used to determine the energy and pitch angle resolution that can be attained in DIII-D experiments.

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