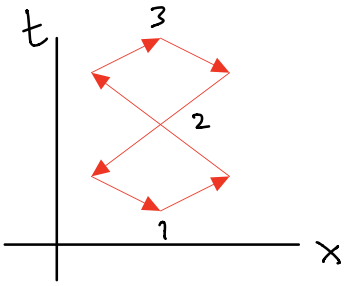
Indistinguishable particles

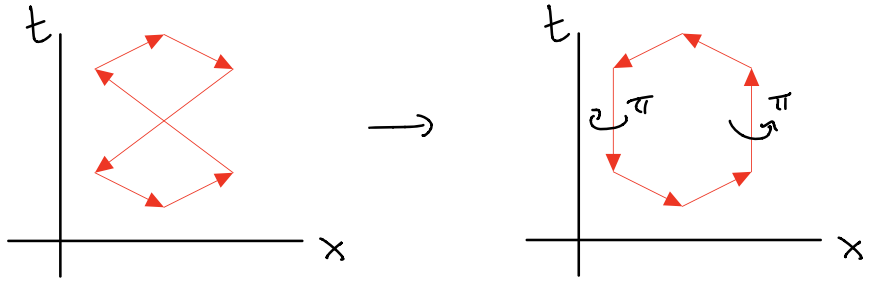
a)



1) creation
2) exchange
3) annihilation

b)

c)



d)

exchange carries $e^{-i2\pi S_z/\hbar}$

rotation

$e^{-i2\pi S_z/\hbar} = e^{-i\pi 2m} = (-1)^{2m} = (-1)^{2S}$

POVMs and QM state Discrimination

$\langle \psi_1 | \psi_0 \rangle \neq 0$

$Q = p_0 |\psi_0\rangle\langle\psi_0| - p_1 |\psi_1\rangle\langle\psi_1|$

e-val: $\{q_+, q_-\}$

e-vec: $\{|\pm\rangle\}$

$|\psi_0\rangle = \cos\theta |0\rangle + \sin\theta |1\rangle$

$|\psi_1\rangle = \cos\theta |0\rangle - \sin\theta |1\rangle$

$Q = \begin{pmatrix} 0 & \cos\theta \sin\theta \\ \cos\theta \sin\theta & 0 \end{pmatrix}$, $p_0 = p_1 = \frac{1}{2}$

$\Pi_0 \Pi_1 = \Pi_0 (1 - \Pi_0) = \Pi_0 - \Pi_0^2 = 0$

since Π_0 is a projector.

b)

(1) Q is still Hermitian so the eigenveters will be orthogonal

(2)

$$\frac{\langle \psi_0 | \Pi_0 | \psi_c \rangle}{\langle \psi_0 | \psi_c \rangle} = \langle \psi_c | \Pi_c | \psi_0 \rangle$$

is going to be proportional to P_0 and $\langle \psi_1 | \Pi_1 | \psi_1 \rangle$ is going to be proportional to P_1, and since $P_0 > P_1$, $|\psi_c\rangle$ will be closer to Π_0 than $|\psi_1\rangle$ is to τ