

$$\hat{W}_N = \frac{1}{4} \sum_{pqrs} \langle pq || rs \rangle \{ \hat{p}^\dagger \hat{q}^\dagger \hat{s} \hat{r} \} =$$

The equation represents the normal-ordered two-body interaction operator \hat{W}_N in terms of a sum over all possible four-index contractions of the two-body interaction $\langle pq || rs \rangle$ and the corresponding normal-ordered product of creation and annihilation operators $\{ \hat{p}^\dagger \hat{q}^\dagger \hat{s} \hat{r} \}$. The diagrams illustrate the various ways these operators can be contracted, including exchange and direct terms, and their corresponding Feynman-like representations with arrows indicating the flow of particles.