

Let's take stock : Summary on our toolbox

- TISE \rightarrow Huge Matrix [Exact] (useful in Variational Method/Perturbation)

- Variational Method

- Theorem, How it works, $\Phi_{\text{trial}} = c_1\phi_1 + c_2\phi_2$

related to matrix problem

- Time-independent Perturbation Theory

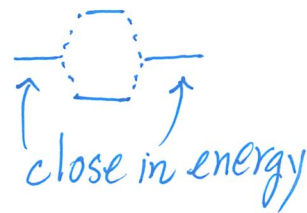
$$E_n \approx E_n^{(0)} + \int \psi_n^{*(0)} \hat{H}' \psi_n^{(0)} d\tau + \sum_{i \neq n} \frac{|H'_{in}|^2}{E_n^{(0)} - E_i^{(0)}}$$

$$\psi_n \approx \psi_n^{(0)} + \sum_{i \neq n} \frac{\int \psi_i^{*(0)} \hat{H}' \psi_n^{(0)} d\tau}{E_n^{(0)} - E_i^{(0)}} \psi_i^{(0)}$$

Non-degenerate
Perturbation Theory

- Matrix interpretation of results

- Degenerate Perturbation Theory [Treat 2x2 (or 3x3) exactly]



We will apply these methods to understand the

- physics of atoms and molecules