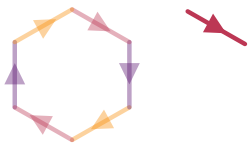
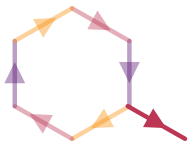
$$[W_p, K_{ij}] = [W_p, H] = 0$$

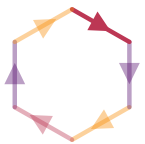


No Overlap $\quad [W_p, K_{ij}] = 0$



One site

$$\begin{aligned}[W_p, K_{ij}] &= [...\sigma_1^{\alpha}\sigma_2^{\alpha}\sigma_2^{\beta}\sigma_3^{\beta}..., \sigma_2^{\gamma}] \\ &= [\sigma_2^{\alpha}\sigma_2^{\beta}, \sigma_2^{\gamma}] = 0\end{aligned}$$



Two sites

$$\begin{aligned}[W_p, K_{ij}] &= [...\sigma_1^{\alpha}\sigma_2^{\alpha}\sigma_2^{\beta}\sigma_3^{\beta}\sigma_3^{\gamma}\sigma_4^{\gamma}..., \sigma_2^{\beta}\sigma_3^{\beta}] \\ &= [\sigma_2^{\gamma}\sigma_3^{\alpha}, \sigma_2^{\beta}\sigma_3^{\beta}] = 0\end{aligned}$$