

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 (m)

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 $h = 6.626 \times 10^{-34} \text{ J} \cdot \text{s}$

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