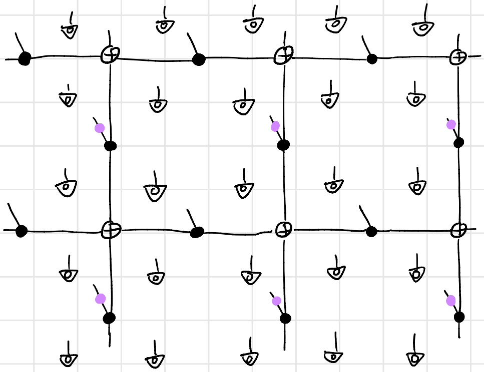
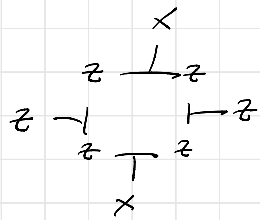
Derby-Klassen TN for vacuum state



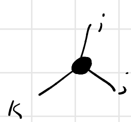
Note: I used a basis where the stabilizers are



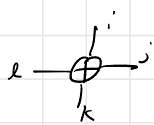
So edge operators would be

$$\tilde{E}_{ij} = \begin{cases} X_i Y_j Z_{f(i,j)} & \downarrow \\ -X_i Y_j Z_{f(i,j)} & \uparrow \\ X_i Y_j X_{f(i,j)} & \rightarrow, \leftarrow \end{cases}$$

Tensor Notation:

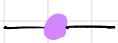


$$C_{ijk} = \begin{cases} 1 & i=j=k \\ 0 & \text{else} \end{cases}$$



$$F_{ijkl} = \begin{cases} 1 & i+j+k+l = 0 \bmod 2 \\ 0 & \text{else} \end{cases}$$

Hadamard:

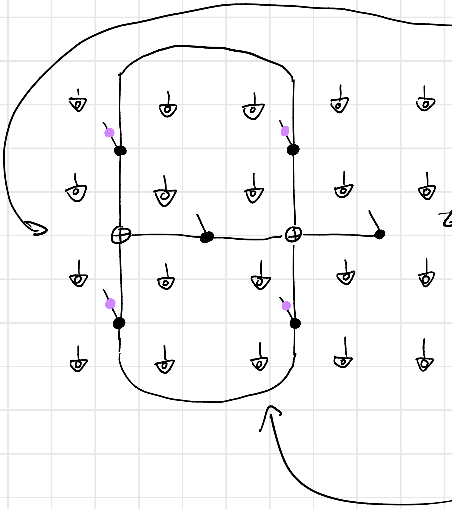
 $= \boxed{H} = \frac{1}{\sqrt{2}}\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$

These are the qubits corresponding to the fermionic occupancies

 $= \begin{pmatrix} 1 \\ 0 \end{pmatrix}$

With boundaries

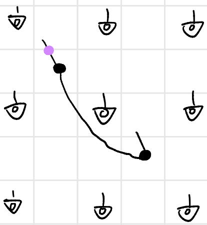
4×5 lattice as in Fig. 1 in the paper



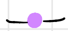
Either:

- Truncate
- Join indices

3 × 3



where:  $= \delta_{ij}$

 $H = \frac{1}{\sqrt{2}}\begin{pmatrix}1 & 1\\ 1 & -1\end{pmatrix}$