

- WAVES TRANSFER ENERGY BUT NOT MATTER.

- LONGITUDINAL: PARTICLES OSCILLATE PARALLEL TO DIRECTION OF ENERGY TRANSFER (COMPRESSIONS & RAREFACTIONS) e.g. SOUND

- TRANSVERSE: PARTICLES OSCILLATE PERPENDICULAR TO DIRECTION OF ENERGY TRANSFER e.g. LIGHT (EM), STRING, WATER.

- POLARISATION: TRANSVERSE WAVES CAN BE (PLANE) POLARISED BY FILTER (SMALL LINES) - ONLY LETS HALF OF LIGHT BE TRANSMITTED, ABSORBS REST - SELECTS WAVES OSCILLATING IN PARTICULAR DIRECTION.

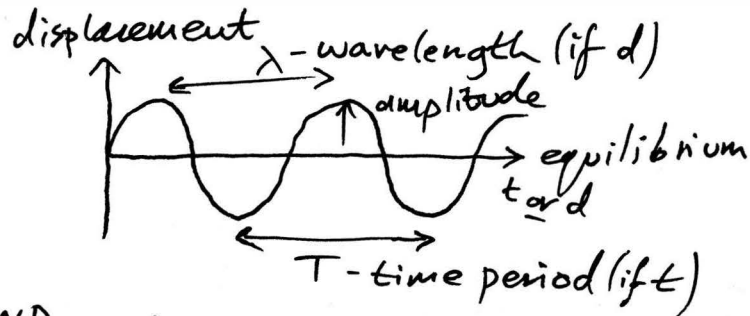
- STATIONARY WAVES ARE FORMED WHEN TWO WAVES OF EQUAL FREQUENCY TRAVEL IN OPPOSITE DIRECTIONS + INTERFERE.

- SUPERPOSITIONING: WHEN DISPLACEMENTS SUM AT EVERY POINT.

- 1st HARMONIC / FUNDAMENTAL $\lambda = 2L$
 2nd HARMONIC $\lambda = L$
 $f = \frac{1}{2L} \sqrt{\frac{T}{\mu}}$ tension μ kgm^{-1} (string)

NODE: ALWAYS DESTRUCTIVE INTF - NO ENERGY TRANSFERRED.

ANTINODE: BOTH CONST + DESTR INTF, E IS TRANSFERRED.



frequency (Hz): NUMBER OF COMPLETE WAVES PASSING A POINT EVERY SECOND.

$$f = \frac{1}{T} \quad v = f\lambda$$

or $c = f\lambda$

WAVES

$$\text{phase diff} = \frac{\Delta t}{T} \times 2\pi = \frac{\Delta d}{\lambda} \times 2\pi$$

$$\frac{1}{2} \text{ wave} = 180^\circ = \pi \text{ rad}$$

$$\frac{1}{4} \text{ wave} = 90^\circ = \frac{\pi}{2} \text{ rad}$$

REFRACTION

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

↑
REFR INDEX

TIR: angle of refr $>$ crit angle, & $n_1 > n_2$.

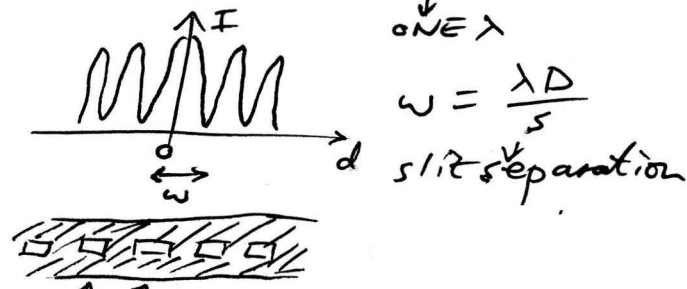
- To find θ_c , $\theta_2 = 90^\circ$, $\therefore n_1 \sin \theta_c = n_2$ TO FIND MAX ORDER:
 \rightarrow ALL LIGHT IS REFLECTED.

DIFFRACTION

YOUNG DOUBLE SLIT

 SINGLES LIT
 TO PRODUCE COHERENT SOURCES

"CONSTANT PHASE DIFF"
 (WE USE LASER - MONOCHROMATIC)



- maxima - constructive interference $\sim = \sim$ (in phase)
 - minima - destructive interference (dark) $\sim = \overline{\sim}$ (out of phase)

- MAX: path diff = $n\lambda$
 - MIN: path diff = $(n - \frac{1}{2})\lambda$

- SINGLE SLIT CENTRAL MAX = $2 \times$ WIDTH OF OTHER FRINGES.

GRATING
 $n\lambda = d \sin \theta$
 order \uparrow line spacing \uparrow
 $= \frac{1}{\text{lines perm.}}$

$n=0$ $n=1$ $\theta = 90^\circ$
 $n=2$ e.g. $n = 3.7$
 $n=3$ max = 3