

Abstract Submitted  
for the GEC08 Meeting of  
The American Physical Society

**Models of  $H\alpha$  Doppler emission profiles from cathode fall discharges in hydrogen** A.V. PHELPS, JILA, University of Colorado and NIST — Doppler profiles are calculated for the  $H\alpha$  line excited in collisions of fast atoms, ions, molecules, and electrons with  $H_2$  in the cathode fall of low-pressure, moderate-current hydrogen discharges. We use a multi-beam model of the particle fluxes and energy distributions, assumed angular distributions of particles approaching and reflected by the cathode, and a simplified cathode fall model. Spectral profiles are compared with measurements parallel and perpendicular to the tube axis for the conditions reported by Cvetanović et al.<sup>1</sup> Excitation is principally by fast H atom collisions with  $H_2$  as they approach and leave the cathode and by the electrons leaving the cathode. The calculated relative magnitudes of the wings and core of the parallel and perpendicular  $H\alpha$  line profiles and the sensitivity of the emission produced by reflected atoms to cathode material are in agreement with experiment.

<sup>1</sup>N. Cvetanović, M. M. Kuraica, and N. Konjević, J. Appl. Phys. **97**, 033302 (2005).

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Date submitted: 17 Jun 2008

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