Oscillations and waves

simple harmonic motion (shm):

$F \sim -x$	$F = -k \cdot x$
$a \sim -x$	$a = -k \cdot x$

} restoring force proportional to displacement from mean positio

total energy in shm:

$W \sim m$ $\quad W \sim A^2$ (A: amplitude) $\quad W \sim f^2$

waves

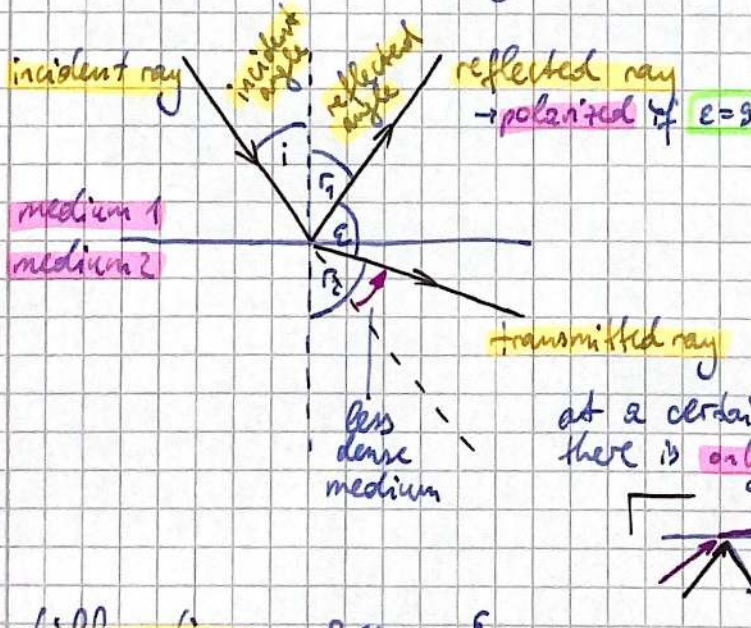
- longitudinal → compression/rarefaction → oscillations parallel to direction of energy transfer
- transverse → crest, trough

intensity:

$I \sim A^2$ $\quad I \sim x^{-2}$ → inverse square law of radiation

$$c = f \cdot \lambda$$

(c: wave speed, f: frequency, λ: wavelength)



→ polarised if $\varepsilon = 90°$

$i = r$

snell's law:

$$\frac{n_1}{n_2} = \frac{\sin(r_2)}{\sin(i)} = \frac{v_1}{v_2}$$

v_1, v_2: ratio of speeds in the mediums

at a certain critical angle, there is only reflection

diffraction „Beugung"

young's double slit „Doppelspalt"

standing wave:

- same amplitude
- same frequency
- opposite directions

node „Knoten" & antinode

boundary conditions:

	open end	closed end
1st harmonic	$L = \frac{\lambda}{4}$	$L = \frac{\lambda}{2}$
2nd -"-	$L = \frac{3\lambda}{4}$	$L = \lambda$
3rd -"-	$L = \frac{5\lambda}{4}$	$L = \frac{3\lambda}{2}$