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Comparison of Fast-ion D-alpha Measurements with Theory in MHD-quiescent Plasmas[1] E. RUSKOV, W.W. HEIDBRINK, M. PODESTA, University of California, Irvine — The NSTX fast-ion D-alpha (FIDA) diagnostic measures the Doppler-shifted charge-exchange recombination light from energetic ions that neutralize in a heating beam. The present instrument views the beam nearly vertically. In a spherical tokamak (ST), the large fast-ion gyroradius is expected to cause an asymmetry between the intensity of blue-shifted and red-shifted light. In addition, for near-tangential injection, the large field-line pitch associated with the large poloidal field in an ST should also produce spectral asymmetries. In a dedicated experiment designed to test these predictions, toroidal field and plasma current scans were performed in low-power neutral-beam heated discharges that had little detectable fast-ion driven instabilities or MHD. The TRANSP NUBEAM module calculates the fast-ion distribution function f, which is then used in a FIDA simulation code to predict the spectra. In preliminary analysis, large discrepancies between predicted and experimental spectra are observed.

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