THE FORBIDDEN ROTATION AND ROTATION-VIBRATION SPECTRUM OF H_2^+

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Previous studies of the g/u electronic symmetry breaking interaction between the rotation-vibration levels of the $X\,^2\Sigma_g^+$ ground electronic state and the $A\,^2\Sigma_u^+$ first excited electronic state of H_2^+ have focused on explaining the large hyperfine structure observed in some rovibronic transitions between these electronic states[a,b]. The interaction is an ortho-para interaction between levels of the two electronic states. It gives rise to an interesting new electric dipole spectrum that consists of forbidden rotation and rotation-vibration transitions within the $X\,^2\Sigma_g^+$ ground state involving levels that are near the dissociation limit[c]. Such a spectrum will occur for any homonuclear diatomic ion having nuclei with non-zero spin such as $^3He_2^+$, Li_2^+ and $^{21}Ne_2^+$.

[a] R. E. Moss, *Chem. Phys. Lett.* **206**, 83 (1993), and references therein.

[b] Section 17.7 of the book *Molecular Symmetry and Spectroscopy,* 2nd Edition, by P. R. Bunker and P. Jensen, NRC Research Press, Ottawa 1998. See http://www.nrc.ca/cisti/journals/41653 for the table of contents and ordering information.

[c] P. R. Bunker and R. E. Moss, *Chem. Phys. Lett.* **316**, 266 (2000).