Excitation of the near-uv continuum of H$_2$ by fast H atoms A.V. PHELPS, JILA, U. of Colorado and NIST — We model the production of the near-uv continuum of H$_2$ by collisions of fast atoms, fast ions, and electrons with H$_2$ in a uniform-electric-field drift tube.[1] Relative intensities versus position at 300 Td $< E/N < 20$ kTd (1 Td $= 10^{-21}$ V m^2), at 0.95 to 0.12 Torr, and 4 cm electrode separation are normalized to electron excitation coefficients at low E/N. Electron and heavy-particle induced excitation are separated by their growth toward the anode or the cathode, respectively. The excitation attributed to heavy-particles increases approximately as the cube of the distance from the anode. This growth is consistent with a three-step reaction sequence starting with a roughly uniform density of H$_2^+$ produced by electrons. A multi-beam model for the electrons, H$^+$, H$_2^+$, H$_3^+$, fast H$_2$, and fast H confirms this dependence. The principal excitation step is fast H + H$_2$ $\rightarrow$ H$_2(a^3\Sigma_g^+)$ + H with a cross section roughly twice that for Hα excitation.

[1]Z. Lj. Petrović and A. V. Phelps, Int'l. Seminar on Reactive Plasmas, Nagoya, June 17-19, (1991).

A. V. Phelps
JILA, U. of Colorado and NIST

Electronic form version 1.4