Part 2. continuation

$$\Psi_{12} = \frac{1}{\sqrt{2}} \{ \uparrow\downarrow - \downarrow\uparrow \}$$

① ②

↑ ↓ ↓ ↑

$$\Psi_{\pm}(\vec{r}_1, \vec{r}_2) = A \{ \psi_a(\vec{r}_1)\psi_b(\vec{r}_2) \pm \psi_b(\vec{r}_1)\psi_a(\vec{r}_2) \}$$

r_1 and r_2 = spetial coordinates

Ψ_+ → bosons Ψ_- → fermions

Postulates

Postulates

Question?

no two electrons can have the same quantum state

By Pauli exclusion principle

Why [-] to fermions

fermions cannot be in the same state as bozons

Ψ_+ = fermions

$$\underbrace{\Psi(\vec{r}_1, \vec{r}_2)}_{\text{coupled state}} = A \{ \psi_a(r_1)\psi_a(r_2) - \psi_b(r_1)\psi_b(r_2) \}$$

ONE

$\psi_2 = \psi_b$

$\psi_2(r_1)\psi_2(r_2) - \psi_a(r_1)\psi_a(r_2) = 0$

$\psi_b(r_1)\psi_b(r_2) - \psi_b(r_1)\psi_b(r_2) = 0$