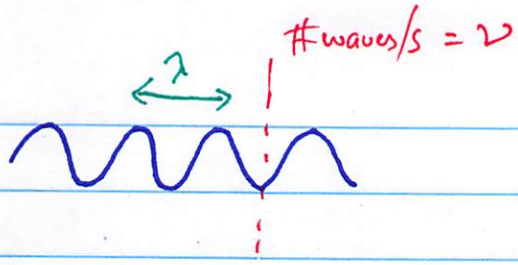
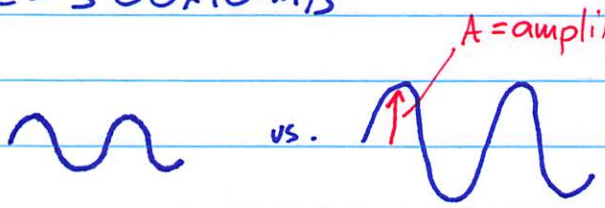
10/30/2019



Speed = freq × wavelength
(m/s) ($1/s$) (m)

light (EM wave) : speed = $c = 3.00 \times 10^8 m/s$

$\boxed{c = \nu \cdot \lambda}$

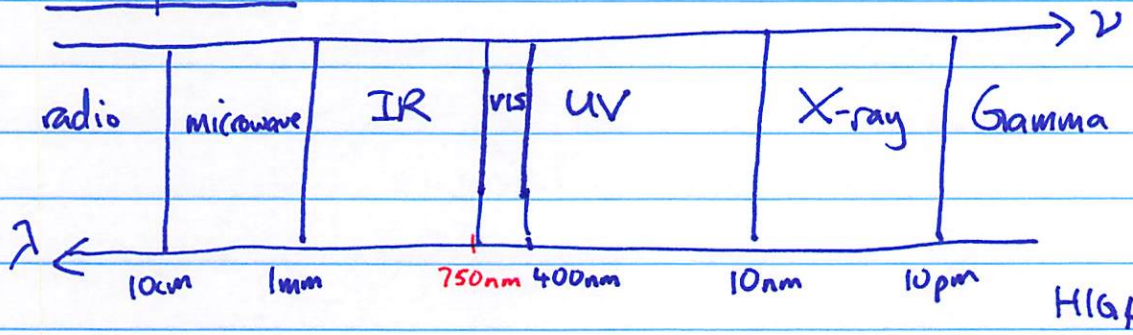


light: brightness $\propto A^2$

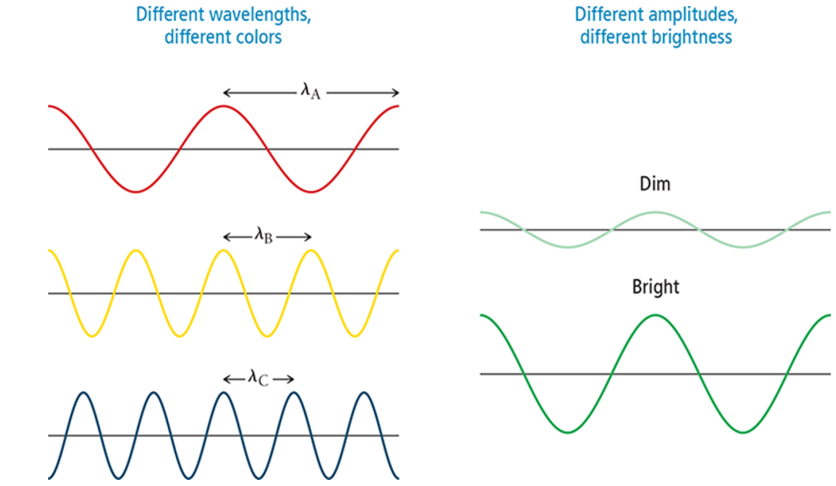
Blu ray laser have $\lambda = 405 nm$
$\nu = ?$ nano: $\times 10^{-9}$

$\frac{c}{\lambda} = \frac{\nu\lambda}{\lambda} \rightarrow \nu = c/\lambda = \frac{3.00 \times 10^8 m/s}{405 \times 10^{-9} m} = 7.41 \times 10^{14} 1/s$ or s^{-1} or Hz

EM spectrum



Amplitude and Wavelength



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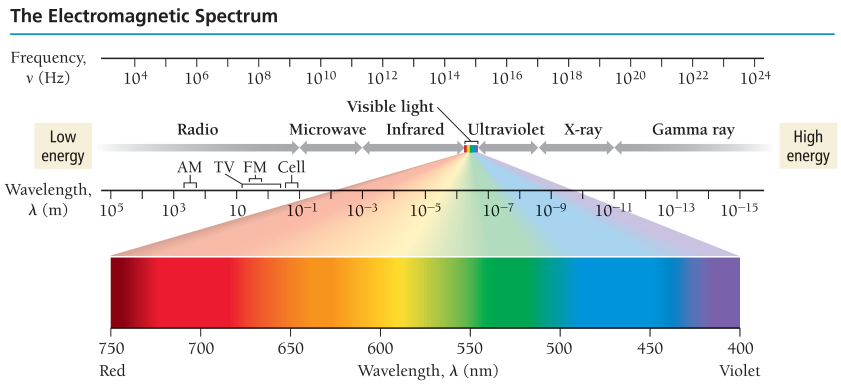
Electromagnetic Spectrum



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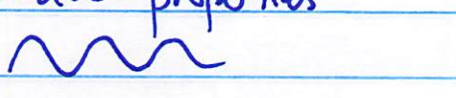
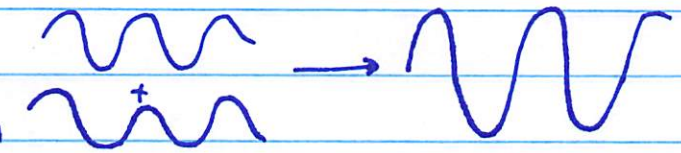
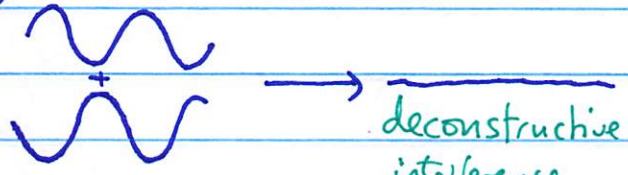
Wave-properties



- interference



constructive interference



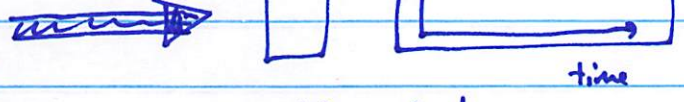
deconstructive interference

diffraction

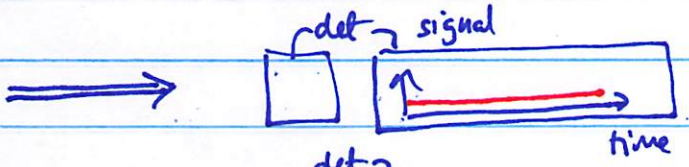
SLIT

LIGHT: wave ✓

Light: Bright



dim

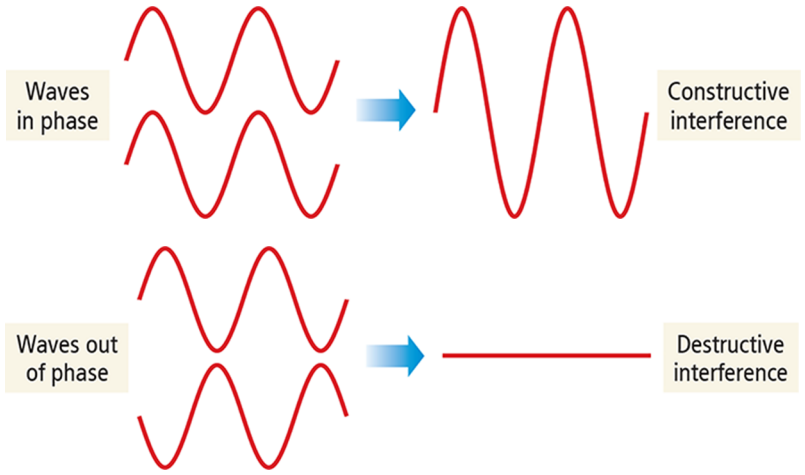


v.v.v.v.v.dim

particles of light

PHOTONS

Interference (2 of 2)



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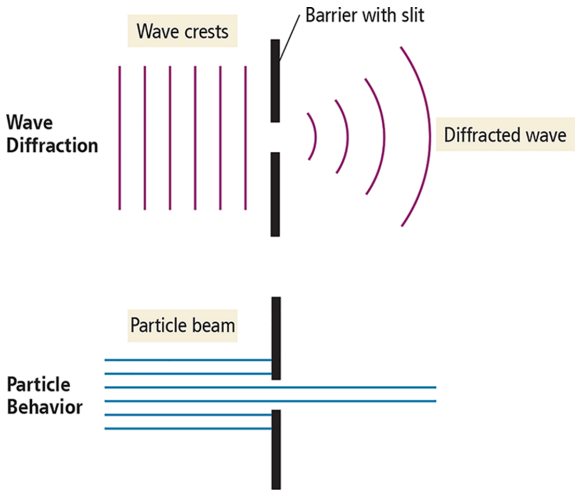
Diffraction (2 of 2)



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Einstein: $E_{photon} = h \cdot \nu$

- individual photon
- freq
- Planck's constant $= 6.626 \times 10^{-34}\ J \cdot s$

since $c = \nu \cdot \lambda$

$\rightarrow \nu = c/\lambda \rightarrow E_{photon} = \frac{hc}{\lambda} \quad \propto 1/\lambda$

$E_{photon} \uparrow, \nu \uparrow, \lambda \downarrow$

$E_{photon} \downarrow, \nu \downarrow, \lambda \uparrow$

RED	BLUE
$\lambda \uparrow$	$\lambda \downarrow$
$E \downarrow$	$E \uparrow$