Quantum States of Atoms and Molecules by David Hanson, Theresa Julia Zielinski, Erica Harvey, and Robert Sweeney is an introduction to quantum mechanics as it relates to spectroscopy, the electronic structure of atoms and molecules, and molecular properties. A digital, living textbook, it provides opportunities not found in conventional textbooks—opportunities that allow students to develop skills in information processing, critical thinking or analytical reasoning, and problem solving that are so important for success.
4: Electronic Spectroscopy of Cyanine Dyes

5: Translational States

6: Vibrational States

7: Rotational States
8: The Hydrogen Atom

9: The Electronic States of the Multielectron Atoms

\[ E_n^{(1)} = \langle \phi_n | H_1 | \phi_n \rangle \]
\[ c_{nk}^{(1)} = \frac{\langle \phi_k | H_1 | \phi_n \rangle}{E_n^{(0)} - E_k^{(0)}} \]
\[ E_n^{(2)} = \sum_{k \neq n} \frac{|\langle \phi_k | H_1 | \phi_n \rangle|^2}{E_n^{(0)} - E_k^{(0)}} \]

10: Theories of Electronic Molecular Structure

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