

In general for a many body system
the information contained in the w.f.
is "physically redundant"

$$m.e. = \int \psi_f^*(123...A) \mathcal{O} \psi_f(123...A) d1 d2 d3 ... dA$$

$$\text{if } \mathcal{O} = \sum_i \mathcal{O}_i \Rightarrow m.e. = A \int \mathcal{O}_1 \left(\int_f^{C1} \right) d1$$

$$\text{if } \mathcal{O} = \sum_{i,j} \mathcal{O}_{ij} \Rightarrow m.e. = \frac{A(A-1)}{2} \int \mathcal{O}_{12} \left(\int_f^{C2} \right) d1 d2$$

$$\text{if } \mathcal{O} = \sum_{i,j,k} \mathcal{O}_{ijk} \Rightarrow m.e. = \frac{A(A-1)(A-2)}{6} \int \mathcal{O}_{123} \left(\int_f^{C3} \right) d1 d2 d3$$

where

$$\int_f^{Cn} (1,2...n) = \int_f \psi_f^*(1,2...n, n+1...A) \psi_f(1,2,n, n+1...A) d(n+1) d(n+2) ... dA$$