

Physics 102 - March 14, 2011

Welcome

Back!



EPR Paradox — Einstein, Podolski, Rosen 1935

"Spooky Action at a distance"



Two photons are produced at once — They are correlated.

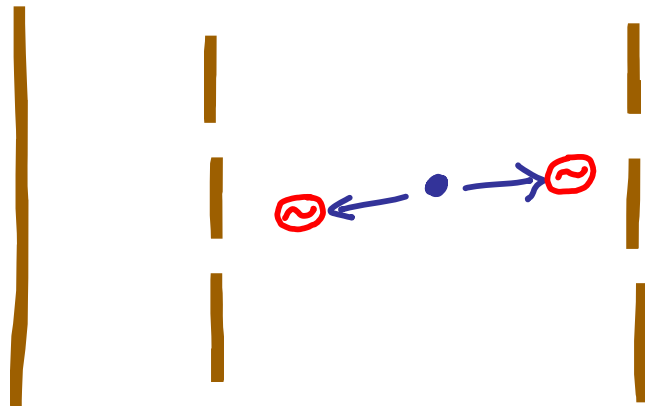
If one has spin one way the other has spin the other way.

They are in an "entangled quantum STATE"

When observer A observes the spin of photon — The wavefunction collapses and the spin of the photon observer B will observe is determined.

But collapse instantaneous and observers A + B far apart

Does this mean information conveys faster than speed of light?

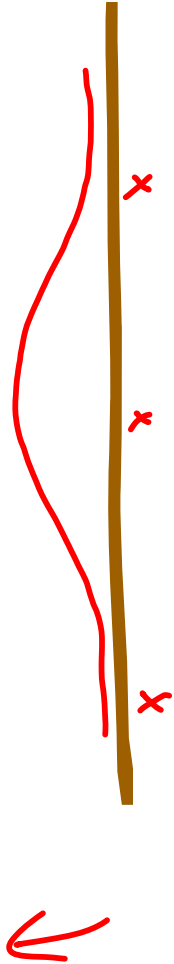
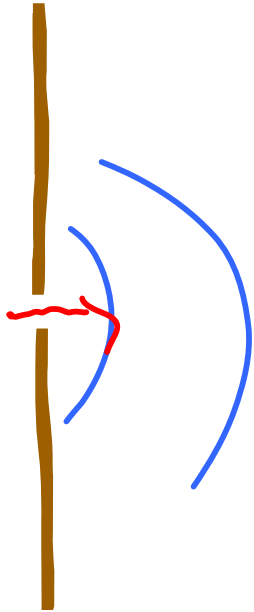


Hobson p. 305

Copenhagen

vs.

Many Worlds + Decoherence

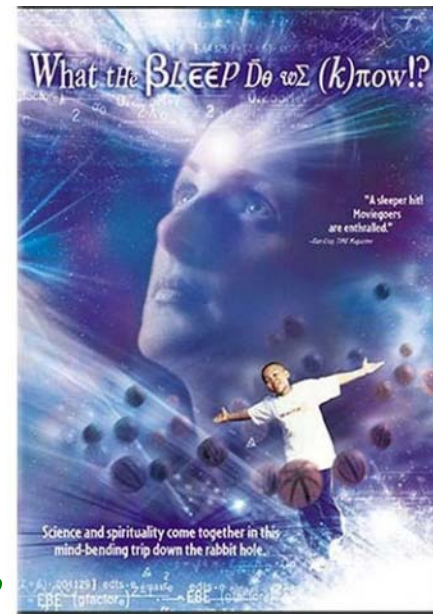


Law of Attraction

If you want something at truly believe it is possible, you'll get it.

Four things must be done:

- 1) Know exactly what you want.
- 2) Ask the universe for it.
- 3) Feel, behave and know as if the object of your desire is already yours.
- 4) Be open to receive it and let go of the outcome



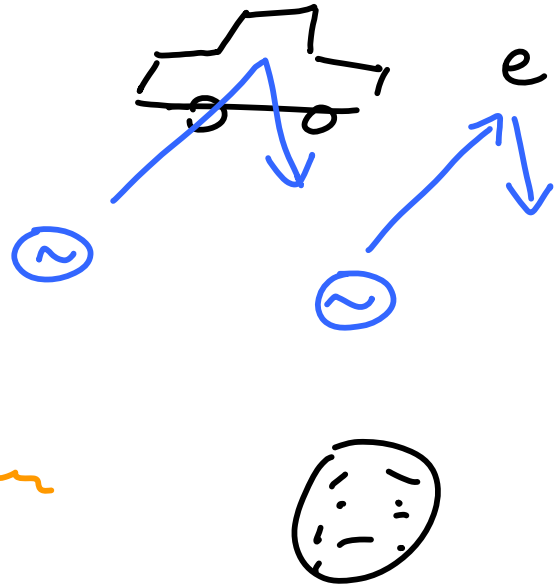
Somehow the mind chooses the path or causes the collapse so that the universe gives you what you want... so says the proponents

Heisenberg's Uncertainty Principle

$$\Delta x \Delta p \geq \frac{h}{2\pi}$$

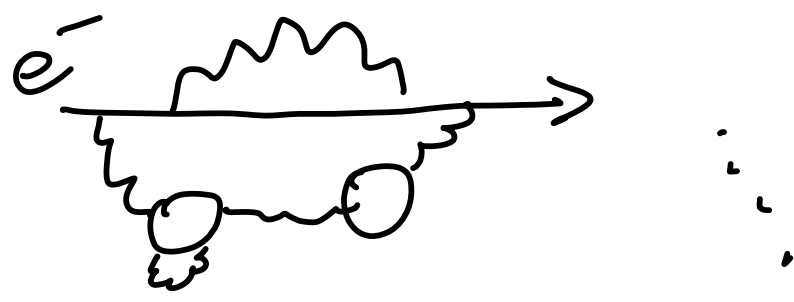
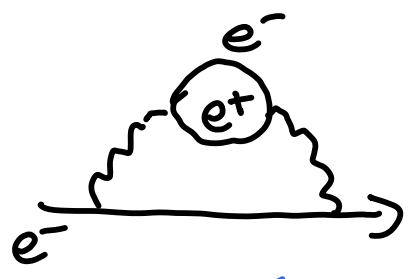
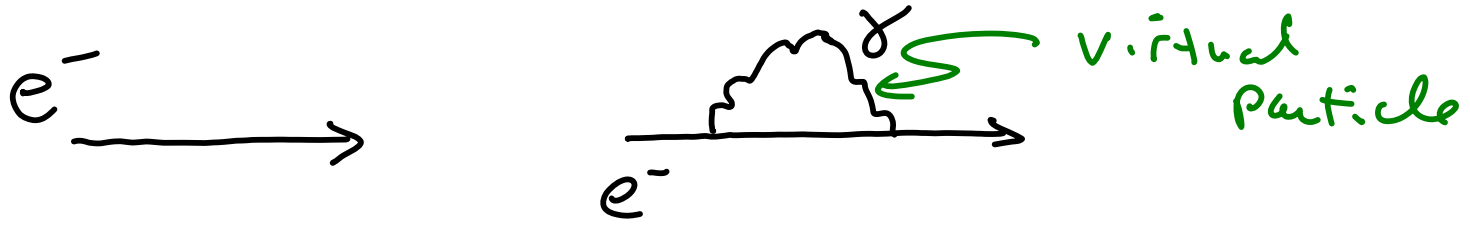
— small #

Δx uncertainty in position
 Δp uncertainty in momentum

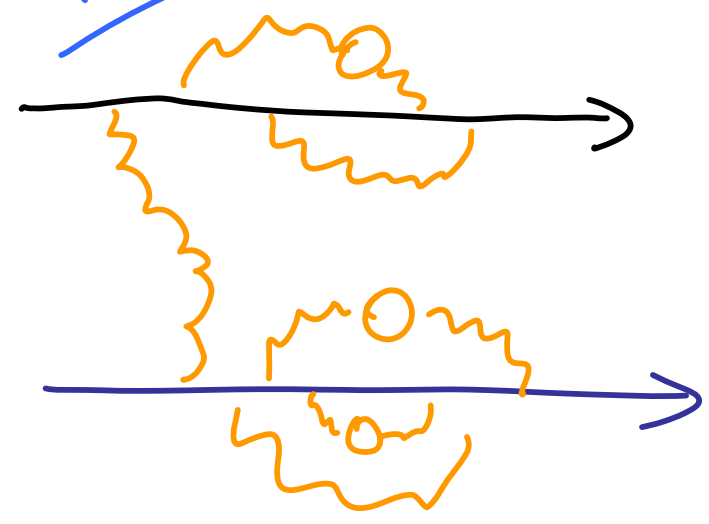


$$\Delta E \Delta t \geq \frac{h}{2\pi}$$

uncertainty in energy
uncertainty in time
Time over which something exists



Quantum
Field
theory



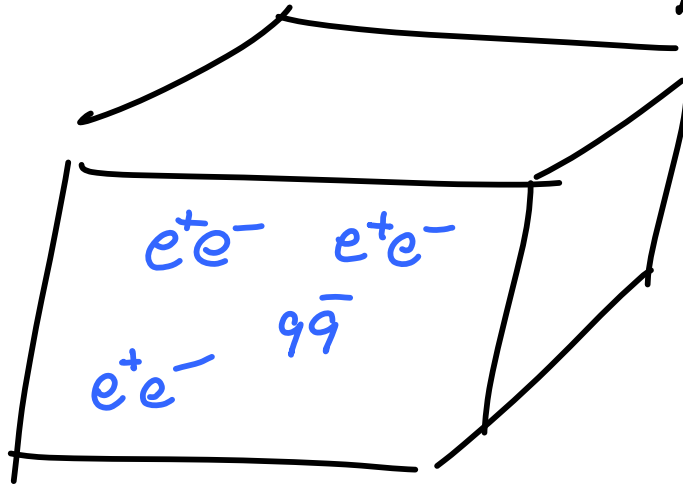
Quantum
Electrodynamics
Richard Feynman

essence of force in
quantum field theory
is exchange of virtual
particles

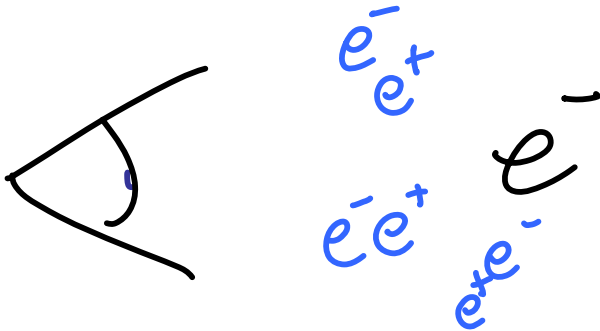
Vacuum is NOT empty - fleeting Particle - Antiparticle pairs

Appear
consistent w/
Heis. Unc.
Principle

~~Nothing~~



Quantum
Vacuum



Vacuum polarization -

can actually see
an effect on Atomic
spectra (Lamb shift)

The Journey into Inner Space

Nuclear physics



By the way, the word
'nuclear' is pronounced

nū-k-lē-ər

and not

nū-k-ū-lər.

Got that Mr.
President!?



Cloud chamber

Thorium

