Lecture FYS5419, February 14, 2024

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

$$|\psi\rangle = \alpha_0 |0\rangle + \alpha_1 |1\rangle$$

$$H|\psi\rangle = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} \alpha_0 \\ \alpha_1 \end{bmatrix}$$

$$= \frac{\alpha_0}{\sqrt{2}} [|0\rangle + |1\rangle] + \frac{\alpha_1}{\sqrt{2}} [|0\rangle - |1\rangle]$$

$$H|0\rangle = \frac{1}{\sqrt{2}} [|0\rangle + |1\rangle]$$

$$H|1\rangle = \frac{1}{\sqrt{2}} [|0\rangle - |1\rangle]$$

$$\sigma_x = X = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

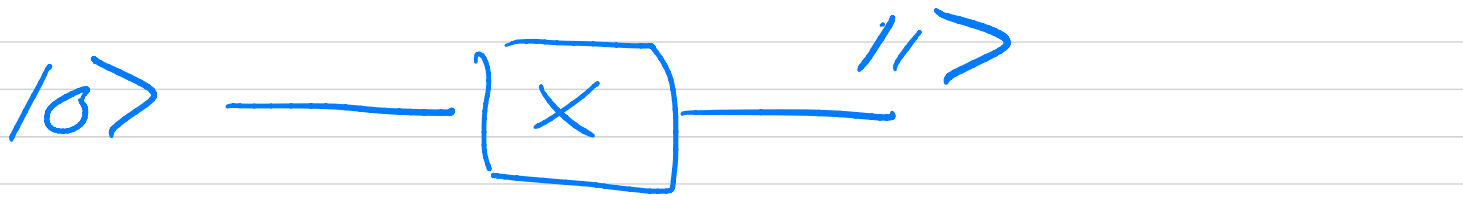
$$\sigma_z = Z = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

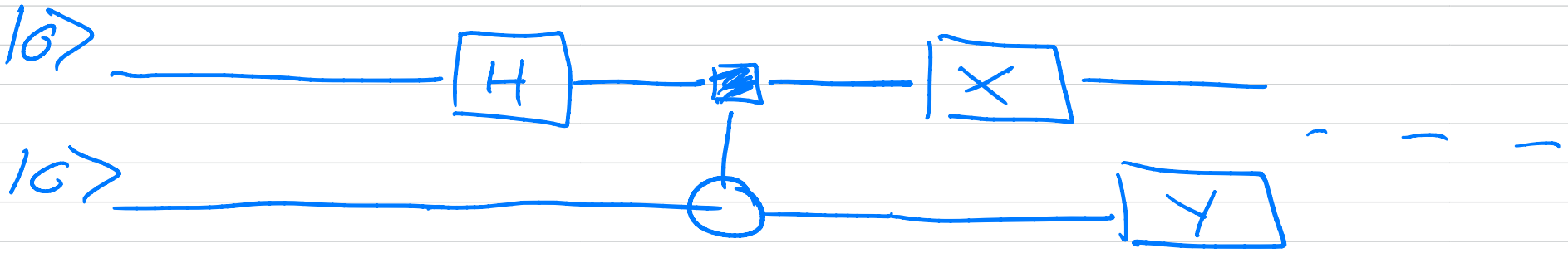
$$\sigma_y = Y = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$$

$$Z = HXH$$

$$HYH = -Y = XYX$$

$$HZH = X \qquad XZ = iY$$





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