ASTR 792
T/R 9:30 - 10:45 AM
Due November 14

Week #13

Draine 5.1ac

Both H_2 and HD have similar internuclear separation $r_0 \approx 0.741$Å. Assume that the molecules can be approximated as rigid rotors.

(a) Calculate $[E(v=0,J) - E(v=0,J=0)]/k$ for H_2 for $J=1$, $J=2$, and $J=3$.

(c) Because H_2 has no electric dipole moment, $\Delta J = \pm 1$ transitions are forbidden, and instead the only radiative transitions are electric quadrupole transitions with $\Delta J = 0, \pm 2$. Calculate the wavelengths of the $J = 2 \rightarrow 0$ and $J = 3 \rightarrow 1$ transitions of H_2