Become a Learning Assistant

- Gain paid professional teaching and mentoring experience
- Reinforce and strengthen your subject area knowledge
- Network with faculty and students in your field

Info Session: **Monday, February 29**
UMC 235 | 5-6 PM

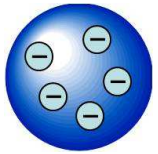
WHO'S HIRING FOR FALL 2016?

Applied Math
Astronomy
ATOC
Chemistry
EBIO
Engineering
MCDBiology
Math
Physics
Psych & Neuroscience

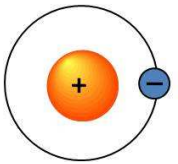
APPLY: Monday, February 29 - Monday, March 14
at **LAcentral.colorado.edu**

Models of the Atom

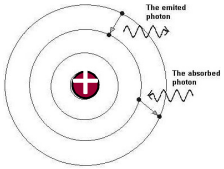
- **Thomson – Plum Pudding**
  - Why? Known that negative charges can be removed from atom.
  - Problem: just a random guess



- **Rutherford – Solar System**
  - Why? Scattering showed hard core.
  - Problem: electrons should spiral into nucleus in ~10^{-11} sec.

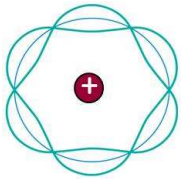


- **Bohr – fixed energy levels**
  - Why? Explains spectral lines.
  - Problem: No reason for fixed energy levels

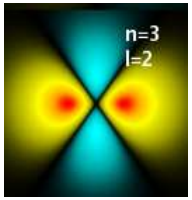


Models of the Atom

- **deBroglie – electron standing waves**
  - Why? Explains fixed energy levels
  - Problem: still only works for Hydrogen.



- **Schrödinger – quantum wave functions**
  - Why? Explains everything!
  - Problem: None (except that it's hard to understand, since does not rely on elements of classical mechanics)



Consider the time-dependent Schrödinger equation:

$$-\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2}\Psi(x,t) = i\hbar\frac{\partial}{\partial t}\Psi(x,t)$$

Is $\Psi(x,t) = A\sin(kx-\omega t)$ a possible solution?

(A)Yes, this is the typical wave-like solution

(B) No, this does not work

Working with complex sine/cosine solutions:

$$\frac{d}{dx}e^{ax} = ae^{ax}$$

$$\frac{d}{dx}e^{ikx} = (ik)e^{ikx}$$

$$\frac{\partial}{\partial x}e^{i(kx-\omega t)} = (ik)e^{i(kx-\omega t)}$$

$$\frac{\partial}{\partial t}e^{i(kx-\omega t)} = (-i\omega)e^{i(kx-\omega t)}$$