L4

EPR Paradox

Let Alice and Bob have two systems of different spin and be separated 5000kms

Alice - $|\psi_a>= \alpha_a| \uparrow> +\beta_a| \downarrow>$

Bob - $|\psi_b>= \alpha_b| \uparrow> +\beta_b| \downarrow>$

- Alice -> α_a and $P_\alpha = 0.5$
- Similarly for β_a

Bob -> α_b and β_b

- now if Alice measures her system, she immediately knows the spin of Bob's, who is $5000 kms$ away
- > the communication between Bob and Alice is faster than speed of light, even though Bob didn't measure anything.

Schrondinger's cat

$|\psi>= |dead, X > +|alive, O >$

We can represent this as spin,

- Bomb burst - 1
- Bomb not burst - 0

$|Bomb>= \alpha_1| \uparrow> +\beta_1| \downarrow>$

$|Cat>= \alpha_2| \uparrow> +\beta_2| \downarrow>$

$|\psi>= |\alpha|| \uparrow\uparrow> +|\beta|| \downarrow\downarrow>$
(Note, the other two states aren't possible i.e. Cat alive with bomb burst, cat ded without bomb burst)

the probability is $|\alpha|^2$