

# Quantum Theory Outline

## Anatomy of a Wave

Sinusoidal Waves

Amplitude

Frequency

Wave Length

Speed

$$c = \nu \lambda$$

## The Electromagnetic Spectrum

x-rays

ultraviolet waves

visible spectrum

microwaves

## Planck's Quantization of Energy

$$E = nh\nu$$

$$h = 6.63 \times 10^{-34} \text{ Js}$$

photons ( $E = h\nu$ )

## Photoelectric Effect

wave particle duality

## The Bohr Theory of the Hydrogen Atom

Bohr's Postulates

Energy-level postulate

– an electron can only have specific energies

Transitions between energy levels

– an electron changes energy by changing levels

Bohr's Theory explained emission and absorption of light by matter

Atomic Line Spectra

Lyman, Balmer and Paschen series of transitions

## de Broglie relation

If light has particle properties then matter has wave properties...

## Wave functions

## Heisenberg's Uncertainty Principle

## Schrödinger's Equation

## Quantum Numbers and Wave Functions

principle quantum number

azimuthal or angular momentum quantum number

magnetic quantum number

spin quantum number

## Orbital Shapes