

# Index

## A

aberration  
2.3: Spherical Mirrors  
absorber  
5.2: Blackbody Radiation  
absorption spectrum  
5.5: Bohr's Model of the Hydrogen Atom  
accommodation  
2.6: The Eye  
activity  
7.4: Radioactive Decay  
alpha ( $\alpha$ ) rays  
7.5: Nuclear Reactions  
alpha decay  
7.5: Nuclear Reactions  
angular magnification  
2.8: The Simple Magnifier  
antielectrons  
7.5: Nuclear Reactions  
antineutrino  
7.5: Nuclear Reactions  
apparent depth  
2.4: Images Formed by Refraction  
atomic mass  
7.2: Properties of Nuclei  
Atomic mass unit  
7.2: Properties of Nuclei  
atomic nucleus  
7.2: Properties of Nuclei  
atomic number  
7.2: Properties of Nuclei

## B

Balmer formula  
5.5: Bohr's Model of the Hydrogen Atom  
Balmer series  
5.5: Bohr's Model of the Hydrogen Atom  
becquerel (Bq)  
7.4: Radioactive Decay  
beta ( $\beta$ ) rays  
7.5: Nuclear Reactions  
Beta decay  
7.5: Nuclear Reactions  
binding energy (nuclear)  
7.3: Nuclear Binding Energy  
binding energy per nucleon (BEN)  
7.3: Nuclear Binding Energy  
birefringence  
1.8: Polarization  
blackbody  
5.2: Blackbody Radiation  
blackbody radiation  
5.2: Blackbody Radiation  
Bohr radius of hydrogen  
5.5: Bohr's Model of the Hydrogen Atom  
Bohr's model of the hydrogen atom  
5.5: Bohr's Model of the Hydrogen Atom  
Born interpretation  
6.2: Wave functions  
Bragg planes  
4.7: X-Ray Diffraction  
breeder reactor  
7.6: Fission

Brewster's angle

1.8: Polarization

Brewster's law

1.8: Polarization

## C

camera  
2.7: The Camera  
Cassegrain design  
2.9: Microscopes and Telescopes  
chart of the nuclides  
7.2: Properties of Nuclei  
coherent waves  
3.2: Young's Double-Slit Interference  
coma (optics)  
2.3: Spherical Mirrors  
complex function  
6.2: Wave functions  
compound microscope  
2.9: Microscopes and Telescopes  
Compton effect  
5.4: The Compton Effect  
Compton shift  
5.4: The Compton Effect  
Compton wavelength  
5.4: The Compton Effect  
concave mirror  
2.3: Spherical Mirrors  
converging (or convex) lens  
2.5: Thin Lenses  
converging lens  
2.5: Thin Lenses  
convex mirror  
2.3: Spherical Mirrors  
Copenhagen interpretation  
6.2: Wave functions  
corner reflector  
1.3: The Law of Reflection  
correspondence principle  
6.2: Wave functions  
6.5: The Quantum Particle in a Box  
critical angle  
1.5: Total Internal Reflection  
critical mass  
7.6: Fission  
criticality  
7.6: Fission  
curie (Ci)  
7.4: Radioactive Decay  
curved mirror  
2.3: Spherical Mirrors

## D

daughter nucleus  
7.5: Nuclear Reactions  
Davisson–Germer experiment  
5.6: De Broglie's Matter Waves  
de Broglie wave  
5.6: De Broglie's Matter Waves  
de Broglie's hypothesis of matter waves  
5.6: De Broglie's Matter Waves  
Decay  
7.4: Radioactive Decay

decay constant

7.4: Radioactive Decay

decay series

7.5: Nuclear Reactions

destructive interference for a single slit

4.2: Single-Slit Diffraction

diffraction

4: Diffraction

4.2: Single-Slit Diffraction

diffraction grating

3.4: Multiple-Slit Interference

4.5: Diffraction Gratings

diffraction limit

4.6: Circular Apertures and Resolution

direction of polarization

1.8: Polarization

Dispersion

1.6: Dispersion

diverging (or concave) lens

2.5: Thin Lenses

diverging lens

2.5: Thin Lenses

## E

electron microscopy  
5.7: Wave-Particle Duality  
emitter  
5.2: Blackbody Radiation  
ENDOSCOPES  
1.5: Total Internal Reflection  
energy levels  
6.5: The Quantum Particle in a Box  
energy of a photon  
5.3: Photoelectric Effect  
energy quantum number  
6.5: The Quantum Particle in a Box  
even function  
6.2: Wave functions  
excited energy states of the H atom  
5.5: Bohr's Model of the Hydrogen Atom  
expectation value  
6.2: Wave functions  
eyepiece  
2.9: Microscopes and Telescopes

## F

far point  
2.6: The Eye  
farsightedness  
2.6: The Eye  
fiber optics  
1.5: Total Internal Reflection  
field emission  
6.7: Quantum Tunneling of Particles through Potential Barriers  
first focus or object focus  
2.4: Images Formed by Refraction  
fission  
7.6: Fission  
focal length  
2.3: Spherical Mirrors  
focal plane  
2.5: Thin Lenses

**focal point**

[2.3: Spherical Mirrors](#)

**Fraunhofer lines**

[5.5: Bohr's Model of the Hydrogen Atom](#)

**fringes**

[3.3: Mathematics of Interference](#)

## G

**gamma ( $\gamma$ ) rays**

[7.5: Nuclear Reactions](#)

**Gamma decay**

[7.5: Nuclear Reactions](#)

**geometric optics**

[1.2: The Propagation of Light](#)

[2: Geometric Optics and Image Formation](#)

**ground state energy**

[6.5: The Quantum Particle in a Box](#)

**ground state energy of the hydrogen atom**

[5.5: Bohr's Model of the Hydrogen Atom](#)

**group velocity**

[5.6: De Broglie's Matter Waves](#)

## H

**harmonic oscillator**

[6.6: The Quantum Harmonic Oscillator](#)

**Heisenberg uncertainty principle**

[5.7: Wave-Particle Duality](#)

[6.3: The Heisenberg Uncertainty Principle](#)

**high dose**

[7.8: Medical Applications and Biological Effects of Nuclear Radiation](#)

**hologram**

[4.8: Holography](#)

**holography**

[4.8: Holography](#)

**horizontally polarized**

[1.8: Polarization](#)

**Humphreys series**

[5.5: Bohr's Model of the Hydrogen Atom](#)

**Huygens's principle**

[1.7: Huygens's Principle](#)

**hyperopia**

[2.6: The Eye](#)

## I

**image distance**

[2.2: Images Formed by Plane Mirrors](#)

**image focus**

[2.4: Images Formed by Refraction](#)

**incoherent**

[3.2: Young's Double-Slit Interference](#)

**index of refraction**

[1.2: The Propagation of Light](#)

[1.4: Refraction](#)

[1.6: Dispersion](#)

**inelastic scattering**

[5.4: The Compton Effect](#)

**infinite square well**

[6.5: The Quantum Particle in a Box](#)

**intensity**

[4.3: Intensity in Single-Slit Diffraction](#)

**interference**

[3.3: Mathematics of Interference](#)

**interference order**

[3.3: Mathematics of Interference](#)

**interferometer**

[3.6: The Michelson Interferometer](#)

**ionization energy**

[5.5: Bohr's Model of the Hydrogen Atom](#)

**ionization limit of the hydrogen atom**

[5.5: Bohr's Model of the Hydrogen Atom](#)

**iridescence**

[4.5: Diffraction Gratings](#)

**isotopes**

[7.2: Properties of Nuclei](#)

## L

**law of reflection**

[1.3: The Law of Reflection](#)

**law of refraction**

[1.4: Refraction](#)

**lifetime**

[7.4: Radioactive Decay](#)

**light**

[1.2: The Propagation of Light](#)

**linear magnification**

[2.3: Spherical Mirrors](#)

**liquid drop model**

[7.6: Fission](#)

**low dose**

[7.8: Medical Applications and Biological Effects of Nuclear Radiation](#)

**Lyman series**

[5.5: Bohr's Model of the Hydrogen Atom](#)

## M

**Magnification**

[2.2: Images Formed by Plane Mirrors](#)

**magnifying glass**

[2.8: The Simple Magnifier](#)

**Malus's law**

[1.8: Polarization](#)

**mass defect**

[7.3: Nuclear Binding Energy](#)

**mass number**

[7.2: Properties of Nuclei](#)

**matter waves**

[5: Photons and Matter Waves](#)

**Michelson interferometer**

[3.6: The Michelson Interferometer](#)

**Microscopes**

[2.9: Microscopes and Telescopes](#)

**missing order**

[4.4: Double-Slit Diffraction](#)

**moderate dose**

[7.8: Medical Applications and Biological Effects of Nuclear Radiation](#)

**momentum operator**

[6.2: Wave functions](#)

**monochromatic**

[3.2: Young's Double-Slit Interference](#)

**myopia**

[2.6: The Eye](#)

## N

**nanotechnology**

[6.7: Quantum Tunneling of Particles through Potential Barriers](#)

**near point**

[2.6: The Eye](#)

**nearsightedness**

[2.6: The Eye](#)

**net magnification**

[2.9: Microscopes and Telescopes](#)

**neutrino**

[7.5: Nuclear Reactions](#)

**neutron number**

[7.2: Properties of Nuclei](#)

**Newton's rings**

[3.5: Interference in Thin Films](#)

**Newtonian design**

[2.9: Microscopes and Telescopes](#)

**normalization condition**

[6.2: Wave functions](#)

**Nuclear Binding Energy**

[7.3: Nuclear Binding Energy](#)

**nuclear fusion**

[7.7: Nuclear Fusion](#)

**nuclear fusion reactor**

[7.7: Nuclear Fusion](#)

**nuclear model of the atom**

[5.5: Bohr's Model of the Hydrogen Atom](#)

**nucleons**

[7.2: Properties of Nuclei](#)

**nucleosynthesis**

[7.7: Nuclear Fusion](#)

**nuclide**

[7.2: Properties of Nuclei](#)

**Numerical Aperture (NA)**

[4.6: Circular Apertures and Resolution](#)

## O

**object distance**

[2.2: Images Formed by Plane Mirrors](#)

**object focus**

[2.4: Images Formed by Refraction](#)

**objective**

[2.9: Microscopes and Telescopes](#)

**odd function**

[6.2: Wave functions](#)

**optical axis**

[2.3: Spherical Mirrors](#)

**optical power**

[2.6: The Eye](#)

**optically active**

[1.8: Polarization](#)

**order**

[3.3: Mathematics of Interference](#)

## P

**paraxial approximation**

[2.3: Spherical Mirrors](#)

**parent nucleus**

[7.5: Nuclear Reactions](#)

**Paschen series**

[5.5: Bohr's Model of the Hydrogen Atom](#)

**Pfund series**

[5.5: Bohr's Model of the Hydrogen Atom](#)

**phasor**

[4.3: Intensity in Single-Slit Diffraction](#)

**photocurrent**

[5.3: Photoelectric Effect](#)

**Photoelectric effect**

[5.3: Photoelectric Effect](#)

**photoelectrode**

[5.3: Photoelectric Effect](#)

**photoelectron**

[5.3: Photoelectric Effect](#)

**Photon**

[5.3: Photoelectric Effect](#)

photons

5: Photons and Matter Waves

Planck's hypothesis of energy quanta

5.2: Blackbody Radiation

plane mirror

2.2: Images Formed by Plane Mirrors

polarization

1.8: Polarization

polarized

1.8: Polarization

position operator

6.2: Wave functions

positron

7.5: Nuclear Reactions

positron emission tomography (PET)

7.8: Medical Applications and Biological Effects of Nuclear Radiation

postulates of Bohr's model

5.5: Bohr's Model of the Hydrogen Atom

potential barrier

6.7: Quantum Tunneling of Particles through Potential Barriers

power intensity

5.2: Blackbody Radiation

principal maximum

3.4: Multiple-Slit Interference

principal quantum number

6.5: The Quantum Particle in a Box

probability density

6.2: Wave functions

propagation vector

5.4: The Compton Effect

## Q

Q value

7.7: Nuclear Fusion

quantized energies

5.2: Blackbody Radiation

quantum dot

6.7: Quantum Tunneling of Particles through Potential Barriers

Quantum Harmonic Oscillator

6.6: The Quantum Harmonic Oscillator

Quantum Number

5.5: Bohr's Model of the Hydrogen Atom

quantum phenomenon

5.3: Photoelectric Effect

quantum state of a Planck's oscillator

5.2: Blackbody Radiation

quantum tunneling

6.7: Quantum Tunneling of Particles through Potential Barriers

## R

radiation dose unit (rad)

7.8: Medical Applications and Biological Effects of Nuclear Radiation

radioactive dating

7.4: Radioactive Decay

radioactive decay law

7.4: Radioactive Decay

radioactive tags

7.8: Medical Applications and Biological Effects of Nuclear Radiation

Radioactivity

7.4: Radioactive Decay

radiopharmaceutical

7.8: Medical Applications and Biological Effects of Nuclear Radiation

radius of a nucleus

7.2: Properties of Nuclei

ray

1.2: The Propagation of Light

ray tracing

2.5: Thin Lenses

Rayleigh criterion

4.6: Circular Apertures and Resolution

real image

2.2: Images Formed by Plane Mirrors

reduced Planck's constant

5.4: The Compton Effect

refraction

1.4: Refraction

2.4: Images Formed by Refraction

relative biological effectiveness (RBE)

7.8: Medical Applications and Biological Effects of Nuclear Radiation

resolution

4.6: Circular Apertures and Resolution

resonant tunneling

6.7: Quantum Tunneling of Particles through Potential Barriers

Retroreflectors

1.3: The Law of Reflection

roentgen equivalent man (rem)

7.8: Medical Applications and Biological Effects of Nuclear Radiation

Rutherford's gold foil experiment

5.5: Bohr's Model of the Hydrogen Atom

Rydberg constant for hydrogen

5.5: Bohr's Model of the Hydrogen Atom

Rydberg formula

5.5: Bohr's Model of the Hydrogen Atom

## S

scanning tunneling microscope (STM)

6.7: Quantum Tunneling of Particles through Potential Barriers

scattering angle

5.4: The Compton Effect

second focus or image focus

2.4: Images Formed by Refraction

secondary maximum

3.4: Multiple-Slit Interference

sievert (Sv)

7.8: Medical Applications and Biological Effects of Nuclear Radiation

Simple Magnifier

2.8: The Simple Magnifier

Snell's law of refraction

1.4: Refraction

1.7: Huygens's Principle

spectroscopic dispersion

4.5: Diffraction Gratings

spherical aberration

2.3: Spherical Mirrors

standing wave state

6.5: The Quantum Particle in a Box

state reduction

6.2: Wave functions

stationary state

6.5: The Quantum Particle in a Box

Stefan-Boltzmann constant

5.2: Blackbody Radiation

stopping potential

5.3: Photoelectric Effect

Strong nuclear force

7.2: Properties of Nuclei

## T

Telescopes

2.9: Microscopes and Telescopes

Total Internal Reflection

1.5: Total Internal Reflection

transmission hologram

4.8: Holography

transmission probability

6.7: Quantum Tunneling of Particles through Potential Barriers

transuranic element

7.5: Nuclear Reactions

transverse wave

1.8: Polarization

tube length

2.9: Microscopes and Telescopes

tunnel diode

6.7: Quantum Tunneling of Particles through Potential Barriers

tunneling probability

6.7: Quantum Tunneling of Particles through Potential Barriers

## U

unpolarized

1.8: Polarization

## V

vertex

2.3: Spherical Mirrors

vertically polarized

1.8: Polarization

virtual image

2.2: Images Formed by Plane Mirrors

## W

Wave function

6.2: Wave functions

wave function collapse

6.2: Wave functions

wave number

5.4: The Compton Effect

wave optics

1.7: Huygens's Principle

wave packet

6.3: The Heisenberg Uncertainty Principle

wave quantum mechanics

5.6: De Broglie's Matter Waves

width of the central peak

4.3: Intensity in Single-Slit Diffraction

work function

5.3: Photoelectric Effect

## Y

Young double slit

3.2: Young's Double-Slit Interference