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Comparison of Fast-ion D-alpha Measurements with Classical Theory[1] W.W. HEIDBRINK, A. BORTOLON, E. RUSKOV, UC Irvine, M. PODESTA, PPPL — The fast-ion D-alpha (FIDA) diagnostic technique measures profiles of Doppler-shifted light from energetic ions that neutralize in a heating beam. The TRANSP NUBEAM module calculates the fast-ion distribution function f, which is then used in a simulation code to predict the FIDA spectra. In MHD-quiescent plasmas in conventional tokamaks, measured FIDA data compare well with predictions [1] but, to date, similar agreement has not been obtained for NSTX. In a spherical tokamak, the large fast-ion gyroradius should cause asymmetries between the intensity of blue-shifted and red-shifted light; also, the large field-line pitch should produce additional spectral asymmetries. Data from a vertically-viewing FIDA diagnostic show smaller spectral asymmetries than expected. Comparisons with data from a newly installed tangentially-viewing FIDA diagnostic are reported, as well as modifications in f that improve agreement with experiment.

[1] Y. Luo *et al.*, Phys. Pl. **14** (2007) 112503; B. Geiger *et al.*, Pl. Phys. Cont. Fusion **53** (2011) 065010.

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