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Theory Experiment

Measurements and Modeling of Fast-ion Light From Edge Neutrals,* N.G. Bolte, W.W. Heidbrink, *University of California-Irvine*; E.A. Unterberg, *Oak Ridge National Laboratory* – Fast ions that are expelled to the plasma edge produce bursts of Doppler-shifted fast-ion D_α (FIDA) light when they charge exchange with edge neutrals [1]. Presently, active FIDA diagnostics use injected neutrals to diagnose confined fast ions but passive FIDA measurements could diagnose losses or provide information on the edge neutral density. In a quantitative test of the technique, prompt losses from a modulated beam provide a known source of fast ions. The edge neutral density is inferred by tomographic inversion of D_α and D_γ data. The FIDA spectrum is measured by an instrument that does *not* view the modulated beams. The data are compared with predictions of a new passive FIDA simulation code that is based on our active FIDA simulation code, FIDASIM [2].

[1] W.W. Heidbrink, et al., *Plasma Phys. Control. Fusion* **53**, 085007 (2011).

[2] W.W. Heidbrink, et al., *Commun. Comput. Phys.* **10**, 716 (2011).

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