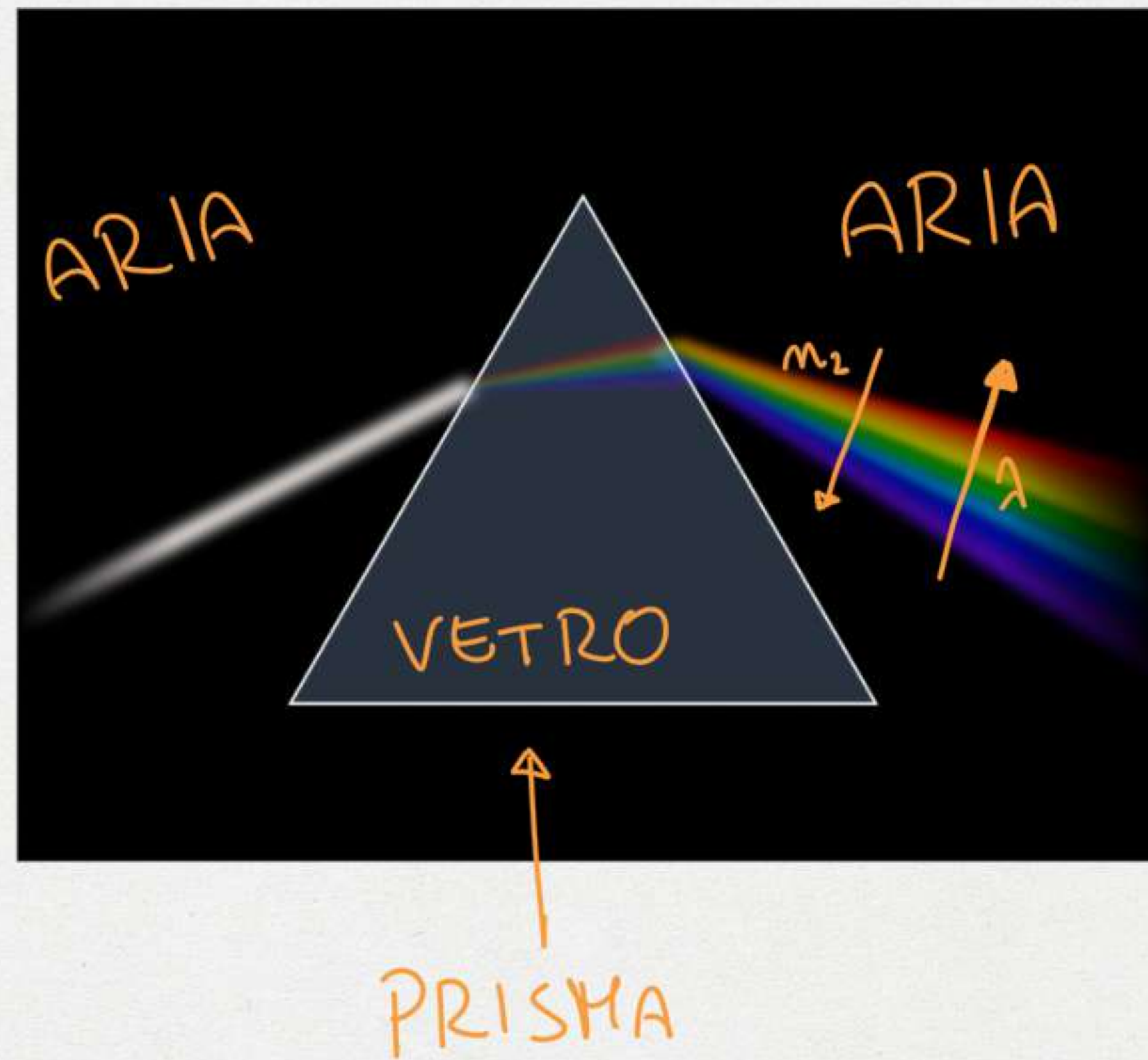


DISPERSIONE DELLA LUCE



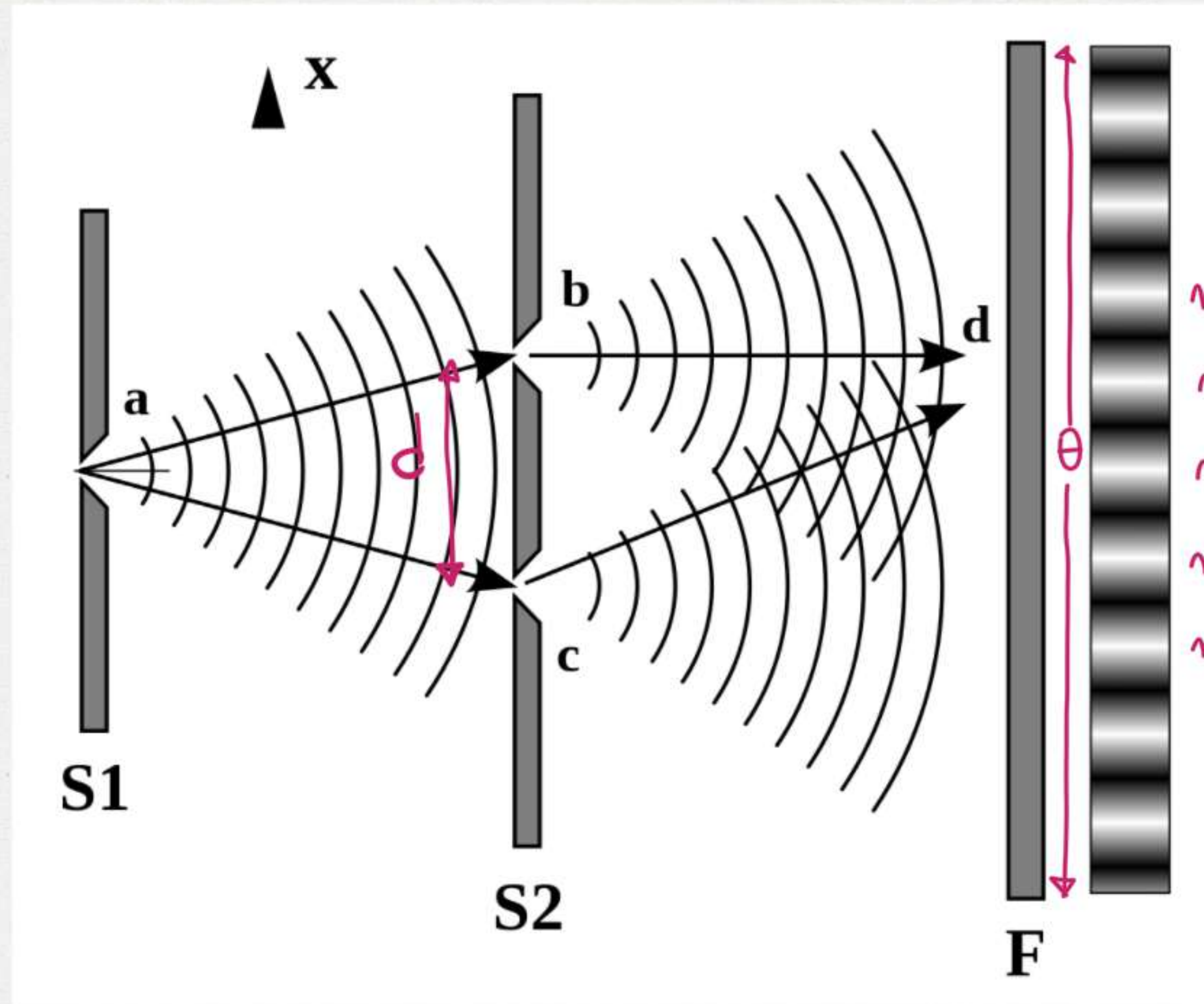
$$n_1 \sin \theta_i = n_2 \sin \theta_t$$

↓

$$\sin \theta_i = n_2 \sin \theta_t \Rightarrow \sin \theta_t = \frac{\sin \theta_i}{n_2}$$

A graph showing the refractive index $n(\lambda)$ as a function of wavelength λ . The vertical axis is labeled $n(\lambda)$ and the horizontal axis is labeled λ . The curve starts at a high value for short wavelengths (labeled "VIOLETTA") and decreases as the wavelength increases (labeled "ROSSO").

ESPERIMENTO DI YOUNG



$$I(\theta) = 4I_0 \cos^2 \left(\frac{\pi d \sin \theta}{\lambda} \right)$$

$$\frac{\pi d \sin \theta}{\lambda} = m \pi, \quad m \text{ INTERO}$$

$$\Delta \theta = \frac{\lambda}{d}$$

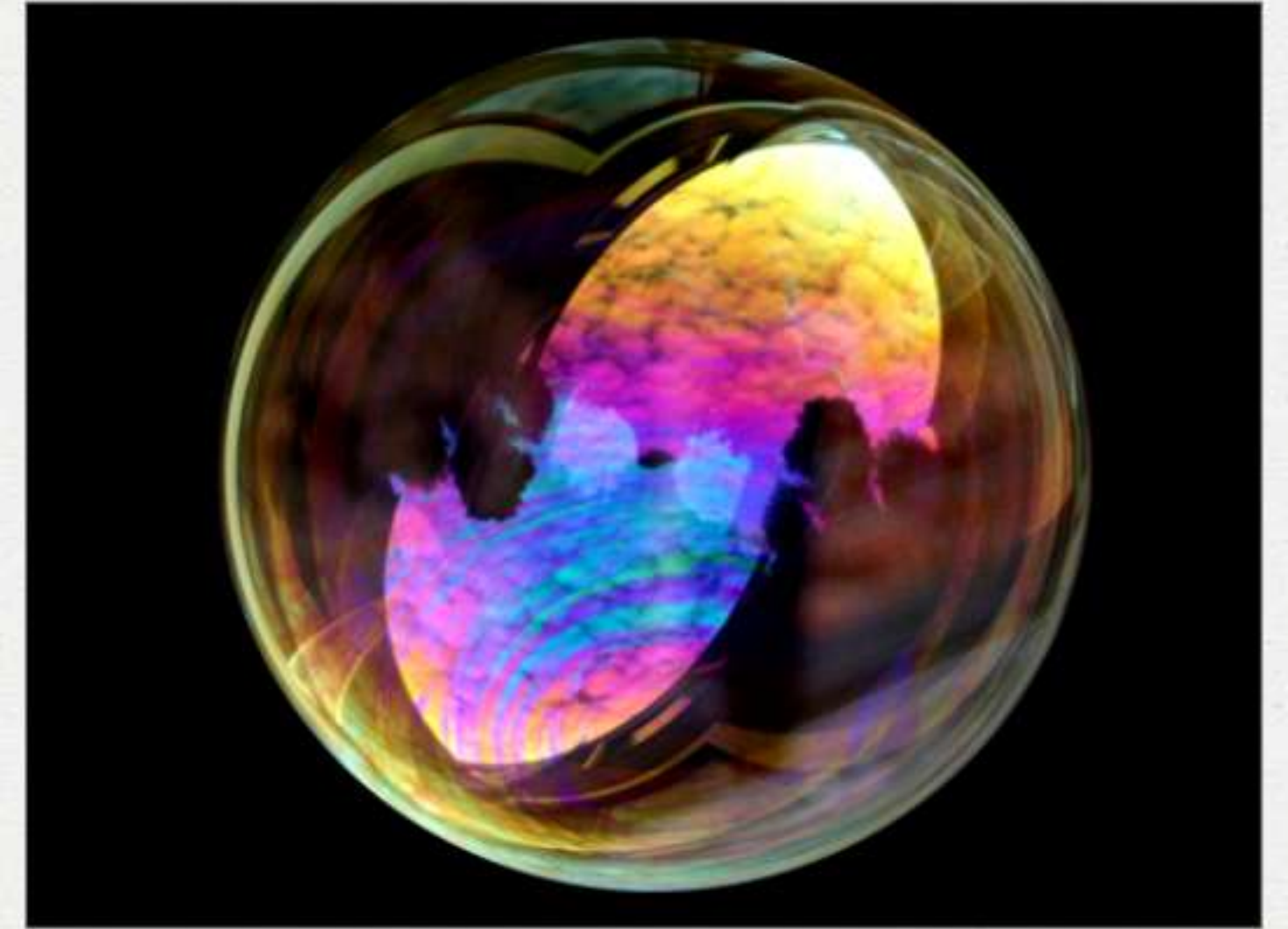
$$m = 2$$

$$m = 1$$

$$m = 0$$

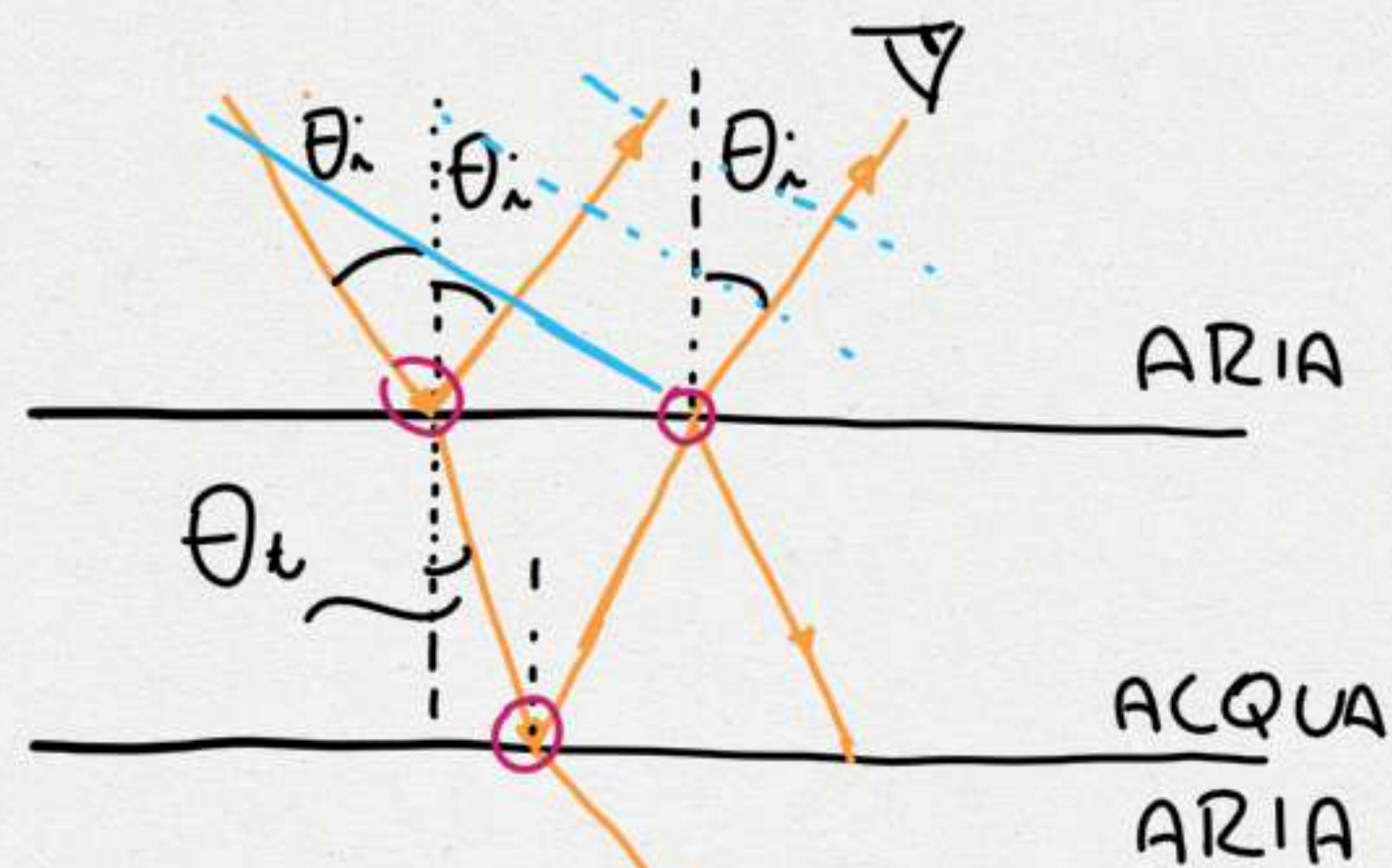
$$m = -1$$

$$m = -2$$



INTERFERENZA DA LAMINE SOTTILI

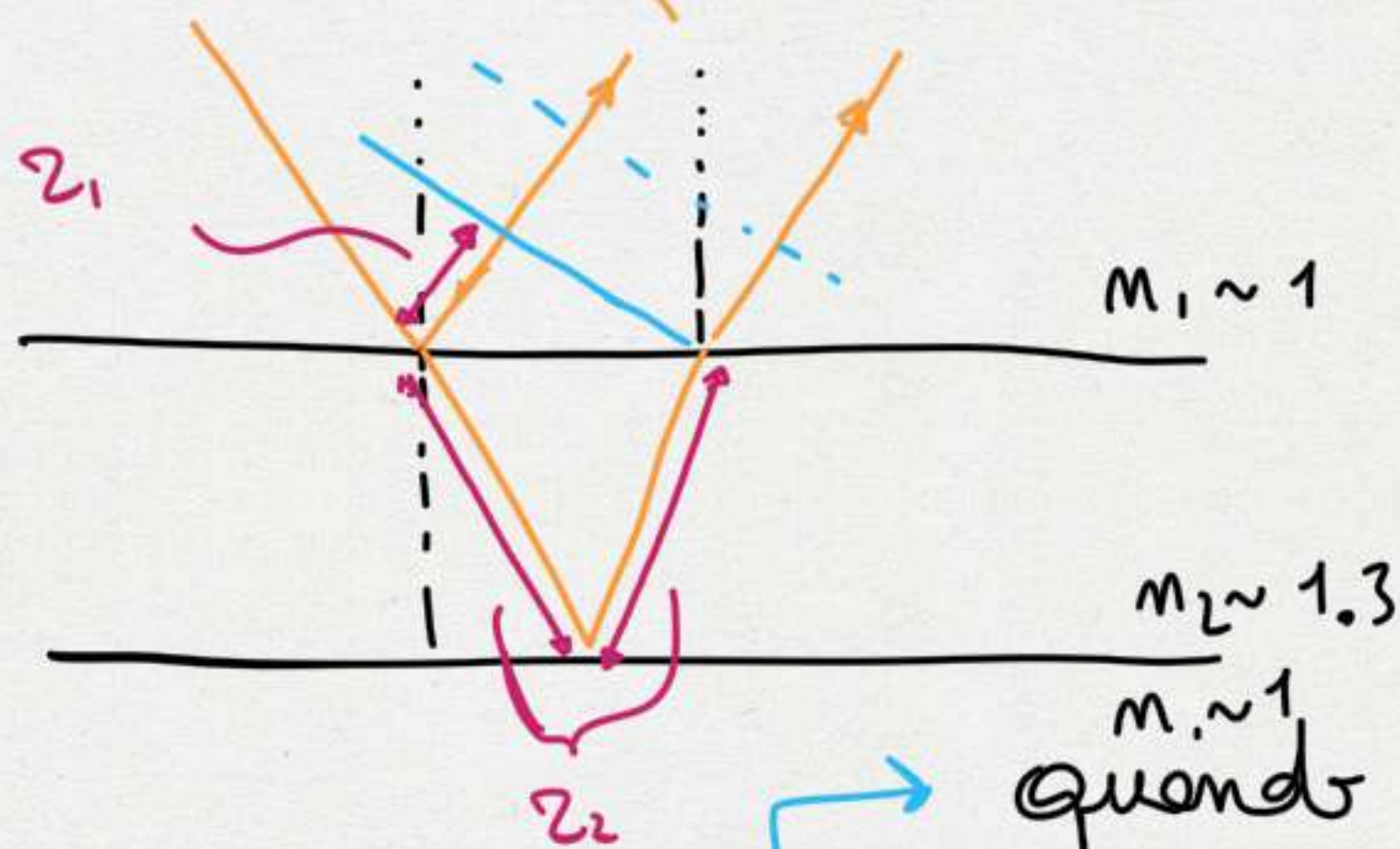
THIN-FILM INTERFERENCE



$$\lambda_0 \rightarrow \lambda = \frac{\lambda_0}{n}$$

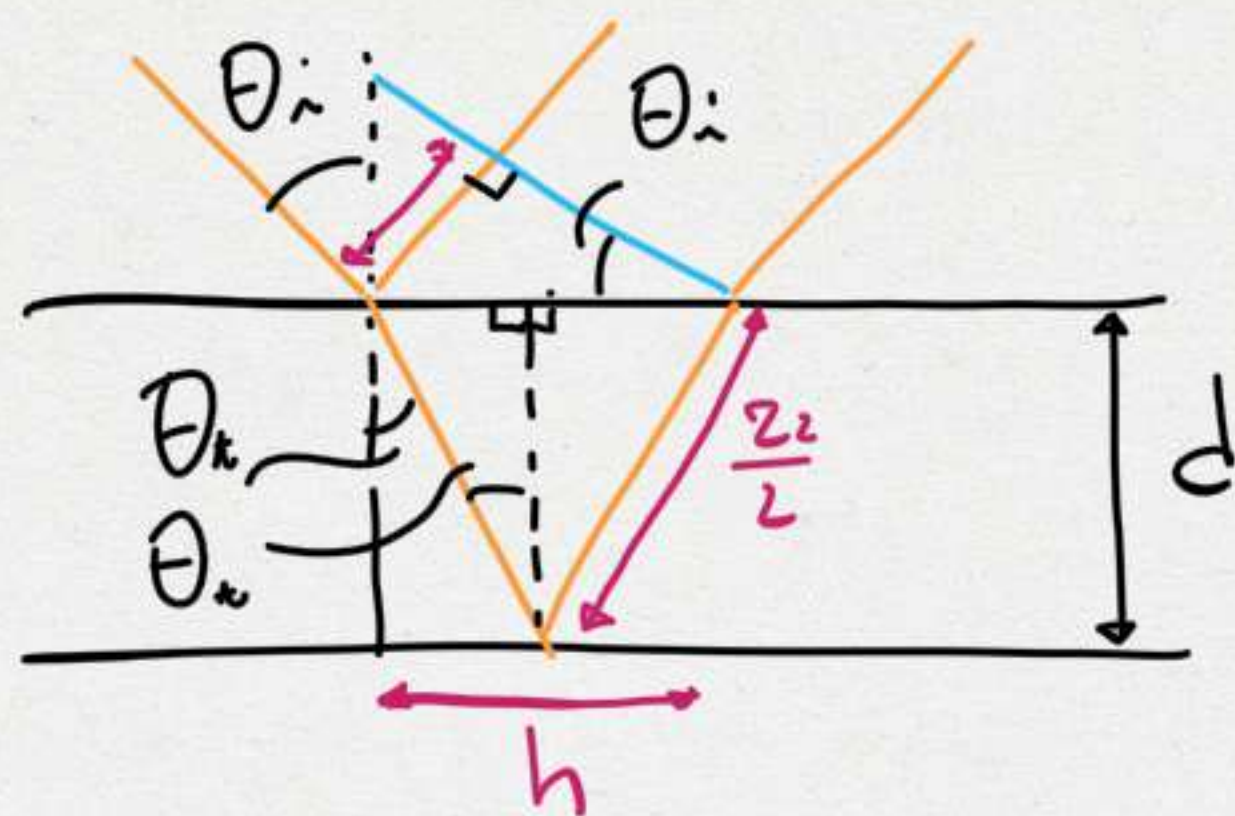
$$k_0 \rightarrow k = n k_0$$

$$k = \frac{2\pi}{\lambda}$$



quando l'onda viene riflessa da un'interfaccia tra due mezzi n_1 e n_2 , con $n_2 > n_1$, l'onda riflessa è sfasata di π

$$\delta = \delta_2 - \delta_1 - \pi = n_2 k_1 z_2 - k_1 z_1 - \pi$$



$$\frac{z_2}{2} \cos \theta_t = d \Rightarrow$$

$$z_2 = \frac{2d}{\cos \theta_t} \Rightarrow \delta_2 = k_1 n z_2 = \boxed{\frac{2k_1 n_2 d}{\cos \theta_t}} \quad n_1 \theta_i = n_2 \sin \theta_t$$

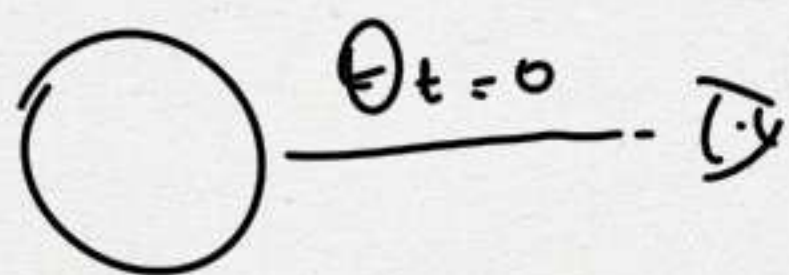
$$z_1 = h \sin \theta_i = \frac{z_2}{2} \sin \theta_t n_1 \sin \theta_i = z_2 \sin \theta_t \sin \theta_i =$$

$$= n_2 z_2 \sin^2 \theta_t = \frac{n_2 2d \sin^2 \theta_t}{\cos^2 \theta_t} \Rightarrow \delta_1 = k_1 z_1 = \boxed{\frac{2d n_2 k_1 \sin^2 \theta_t}{\cos \theta_t}} \Rightarrow$$

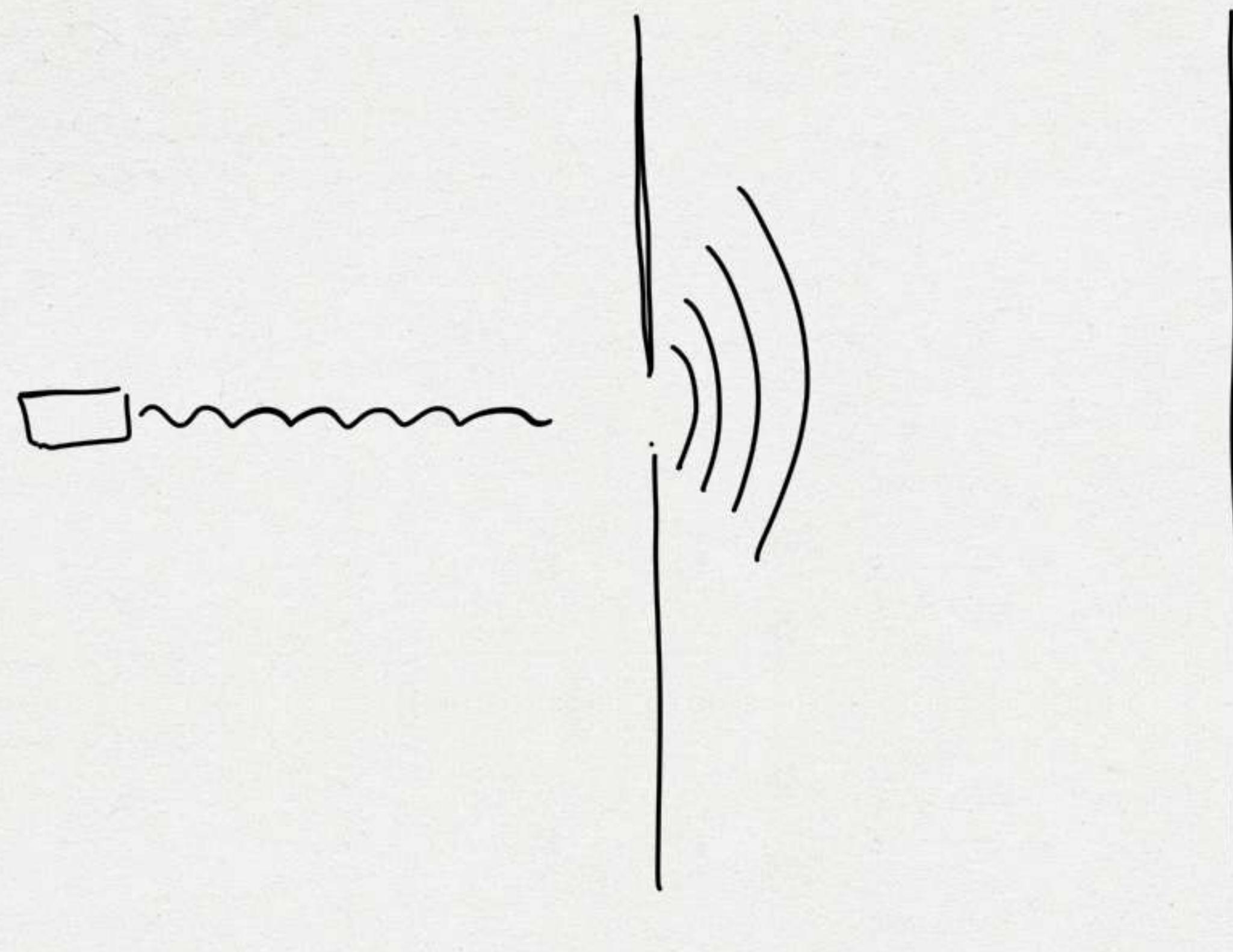
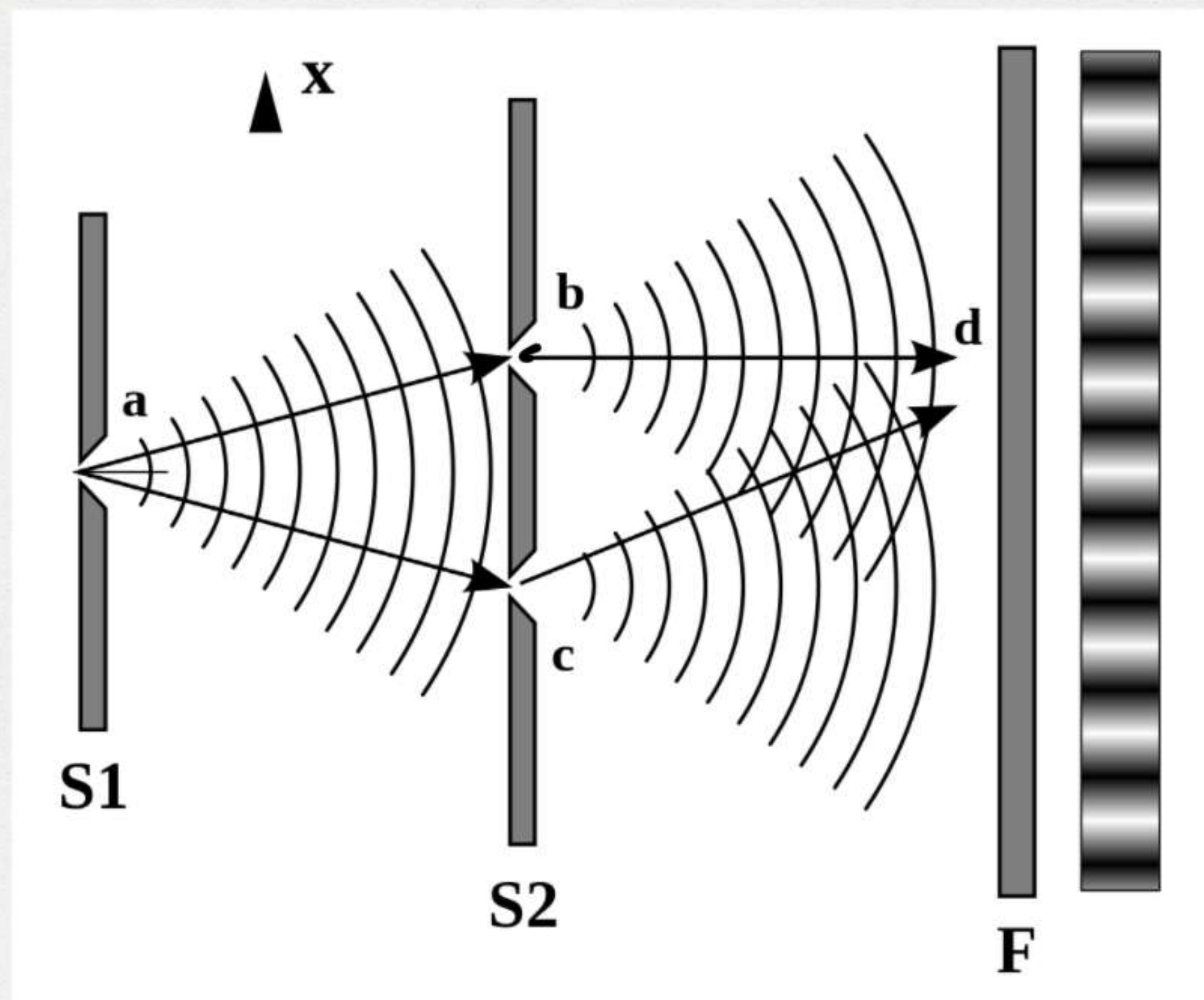
$$\delta = \delta_2 - \delta_1 - \pi = \frac{2k_1 n_2 d}{\cos \theta_t} (1 - \sin^2 \theta_t) - \pi = 2k_1 n_2 d \cos \theta_t - \pi$$

$$\delta \xrightarrow{\theta_t \rightarrow 0} 2k_1 n_2 d - \pi = \boxed{\frac{4\pi m d}{\lambda} - \pi} \quad \text{se } \delta = 2m\pi \text{ con } m \text{ INTERO} \rightarrow \text{MASSIMO DI INTENSITA'}$$

$$\text{se } \delta = (2m+1)\pi \rightarrow \text{MINIMO DI INTENSITA'}$$



$$\frac{d}{\lambda} \rightarrow 0 \rightarrow -\pi$$

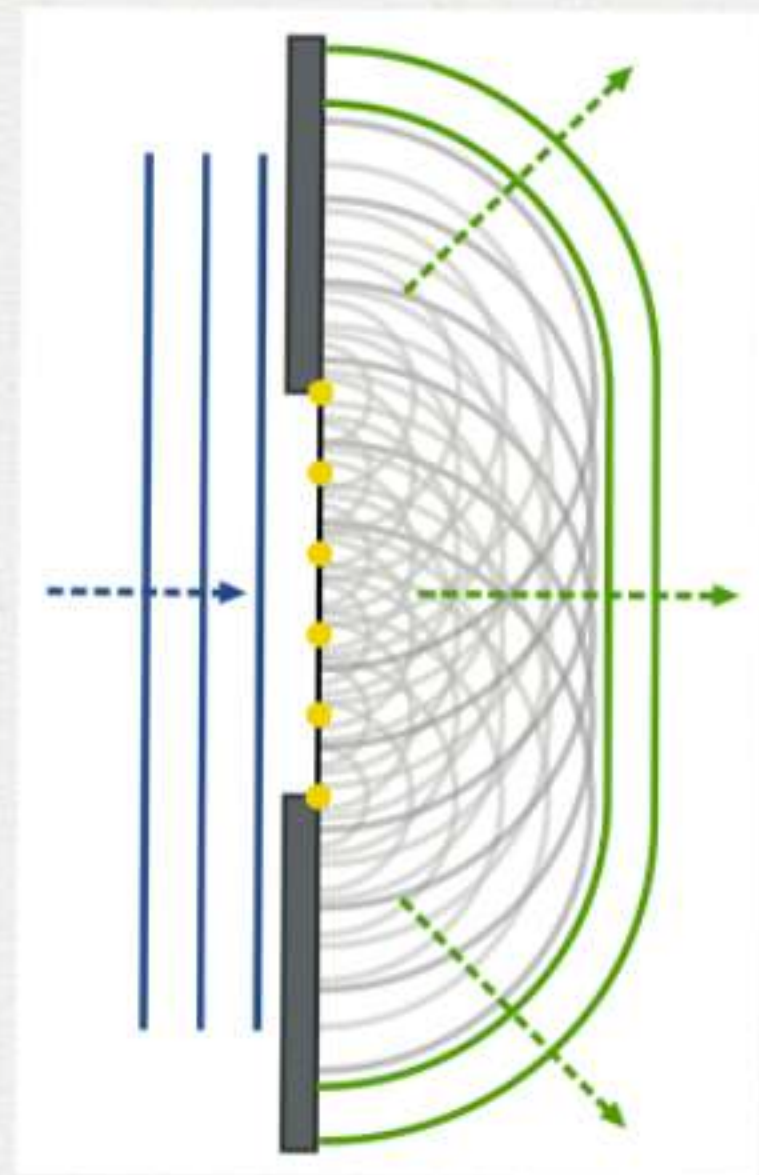
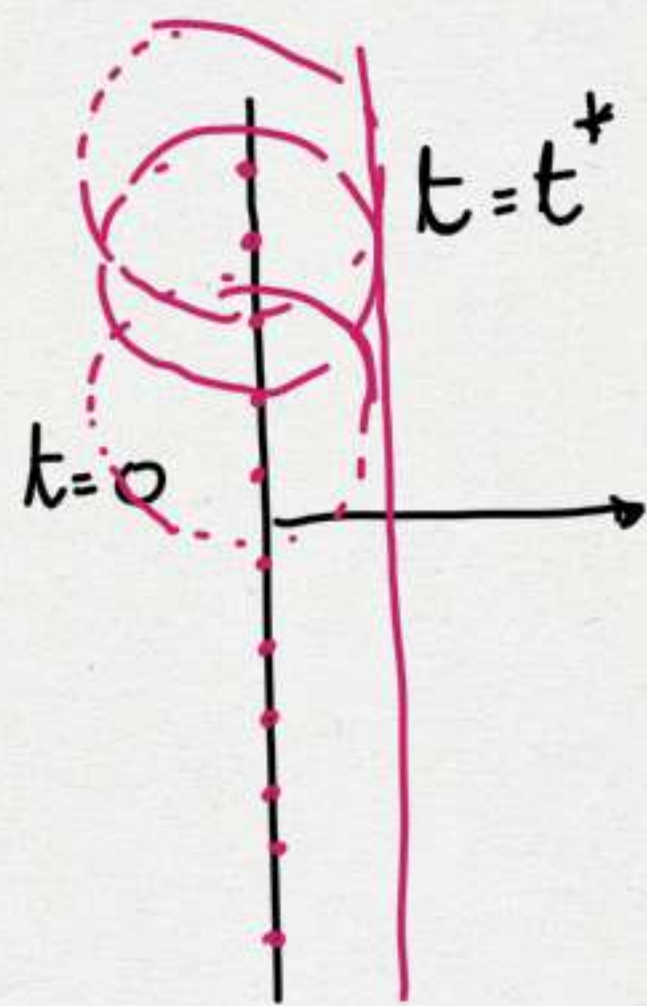


DIFFRAZIONE

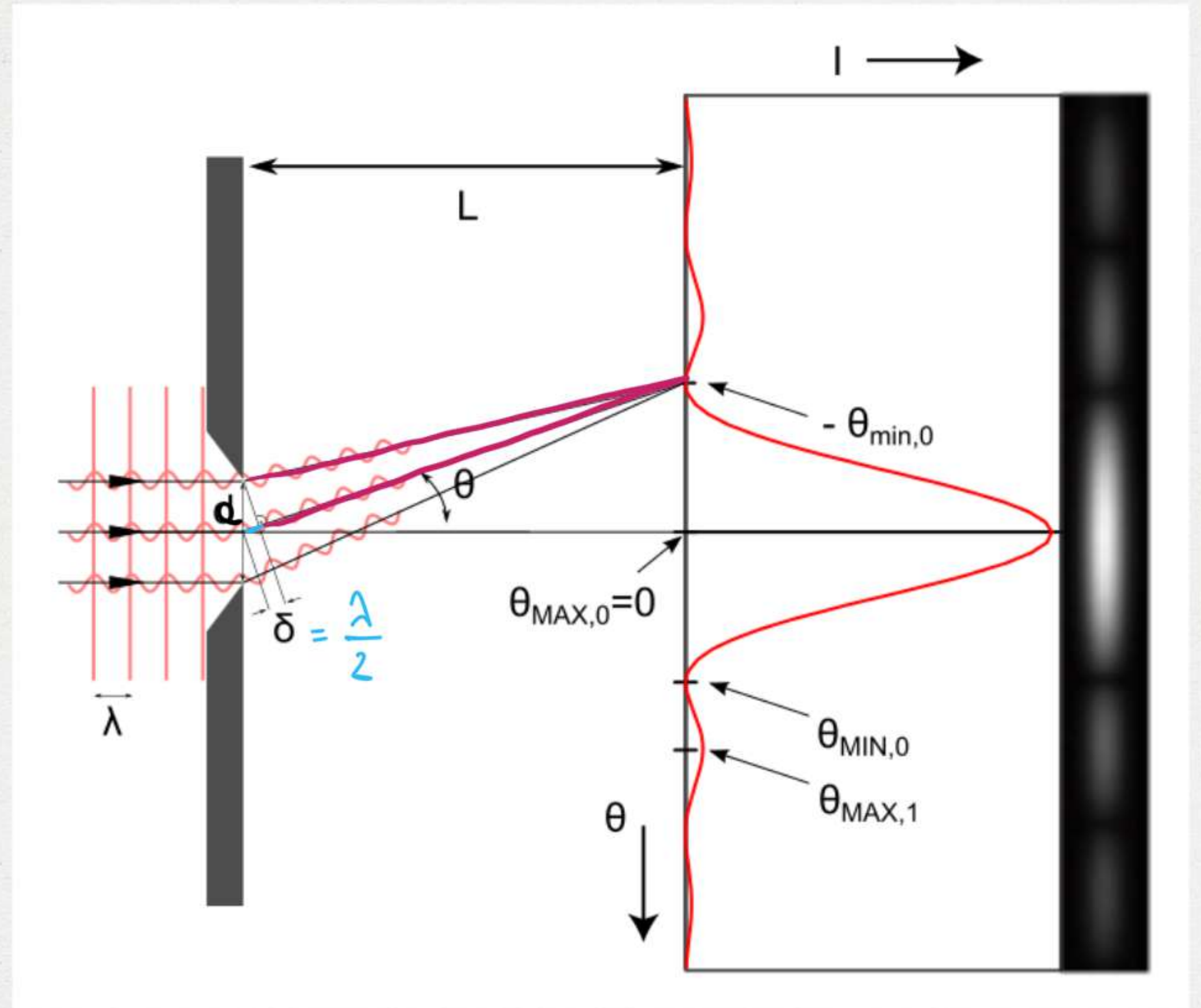
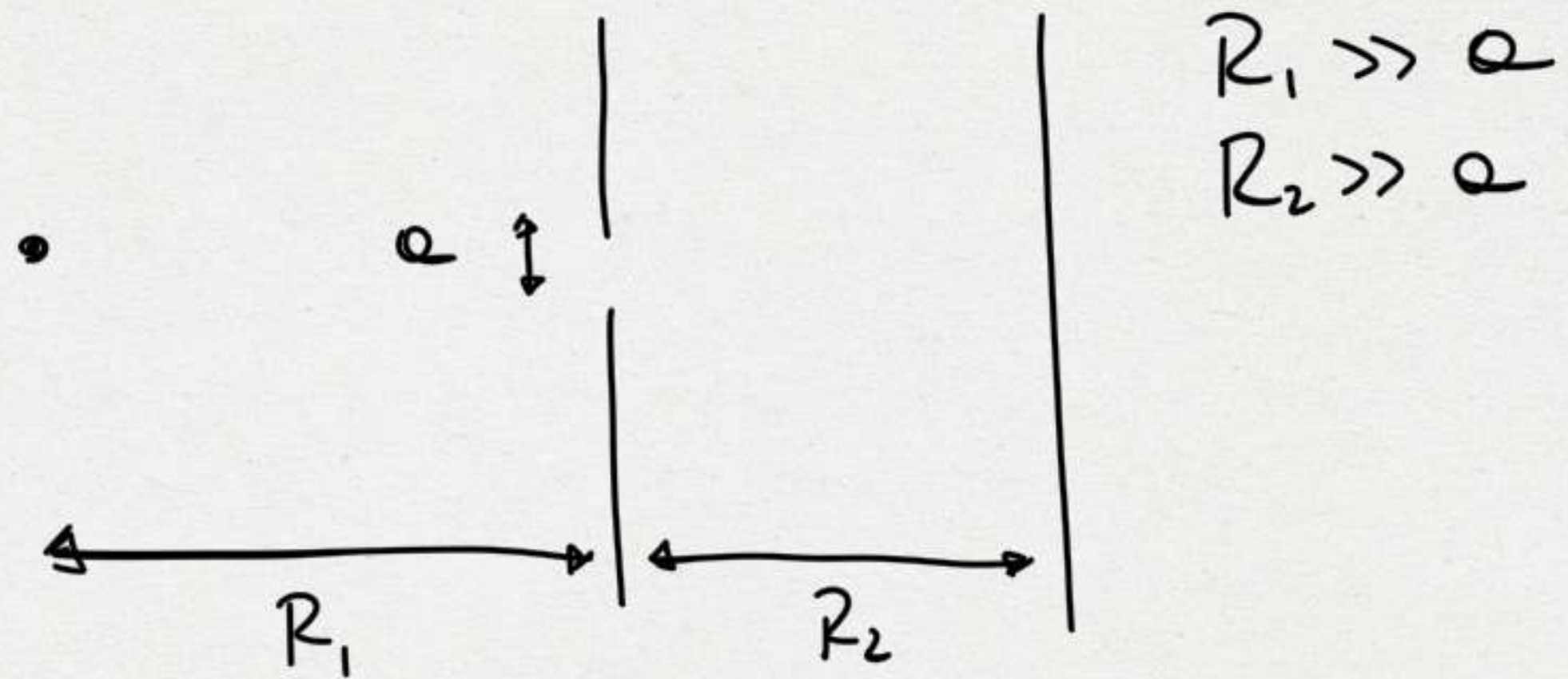
è un'interferenza di un'onda con se stessa

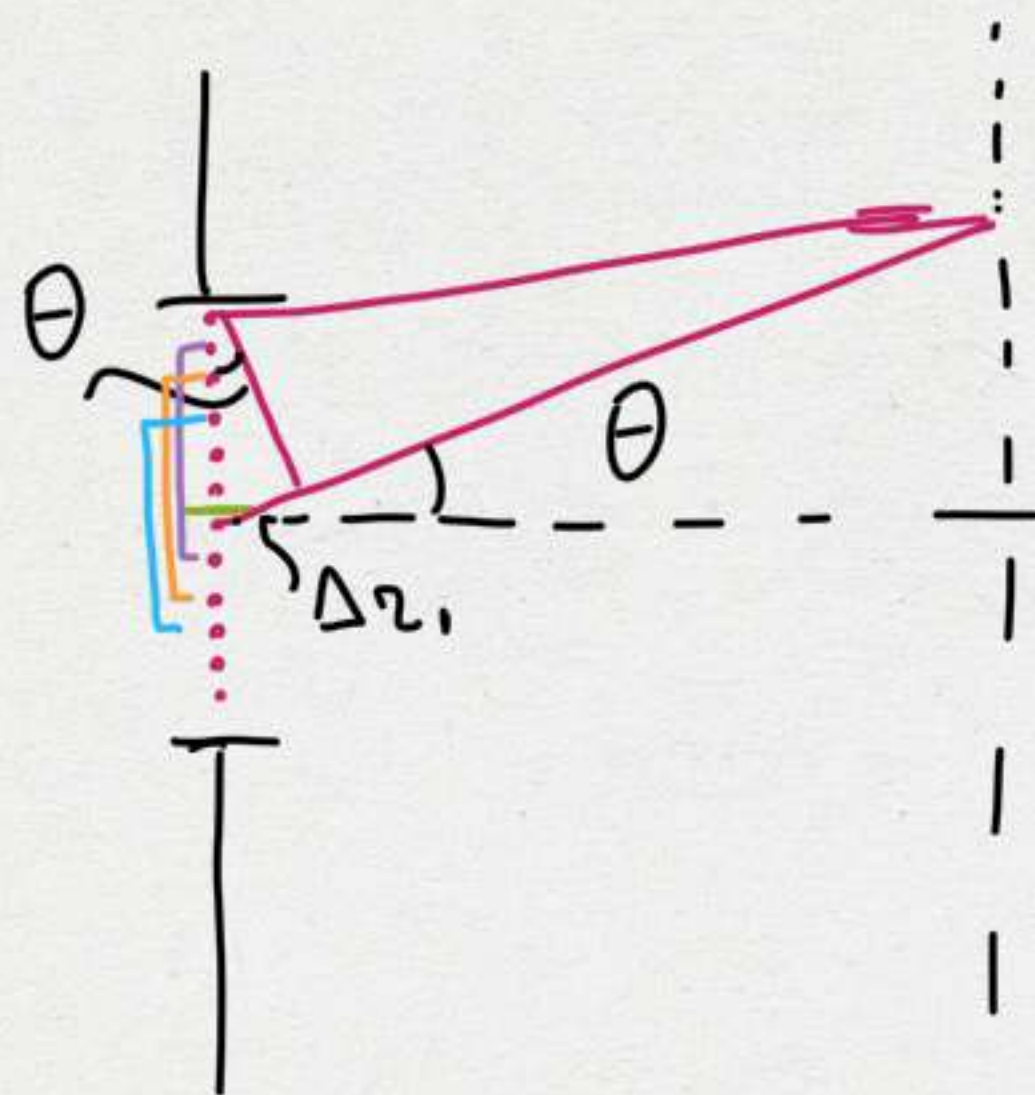
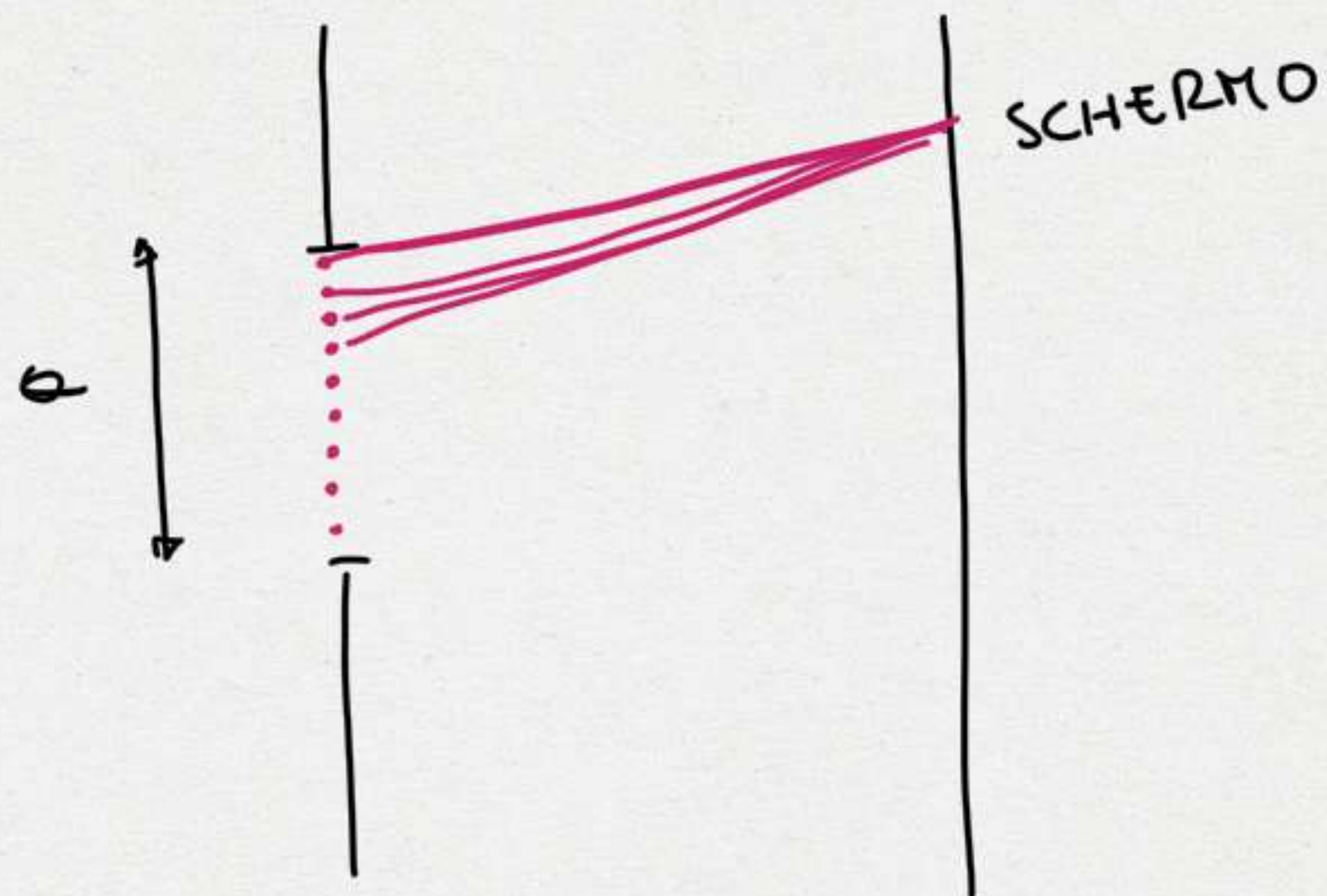
se l'ostacolo / fenditura ha dimensione $\sim \lambda$, si osserva diffrazione se $\lambda \sim a$

PRINCIPIO DI HUYGENS-FRESNEL



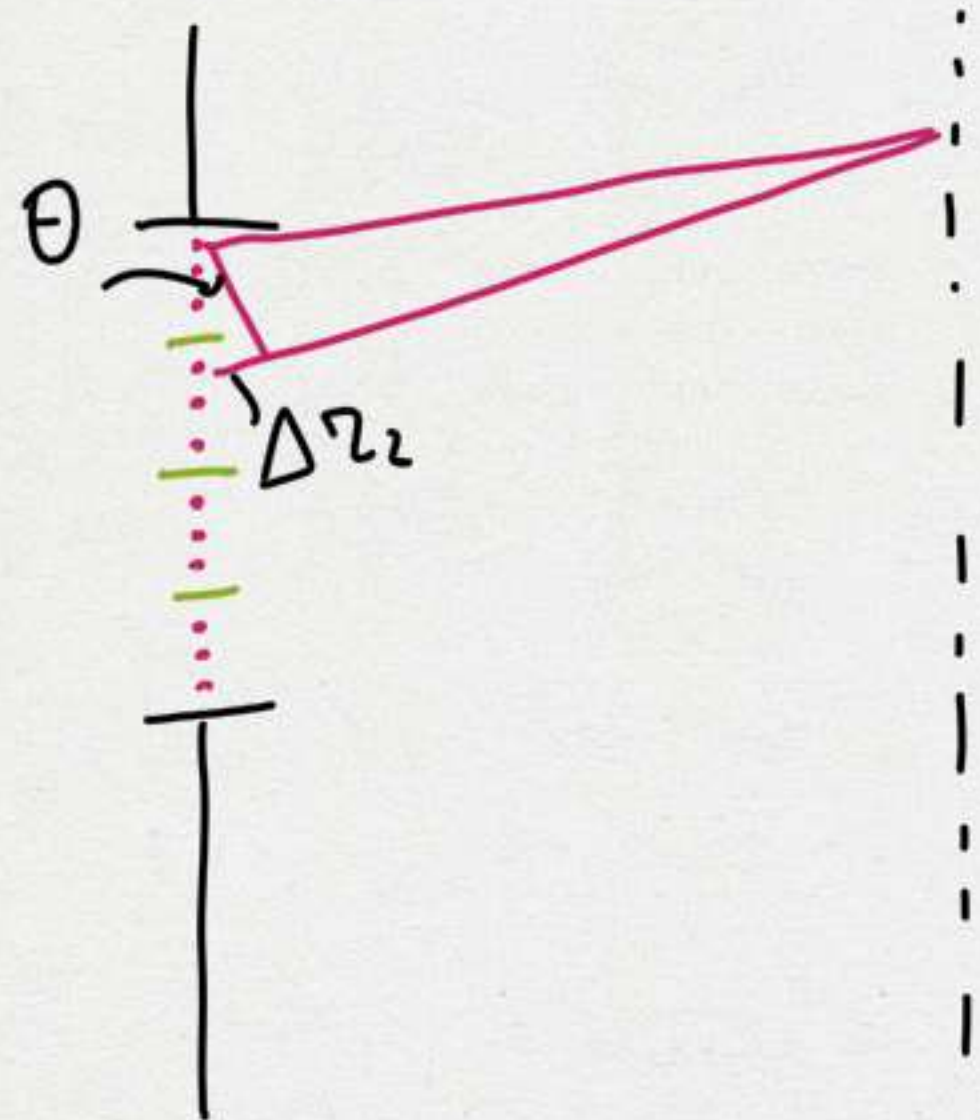
DIFFRAZIONE DI FRAUNHOFER





$$\Delta r_1 = \frac{a}{2} \sin \theta = \frac{\lambda}{2} \Rightarrow$$

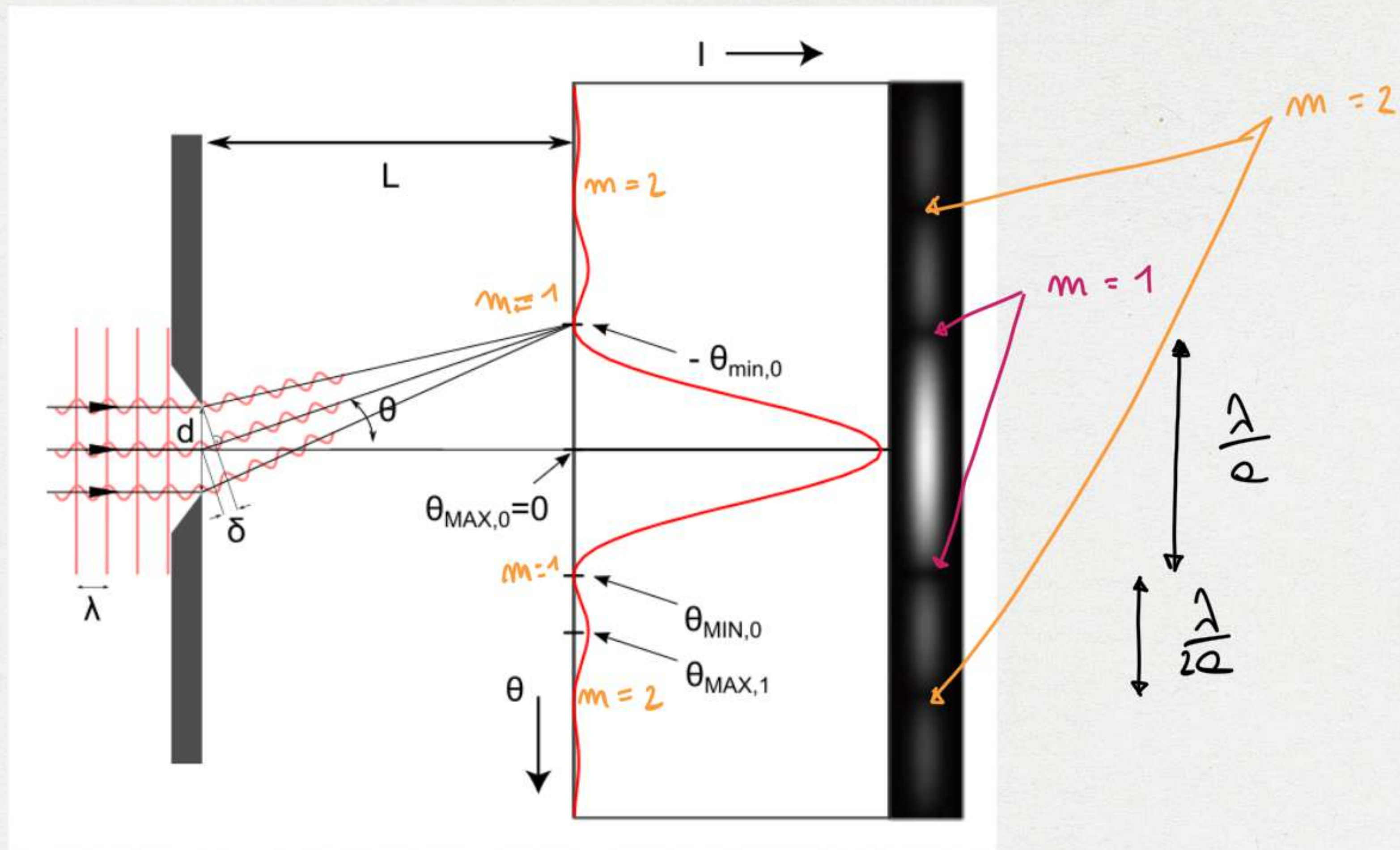
$$\sin \theta = \frac{\lambda}{a}$$



$$\Delta r_2 = \frac{a}{4} \sin \theta = \frac{\lambda}{2} \Rightarrow$$

$$\sin \theta = \frac{2\lambda}{a}$$

$\sin \theta = \frac{m\lambda}{a}$, dove $2m$ è il numero di divisioni della fenditura



quindi se $\lambda \ll a \longrightarrow$ non vedo la diffrazione
 se $\lambda \sim a \longrightarrow$ diffrazione