Glossary

atomic spectra
the electromagnetic emission from atoms and molecules

binding energy
also called the *work function*; the amount of energy necessary to eject an electron from a material

blackbody
an ideal radiator, which can radiate equally well at all wavelengths

blackbody radiation
the electromagnetic radiation from a blackbody

bremsstrahlung
German for *braking radiation*; produced when electrons are decelerated

characteristic x rays
x rays whose energy depends on the material they were produced in

Compton effect
the phenomenon whereby x rays scattered from materials have decreased energy

correspondence principle
in the classical limit (large, slow-moving objects), quantum mechanics becomes the same as classical physics

de Broglie wavelength
the wavelength possessed by a particle of matter, calculated by $\lambda = h/p$

gamma ray
also γ-ray; highest-energy photon in the EM spectrum

Heisenberg's uncertainty principle
a fundamental limit to the precision with which pairs of quantities (momentum and position, and energy and time) can be measured

infrared radiation
photons with energies slightly less than red light

ionizing radiation
radiation that ionizes materials that absorb it

microwaves
photons with wavelengths on the order of a micron (μm)

particle-wave duality
the property of behaving like either a particle or a wave; the term for the phenomenon that all particles have wave characteristics

photoelectric effect
the phenomenon whereby some materials eject electrons when light is shined on them

photon
a quantum, or particle, of electromagnetic radiation

photon energy
the amount of energy a photon has; E = hf

photon momentum
the amount of momentum a photon has, calculated by $p = \frac{h}{\lambda} = \frac{E}{c}$

Planck's constant
$h = 6.626 \times 10^{-34}$ J · s

probability distribution
the overall spatial distribution of probabilities to find a particle at a given location

quantized
the fact that certain physical entities exist only with particular discrete values and not every conceivable value

quantum mechanics
the branch of physics that deals with small objects and with the quantization of various entities, especially energy

ultraviolet radiation
UV; ionizing photons slightly more energetic than violet light

uncertainty in energy
lack of precision or lack of knowledge of precise results in measurements of energy

uncertainty in momentum
lack of precision or lack of knowledge of precise results in measurements of momentum

uncertainty in position
lack of precision or lack of knowledge of precise results in measurements of position

uncertainty in time
lack of precision or lack of knowledge of precise results in measurements of time

visible light
the range of photon energies the human eye can detect

x ray
EM photon between γ-ray and UV in energy