$$M_{K,2} = \left[\begin{array}{c|c} 2D_1^2 - Id & 2D_1D_2 \\ \hline 2D_1D_2 & 2D_2^2 - Id \end{array}\right]$$

$$M_{K,1} = \begin{bmatrix} \boxed{Z} & & & \\ & \boxed{Z} & & \\ & & \ddots & \\ & & & \boxed{Z} \end{bmatrix} \qquad M_{K,2} = \begin{bmatrix} \boxed{\cos\theta_1 Z + \sin\theta_1 X} & & & \\ & \boxed{c_2 Z + s_2 X} & & \\ & & \ddots & \\ & & & \boxed{} \end{bmatrix}$$

JORDAN'S LEMMA:

Decompose the space into two-dimensional subspaces.

$$B_{AB} = M_{A,1} M_{B,1} + M_{A2} M_{B1} + M_{A1} M_{B1} - M_{A,2} M_{B,2}$$

STEP 2

$$B_{AB} \leq 2\sqrt{1 + \langle Y_A Y_B \rangle^2 - \langle Y_A Y_C \rangle^2 - \langle Y_B Y_C \rangle^2}$$

$M_{A,i} = \hat{a}_i \cdot \vec{\sigma}_r$

$M_{B,i} = \hat{b}_i \cdot \vec{\sigma}_r$

$\vec{\sigma}_r = (X, Z)$

Rewrite B_{AB} as

$$\max B_{AB} = \max_{\hat{a}_i \hat{b}_i} \left(\hat{a}_1^t T_{AB} (\hat{b}_1 + \hat{b}_2) + \hat{a}_2^t T_{AB} (\hat{b}_1 - \hat{b}_2) \right)$$

$$T_{AB} = \begin{bmatrix} \langle X_A X_B \rangle & \langle X_A Z_B \rangle \\ \langle Z_A X_B \rangle & \langle Z_A Z_B \rangle \end{bmatrix}$$

$$\leq \sqrt{\langle X_A X_B \rangle^2 + \langle X_A Z_B \rangle^2 + \langle Z_A X_B \rangle^2 + \langle Z_A Z_B \rangle^2}$$

CHECK THIS RHS by using an The 8-dimensional vector to evaluate. The correlation functions to obtain "step 2" above.

We also use $B_{AC} \leq 2\sqrt{1 + \langle Y_A Y_C \rangle^2 - \langle Y_A Y_B \rangle^2 - \langle Y_B Y_C \rangle^2}$

$$B_{AB}^2 + B_{AC}^2 \leq 8\left(1 - \cancel{\langle Y_B Y_C \rangle}^{0}{}^2\right) \quad \text{UPPER BOUND.}$$

TIGHTNESS: $|\psi\rangle = \frac{1}{\sqrt{2}} \left(\cos\theta\, |001\rangle + \sin\theta\, |010\rangle + |111\rangle \right)$