

a) distinguishable particles

$$\Psi(x_1, x_2, x_3) = \Psi_a(x_1) \Psi_b(x_2) \Psi_c(x_3)$$

b) identical bosons:

$$\Psi(x_1, x_2, x_3) = \frac{1}{\sqrt{6}} \left( \Psi_a(x_1) \Psi_b(x_2) \Psi_c(x_3) + \Psi_a(x_1) \Psi_c(x_2) \Psi_b(x_3) + \Psi_b(x_1) \Psi_a(x_2) \Psi_c(x_3) + \Psi_b(x_1) \Psi_c(x_2) \Psi_a(x_3) + \Psi_c(x_1) \Psi_a(x_2) \Psi_b(x_3) + \Psi_c(x_1) \Psi_b(x_2) \Psi_a(x_3) \right)$$

c) identical fermions:

$$\Psi(x_1, x_2, x_3) = \frac{1}{\sqrt{6}} \begin{vmatrix} \Psi_a(x_1) & \Psi_b(x_1) & \Psi_c(x_1) \\ \Psi_a(x_2) & \Psi_b(x_2) & \Psi_c(x_2) \\ \Psi_a(x_3) & \Psi_b(x_3) & \Psi_c(x_3) \end{vmatrix} = \left( \Psi_a(x_1) \Psi_b(x_2) \Psi_c(x_3) - \Psi_a(x_1) \Psi_b(x_3) \Psi_c(x_2) - \Psi_b(x_1) \Psi_a(x_2) \Psi_c(x_3) + \Psi_b(x_1) \Psi_a(x_3) \Psi_c(x_2) + \Psi_c(x_1) \Psi_a(x_2) \Psi_b(x_3) - \Psi_c(x_1) \Psi_a(x_3) \Psi_b(x_2) \right) \frac{1}{\sqrt{6}}$$