2.3 Feldoperatoren

$$\hat{N} = \sum_{\lambda=1}^{\infty} a_\lambda^+ a_\lambda = \sum_{\lambda=1}^{\infty} \int \psi_\lambda(\underline{x})\, \hat{\psi}^+(\underline{x})\, d\tau \int \psi_\lambda^*(\underline{x}')\, \hat{\psi}(\underline{x}')\, d\tau'$$

$$= \int \underbrace{\sum_{\lambda=1}^{\infty} \psi_\lambda(\underline{x})\, \psi_\lambda^*(\underline{x}')}_{=\delta(\underline{x}-\underline{x}')} \hat{\psi}^+(\underline{x})\, \hat{\psi}(\underline{x}')\, d\tau\, d\tau'$$

$$= \int \hat{\psi}^+(\underline{x})\, \hat{\psi}(\underline{x})\, d\tau$$

$$\phi(\bar{r}) = \begin{pmatrix} \phi_{\frac{1}{2}}(\bar{r}) \\ \phi_{-\frac{1}{2}}(\bar{r}) \end{pmatrix}$$

$$\begin{pmatrix} \phi_{\frac{1}{2}}(\bar{r}) \\ \phi_{-\frac{1}{2}}(\bar{r}) \end{pmatrix} = \begin{pmatrix} h_{\frac{1}{2}\frac{1}{2}} & h_{\frac{1}{2}-\frac{1}{2}} \\ h_{-\frac{1}{2}\frac{1}{2}} & h_{-\frac{1}{2}-\frac{1}{2}} \end{pmatrix} \begin{pmatrix} \psi_{\frac{1}{2}}(\bar{r}) \\ \psi_{-\frac{1}{2}}(\bar{r}) \end{pmatrix}$$