Two-body EIHH

Given A-body Hamiltonian : $H^{[A]} = H_0 + V$

- Divide Hilbert space in model space $\mathcal{P}$ and residual sp. Q
- Replace $H^{[A]}$ by effective model space Hamiltonian

$$H^{[A]\,eff} = \mathcal{P} H_0 \mathcal{P} + \mathcal{P} V^{[A]\,eff} \mathcal{P}$$

requiring that $H^{[A]}$ and $H^{[A]\,eff.}$ have the same low lying energy spectrum

In general $H^{[A]\,eff}$: A-body interaction

its construction is as difficult as finding full space solution

$\Rightarrow$ approximate $H^{[A]\,eff}$ (under condition that for $\mathcal{P} \to 1$ true spectrum is obtained)

HH Hamiltonian : $H^{[A]} = \underbrace{T_\rho}_{\sum_{i=1}^{A} \frac{\vec{p}_i^{\,2}}{2m}} + \boxed{T_K(\rho) + \underbrace{V^{[A]}(\rho, \Omega_A)}_{\sum_{i<j} v_{ij}}}$

Adiabatic Hamiltonian

$T_\rho = -\frac{1}{2m} \Delta_\rho$ hyperradial kinetic energy

$T_K(\rho) = \frac{1}{2m} \frac{\hat{K}^2}{\rho^2}$ hyperspherical kinetic energy

$\hat{K}$: hypersph. grand angular momentum operator

$\rho = \left(\sum_{i=1}^{A-1} \vec{\eta}_{ij}^{\,2} \right)^{1/2}$ → Jacobi coord., Ω_A : $(3A-4)$-dim. hyper angle