Monday, October 22
Ford Chs: 8&9

Agenda

- Announce:
  - Test Two Weeks From Wednesday
  - Calendar:
    - Oct 24
    - Oct 29
    - Oct 31—Movie
    - Nov 5—Review 9&10
    - Nov 7—Test2
  - Project Ideas due by Halloween
- Ch. 8
- Ch. 9

Ch. 8

- Conservation Laws
  - Energy, Momentum, Angular Momentum, Charge
  - Baryon number, Lepton number, color, TCP
- Invariance Principles
- Symmetries
  - Homogeneity
  - Isotropy
  - Temporal invariance/symmetry

Ch. 9

- Particles are Waves
  - Electrons are waves (e.g. double slit, electron imaging a crystal)
  - Photons are waves (e.g. shadows a bit fuzzy)
- Waves are Particles
  - Light is photons (photoelectric effect)

Electrons Sent Through a Double Slit

Momentum versus Wavelength

- For massive objects:
  - High momentum means small wavelength (very localized)
### Electrons in the Atom

- Finally a good explanation
- Electrons reach a balance
  - Charge attracts electron to nucleus
  - Electron “wants” to stay far away to minimize its momentum/energy
- QM can now solve for the states of the electron in atoms…

### Wavefunction

- QM finds the wavefunction for a particle
  \[ \psi(x, y, z) \]
- It’s square gives a probability
  \[ |\psi(x, y, z)|^2 \]