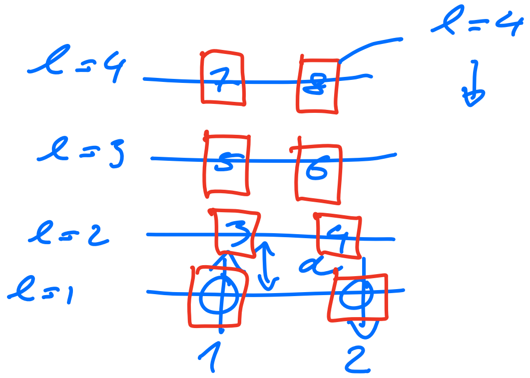
$$H = H_0 + H_I$$

$$H_0 = \sum_{i=1}^{N} \langle i | h_0 | i \rangle a_i^\dagger a_i - g \sum_{i<j}^{N} a_{i+}^\dagger a_{i-}^\dagger a_{j-} a_{j+}$$

$$h_0 | i \rangle = \varepsilon_i | i \rangle$$

en-partikkel basis

$n = 8$

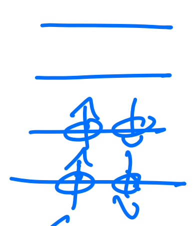


$N = 4$

$n = 8$

$$\# SD = \binom{8}{4} = \frac{5 \cdot 6 \cdot 7 \cdot 8}{1 \cdot 2 \cdot 3 \cdot 4} = 70$$

$\Phi_0 =$



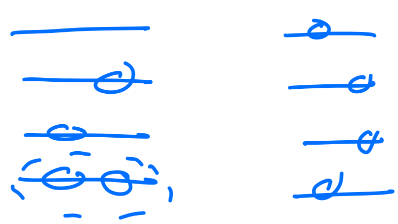
$S = 0$

$P = 2$

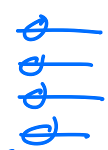
$a_1^\dagger a_2^\dagger a_3^\dagger a_4^\dagger$

$l = 2 \uparrow$

$\Phi_1 =$



$\langle \Phi_1 | H | \Phi_1 \rangle$



$S = 2$

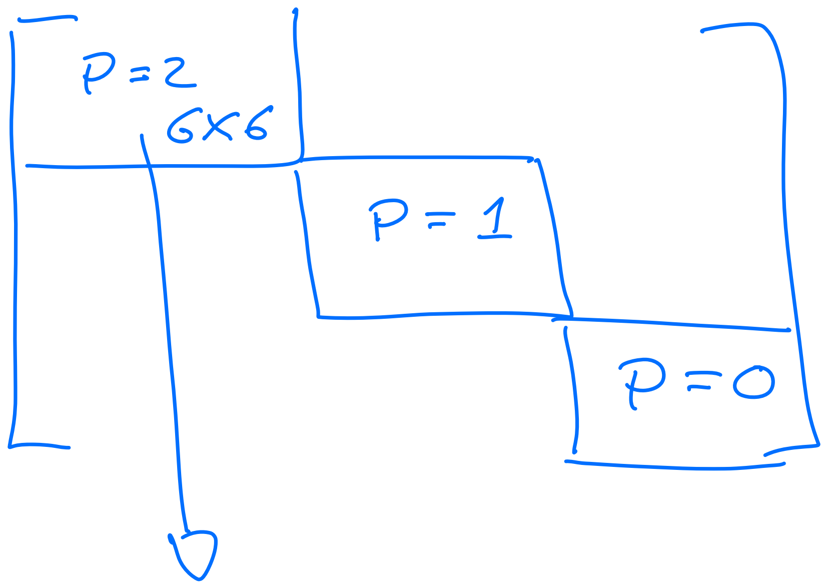
$$\langle \Phi_0 | H | \Phi_0 \rangle = \langle 0 | a_4 a_3 a_2 a_1 \hat{H} a_1^\dagger a_2^\dagger a_3^\dagger a_4^\dagger | 0 \rangle$$

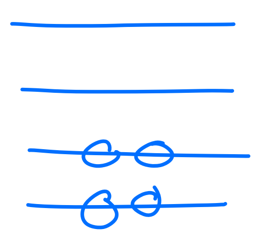
H konserverer totalt spin S og antall par.

$$\mathbb{H} \in \mathbb{C}^{70\times 70}$$

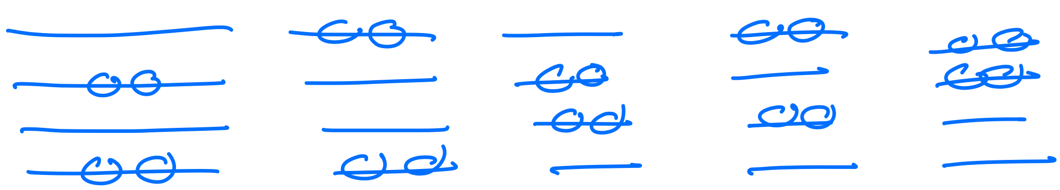
$$H_{ij} = \langle \Phi_i | H | \Phi_j \rangle$$

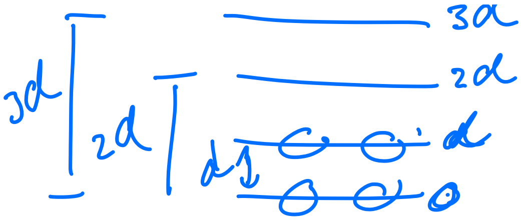
$\mathbb{H} =$



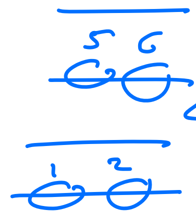


$$\begin{matrix} p=2 \\ n=4 \end{matrix} \Rightarrow \binom{4}{2} = 6$$





H



$\langle 1234 | a_i^{\dagger} a_i | 1256 \rangle$

H_0

$$\langle \Phi_0 | \; H \; | \Phi_1 \rangle$$

$$\langle \Phi_0 | \sum \varepsilon_i a_i^{\dagger} a_i | \Phi_0 \rangle = 2\alpha$$