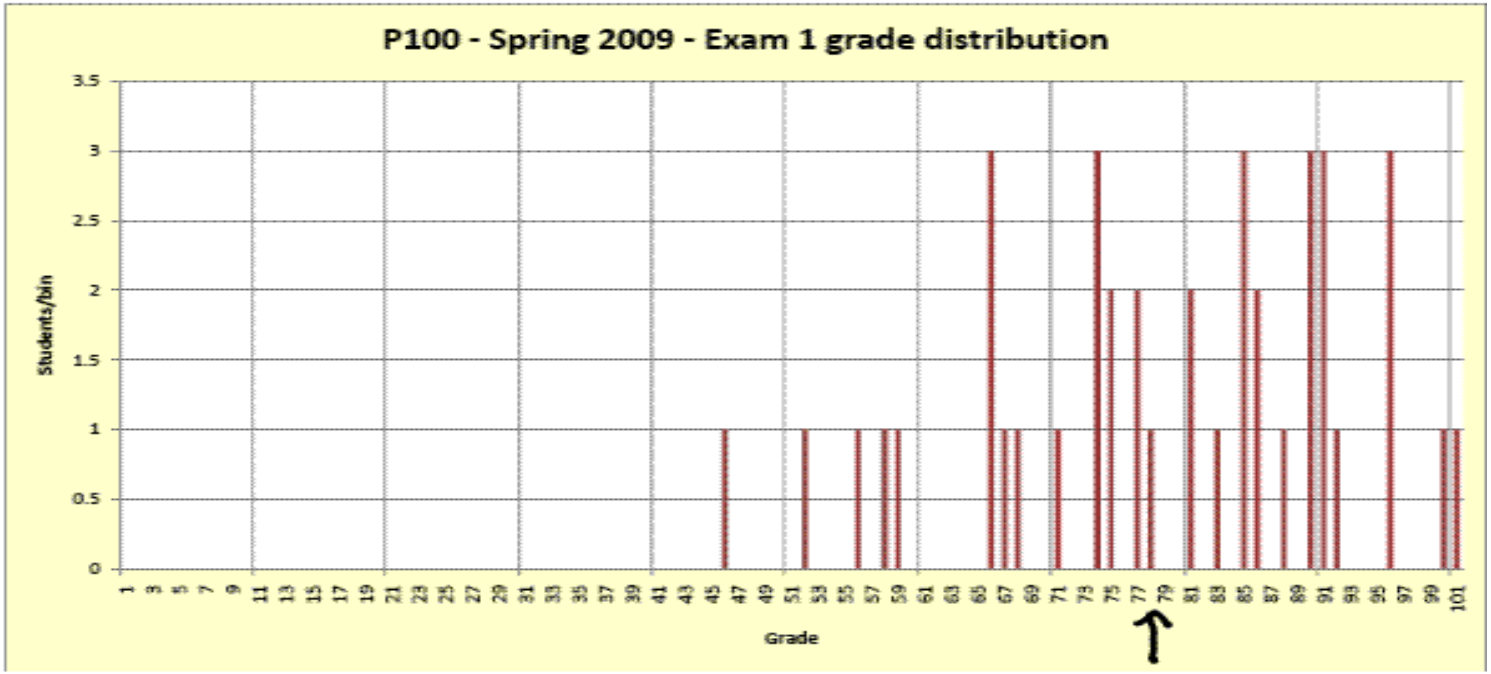
Physics 100 - March 16, 2009

Welcome Back . . .



- What does grade mean?

- Solutions on web (soon if NOT yet)
- Picking up your exam
- Regrade policy

New Business ...

- Recitations meeting this week
- Will try to get next Prob Set posted
- Presentation topics (March 18)

  Petition for new topics by Wed Morning

Last Time

This was mostly a review of the 03/04/09 lecture

House-quantum mechanics Analogy

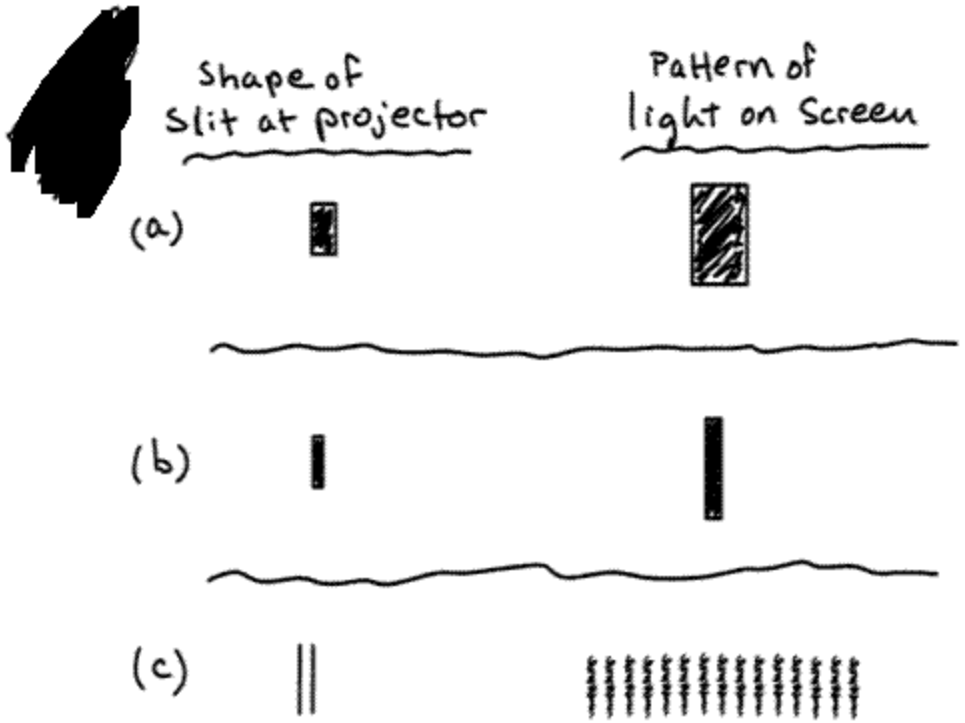
$\psi^2 \approx$ Probability

Could imagine making a good guess as to how much time a person spends in a room

say 8 hours a day in the Bedroom

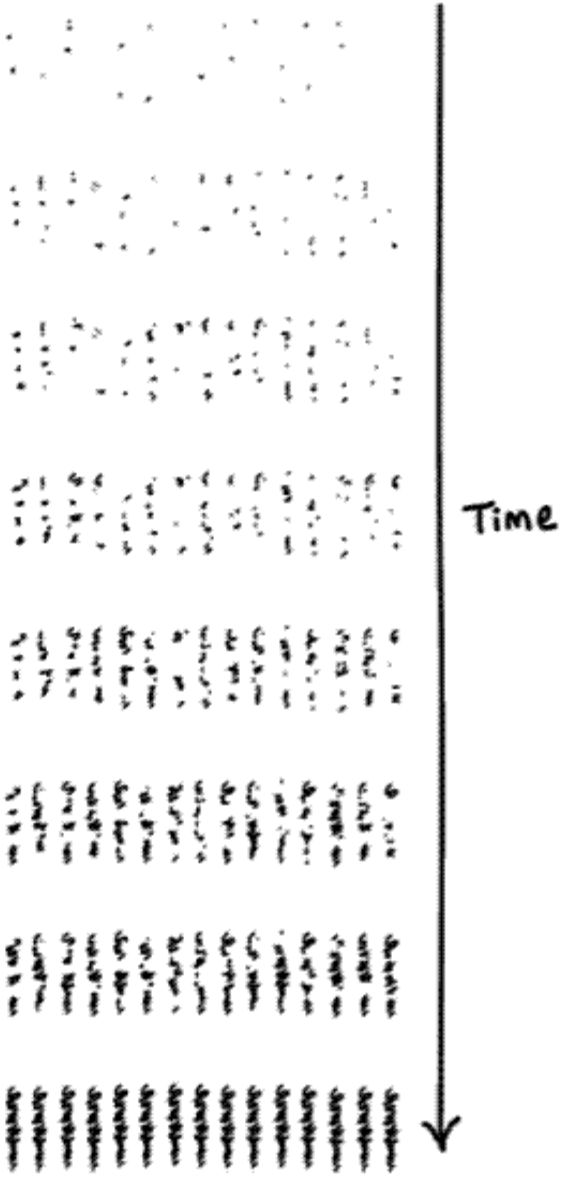
But - at any given moment you can't know where the person is in the house without looking

Projector
Slit
Screen

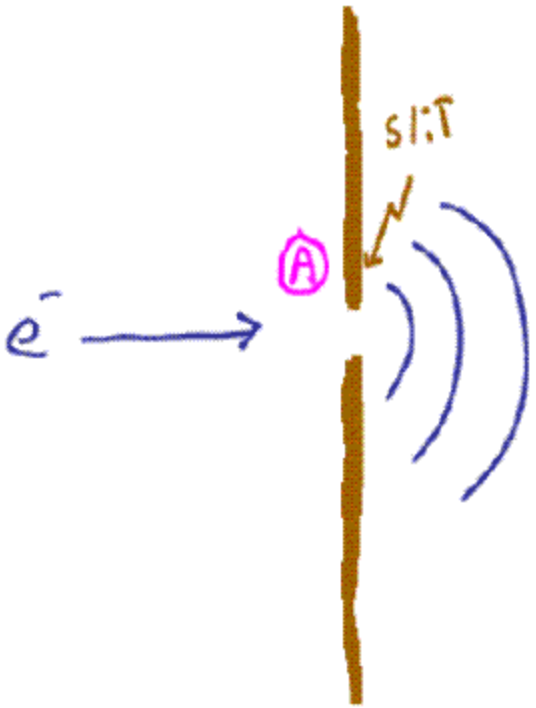

Shape of slit at projector
Pattern of light on screen
(a)
(b)
(c)

Even Single photons Act as Waves.

Image forming as a function of time.



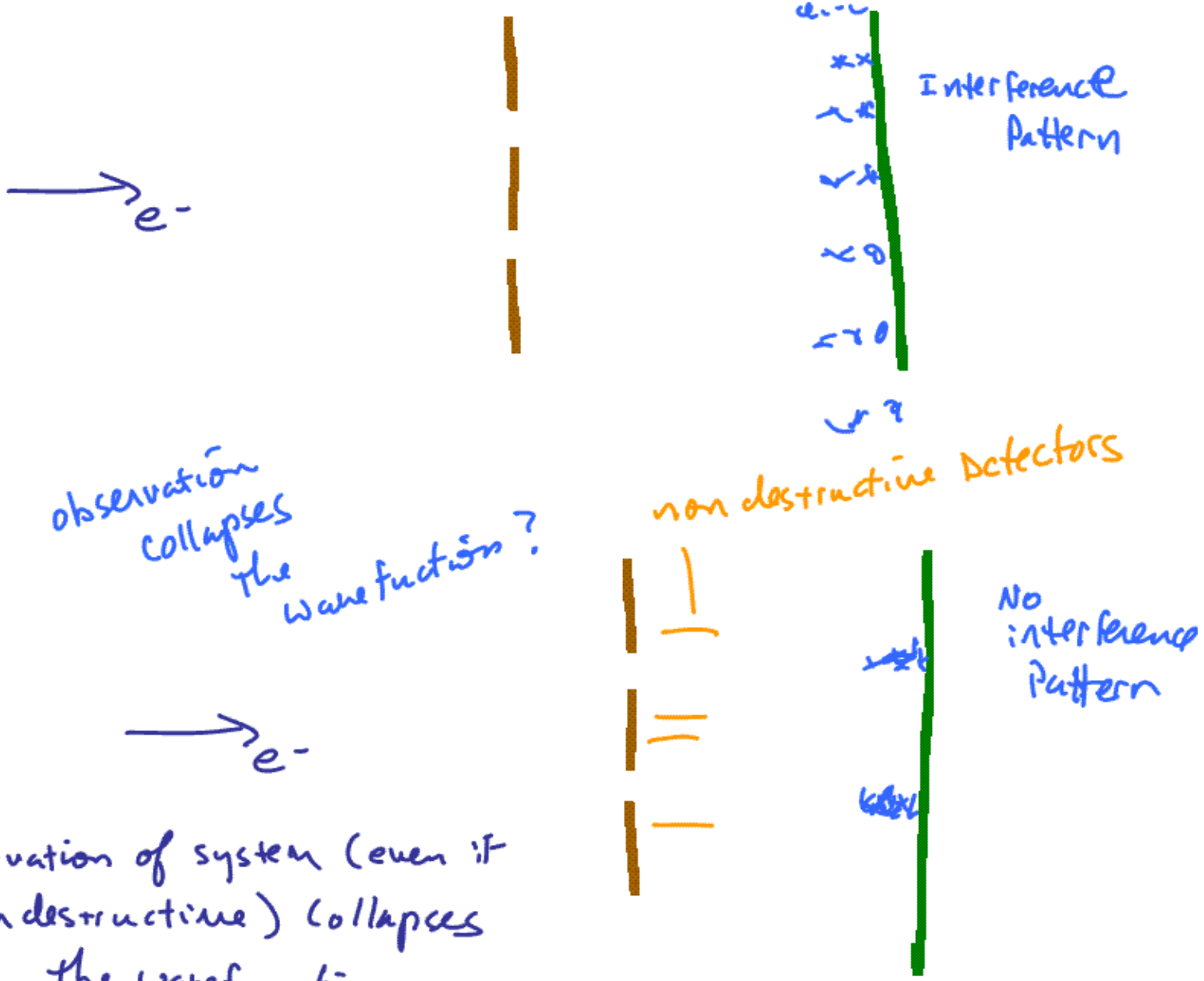
Single e^-



once e^- observed

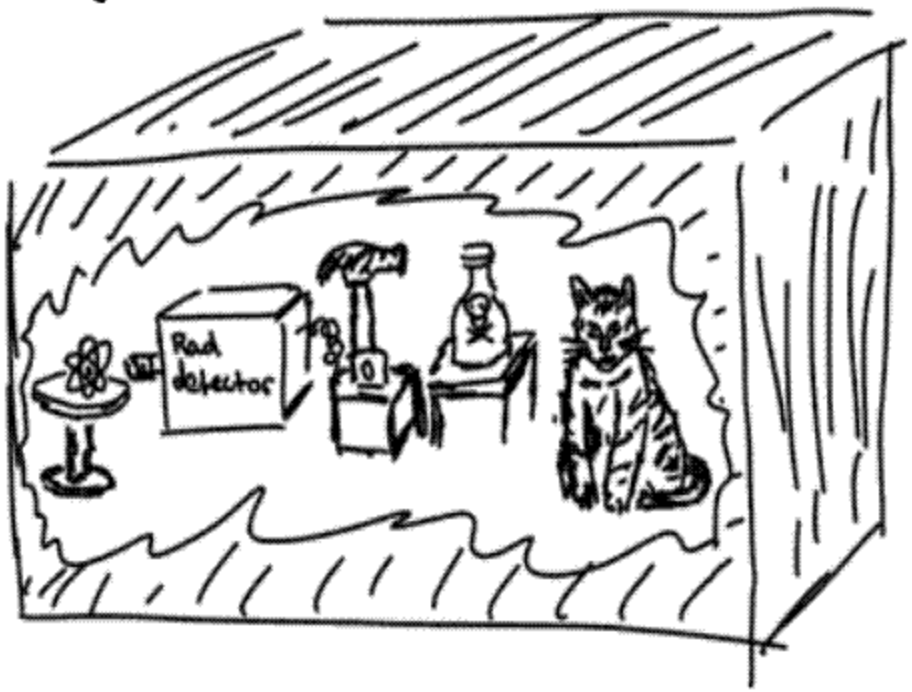
Wavefunction collapses

We know where it is.



observation of system (even if nondestructive) collapses the wavefunction.

Schrödinger's Cat



Copenhagen Interpretation

$$\text{nucleus quantum state} = \frac{1}{2}(\text{decayed}) + \frac{1}{2}(\text{not decayed})$$

$$\text{cat state} = \frac{1}{2}(\text{dead}) + \frac{1}{2}(\text{alive})$$

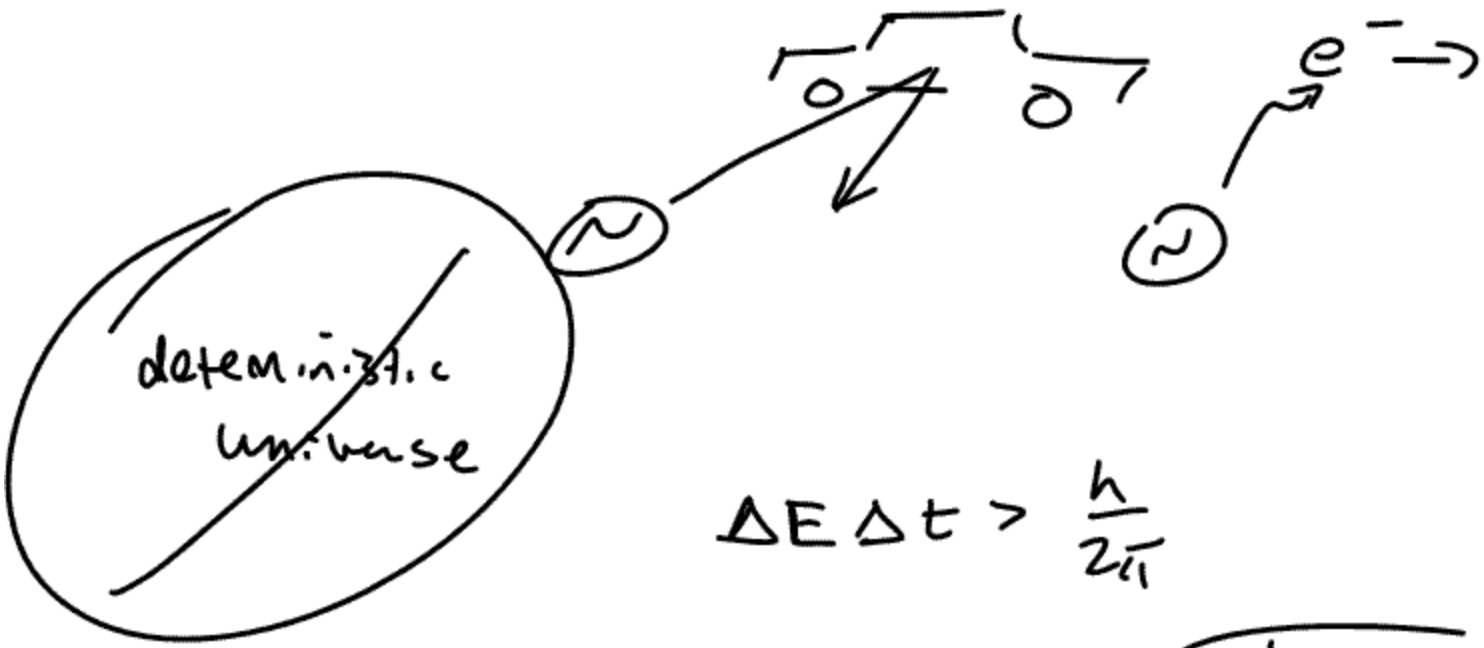
Hugh Everett (1957)

Bryce DeWitt 1960's + 70's

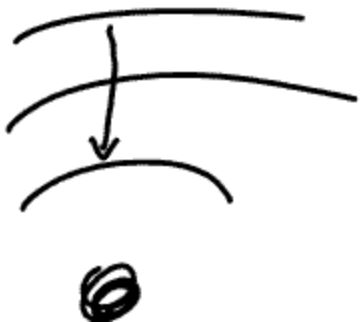
→ Many Worlds interpretation

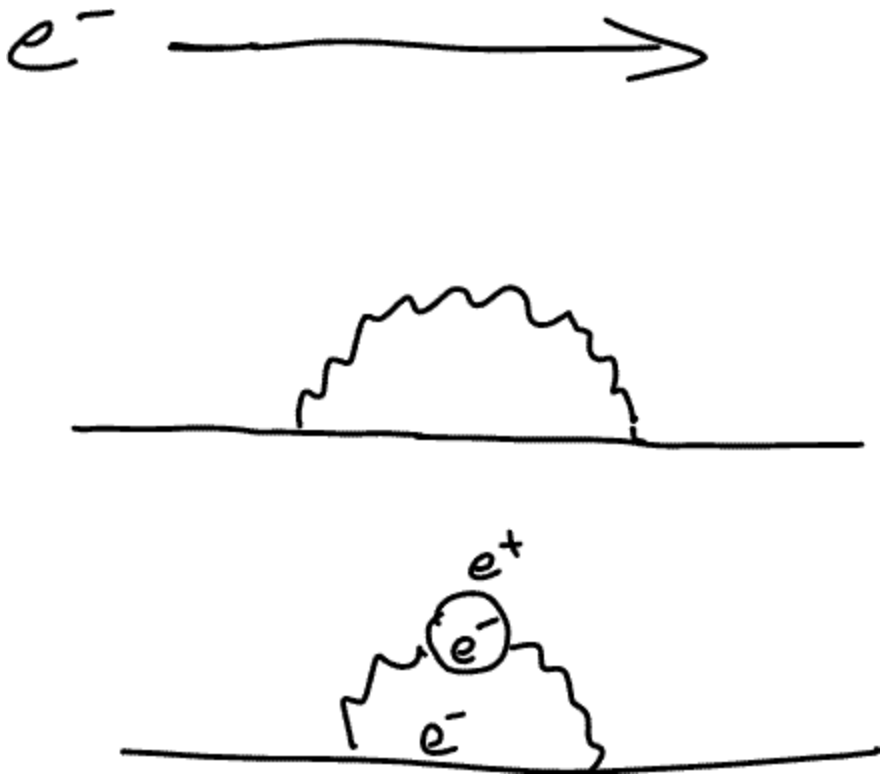
Heisenberg's Uncertainty Principle

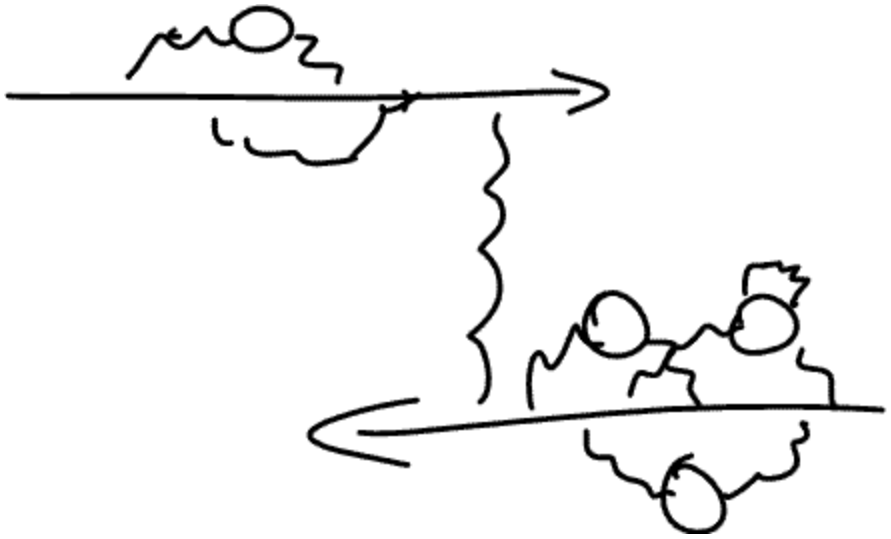
$\Delta x \, \Delta p > \frac{h}{2\pi}$ ← $h \sim 10^{-34}$



$\Delta E \, \Delta t > \frac{h}{2\pi}$




e^-
e^+
e^-
e^-



Quantum
Field
Theory