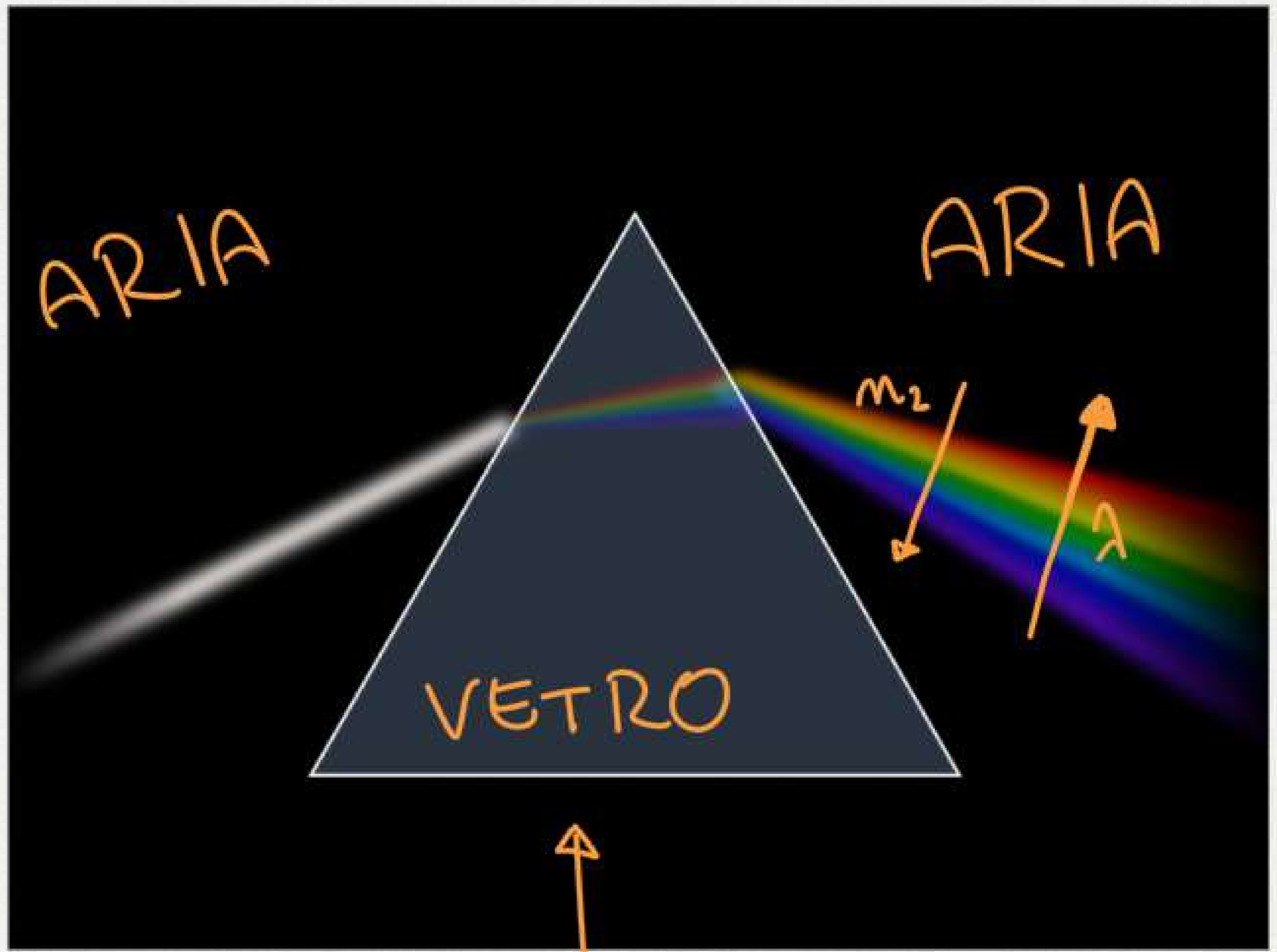
DISPERSIONE DELLA LUCE

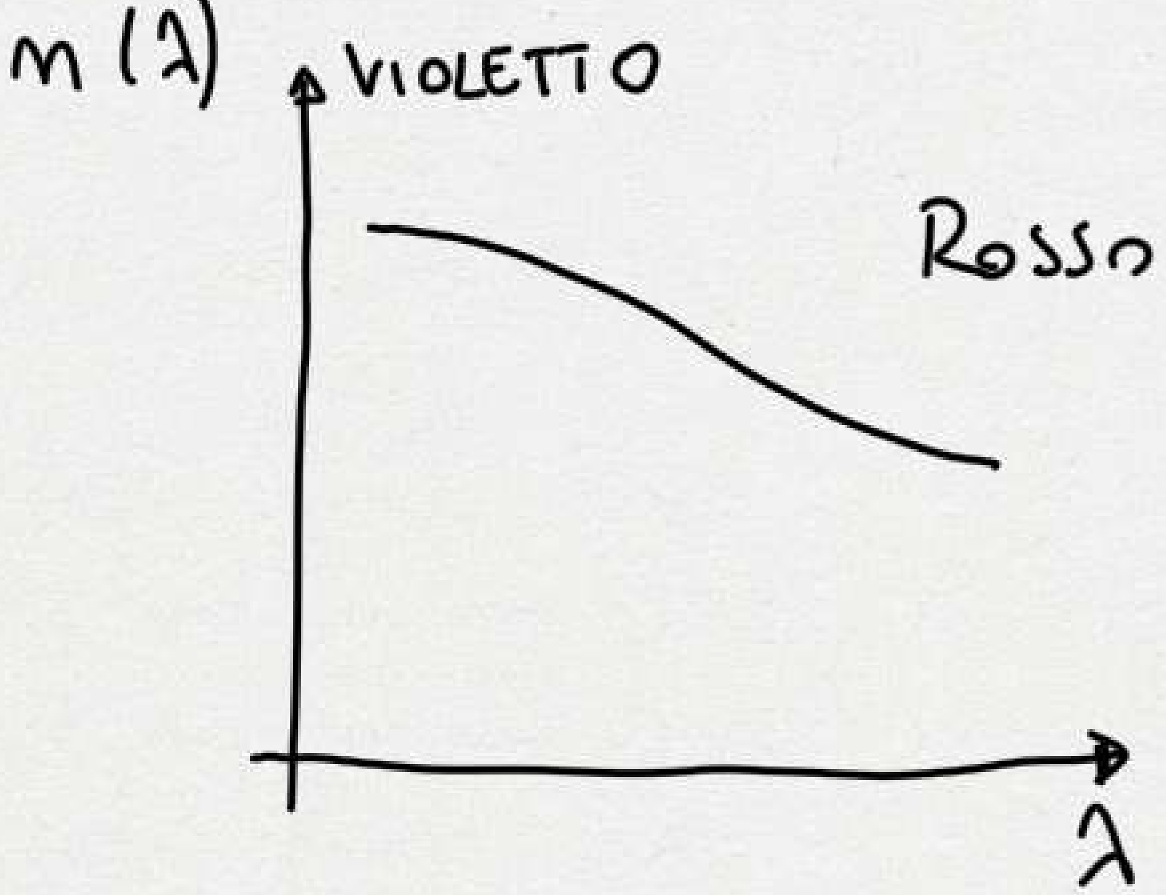


PRISMA

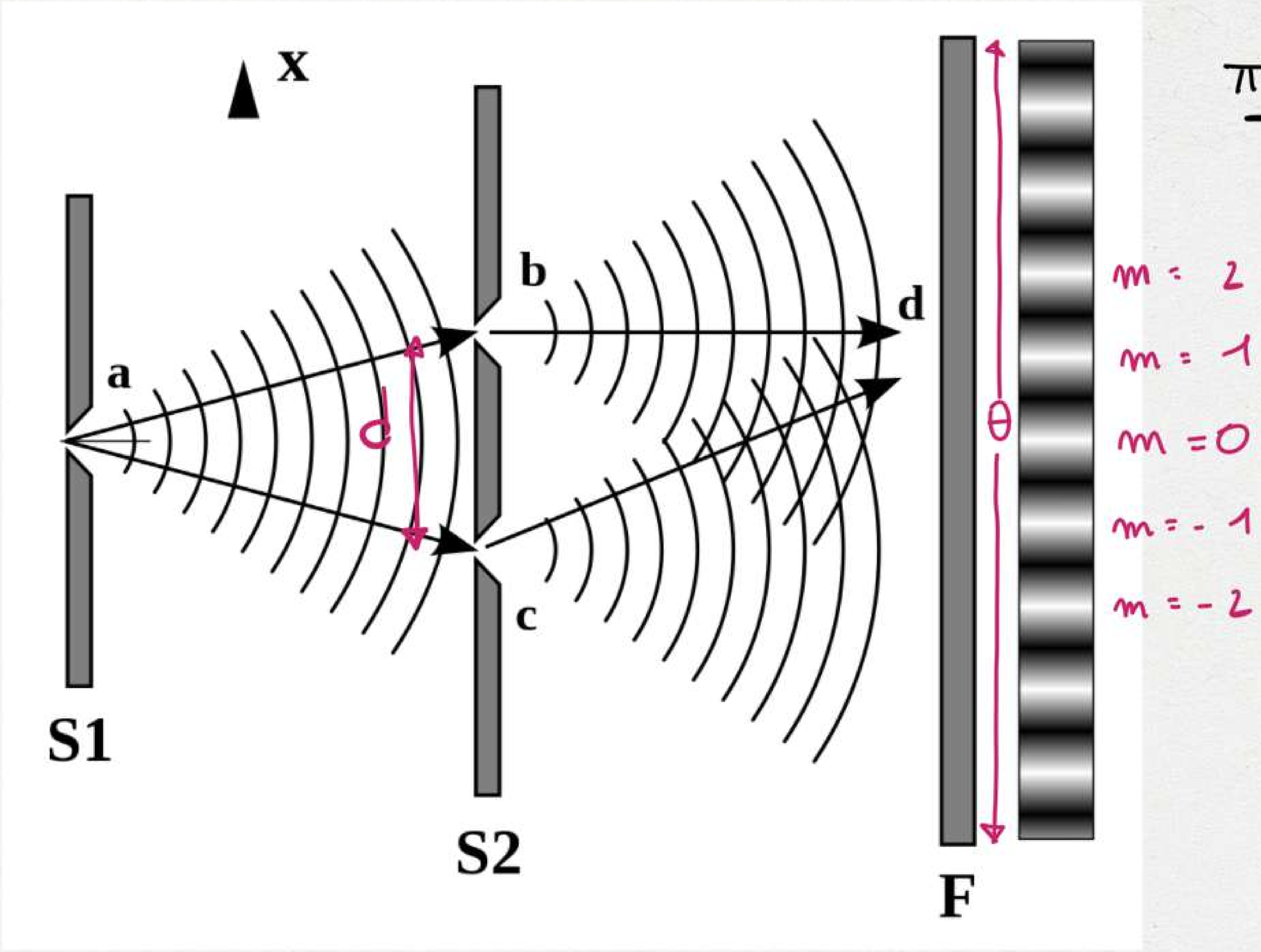
$$n_1 \sin\theta_i = n_2 \sin\theta_t$$

$$\approx$$

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



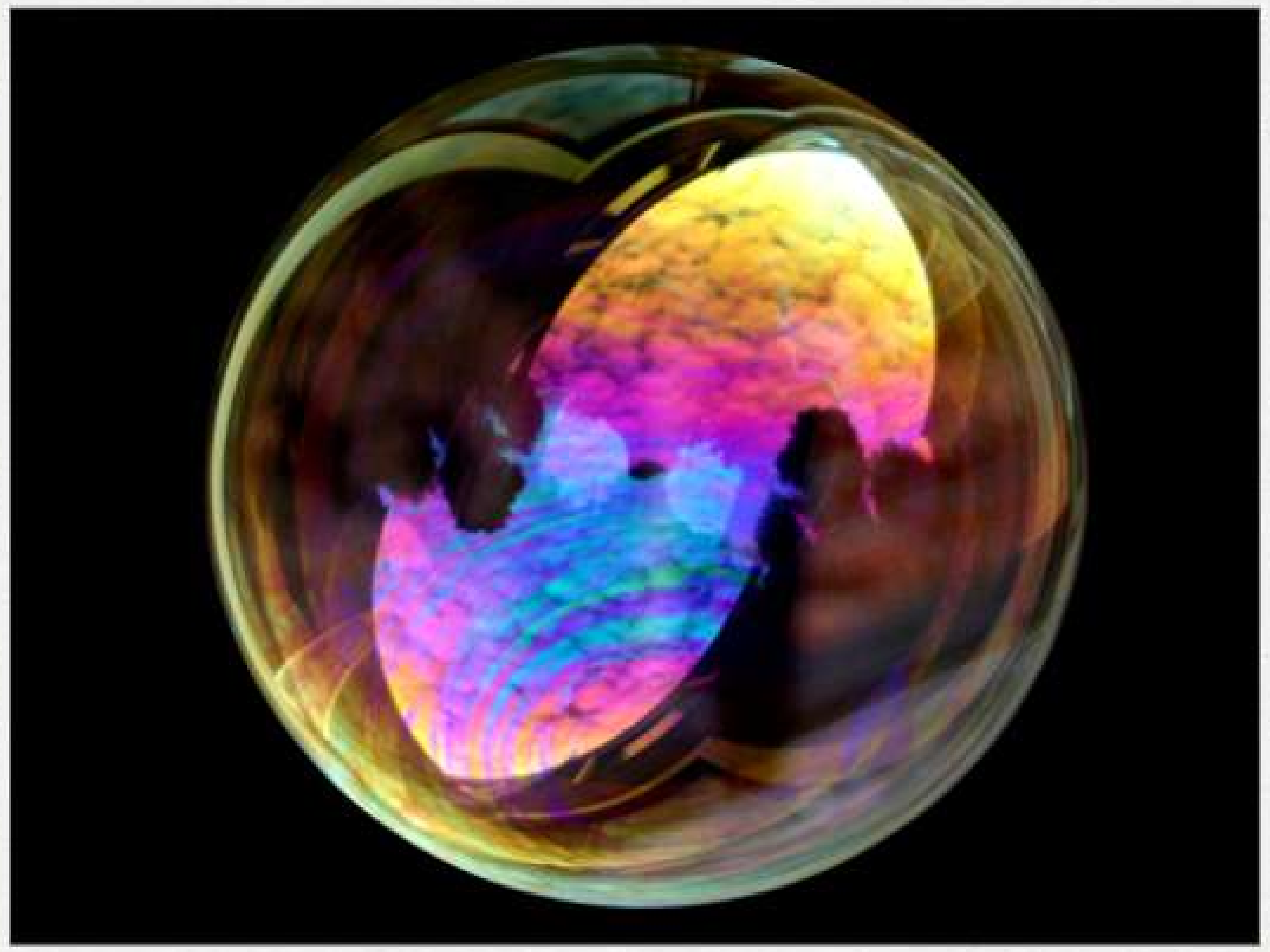
ESPERIMENTO DI YOUNG



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

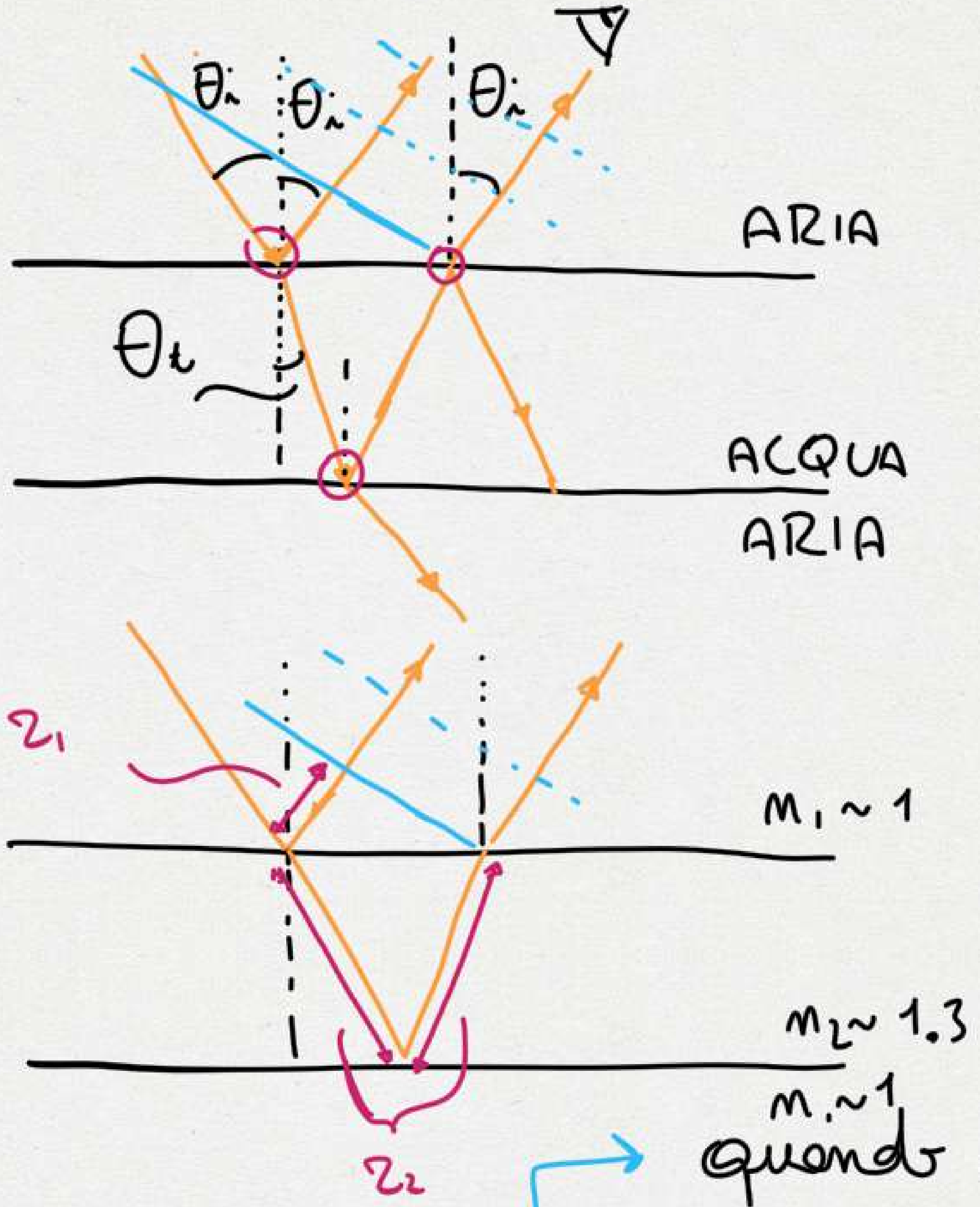
$$\frac{\pi d \sin\theta}{\lambda} = m\pi \quad , \quad m \text{ INTERO}$$

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

INTERFERENZA DA LAMINE SOTTILI

THIN-FILM INTERFERENCE



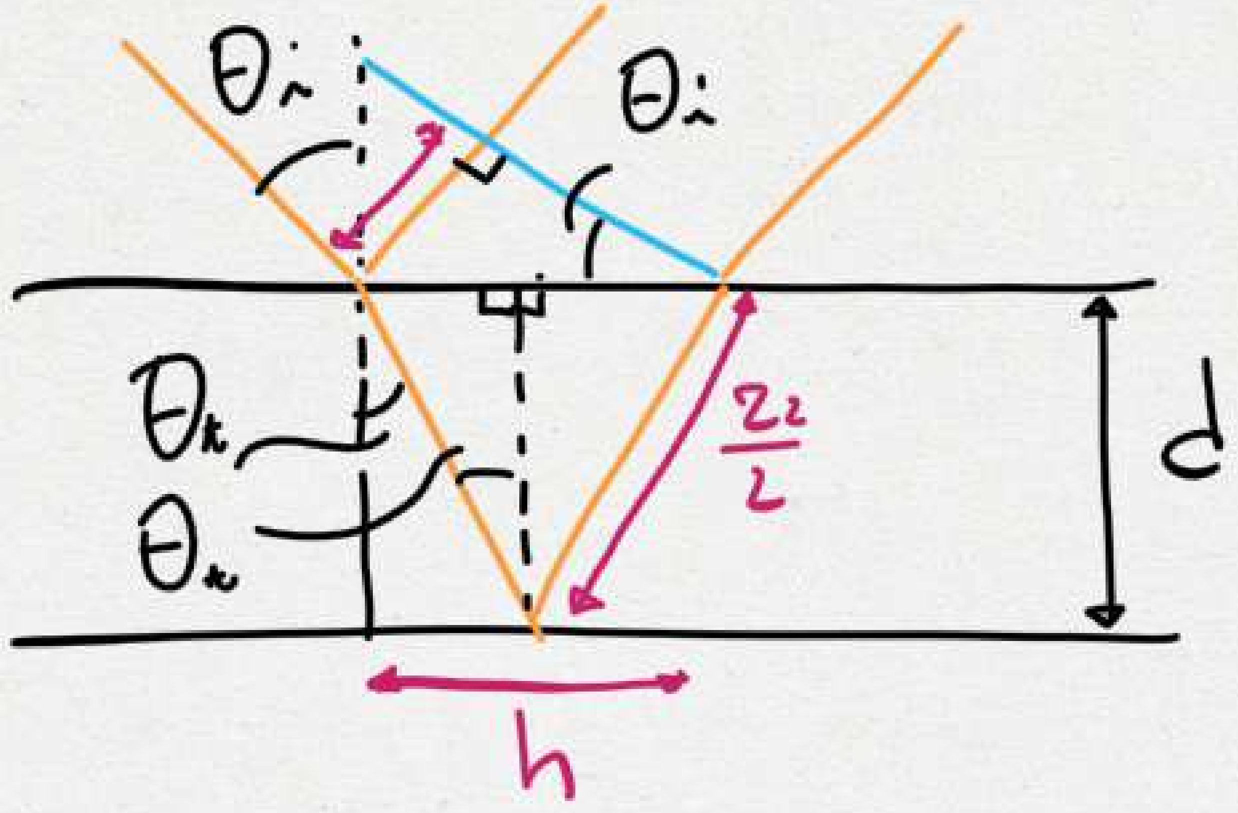
$$\lambda_0 \rightarrow \lambda = \frac{\lambda_0}{n} \qquad k = \frac{2\pi}{\lambda}$$

$$k_0 \rightarrow k = n\,k$$

$$\delta = \delta_2 - \delta_1 - \pi =$$

$-\pi$ → 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

$$= k_2 z_2 - k_1 \delta_1 - \pi = n_2 k_1 z_2 - k_1 z_1 - \pi$$



$$\frac{r_2}{2}\cos\theta_t = d \Rightarrow$$

$$r_2 = \frac{2d}{\cos\theta_t} \Rightarrow \delta_2 = k_1 n r_2 = \boxed{\frac{2k_1 n_2 d}{\cos\theta_t}}$$

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

$$r_1 = h\sin\theta_i = \cancel{2}\frac{r_2}{\cancel{2}}\sin\theta_t\sin\theta_i = r_2\sin\theta_t\sin\theta_i =$$

$$= n_2 r_2 \sin^2\theta_t = \frac{n_2 2d\sin^2\theta_t}{\cos\theta_t} \Rightarrow \delta_1 = k_1 r_1 = \boxed{\frac{2d n_2 k_1 \sin^2\theta_t}{\cos\theta_t}} \Rightarrow$$

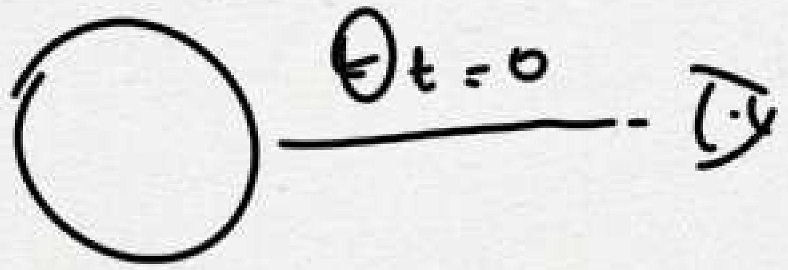
$$\delta = \delta_2 - \delta_1 - \pi = \frac{2k_1 n_2 d}{\cos\theta_t}\overbrace{\left(1 - \sin^2\theta_t\right)}^{\cos^2\theta_t} - \pi = 2k_1 n_2 d\cos\theta_t - \pi$$

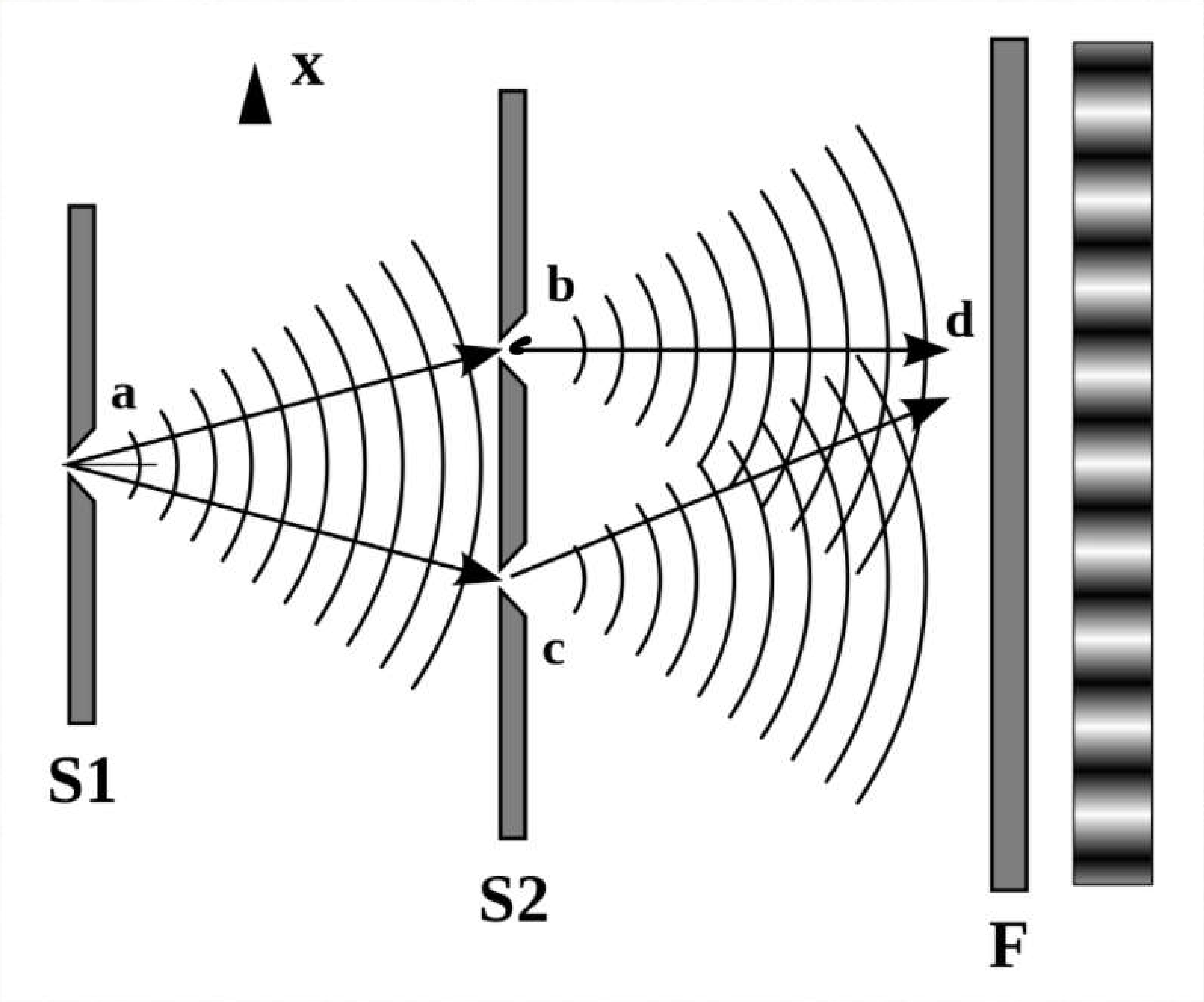
$$\delta \xrightarrow[\theta_t \to 0]{} 2k_1 n_2 d - \pi = \boxed{\frac{4\pi n d}{\lambda} - \pi}$$

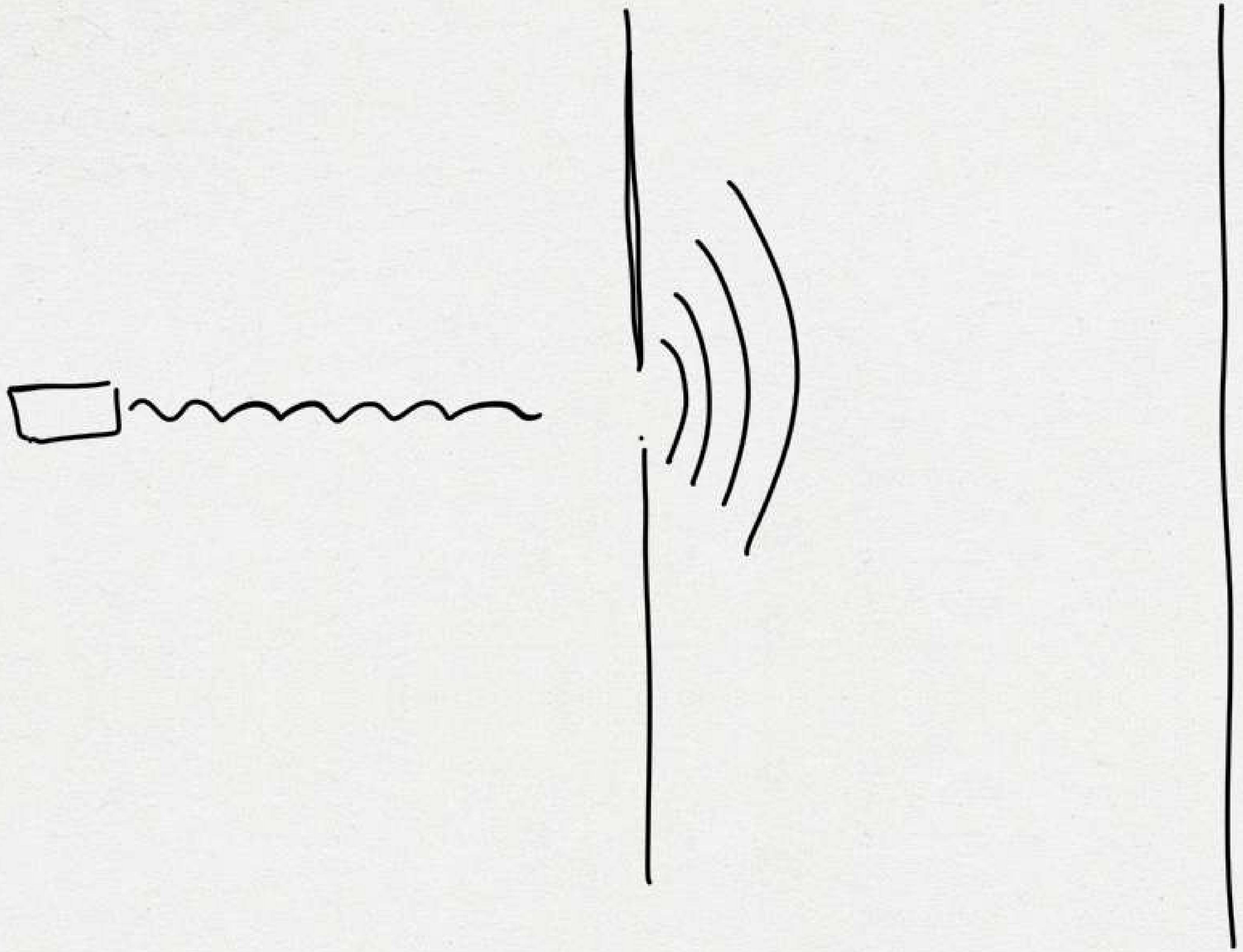
se $\delta = 2m\pi$ con m INTERO → MASSIMO DI INTENSITÀ

se $\delta = (2m+1)\pi$ → MINIMO DI INTENSITÀ

$$\xrightarrow[d/\lambda \to 0]{} -\pi$$




x
a
b
c
d
S1
S2
F

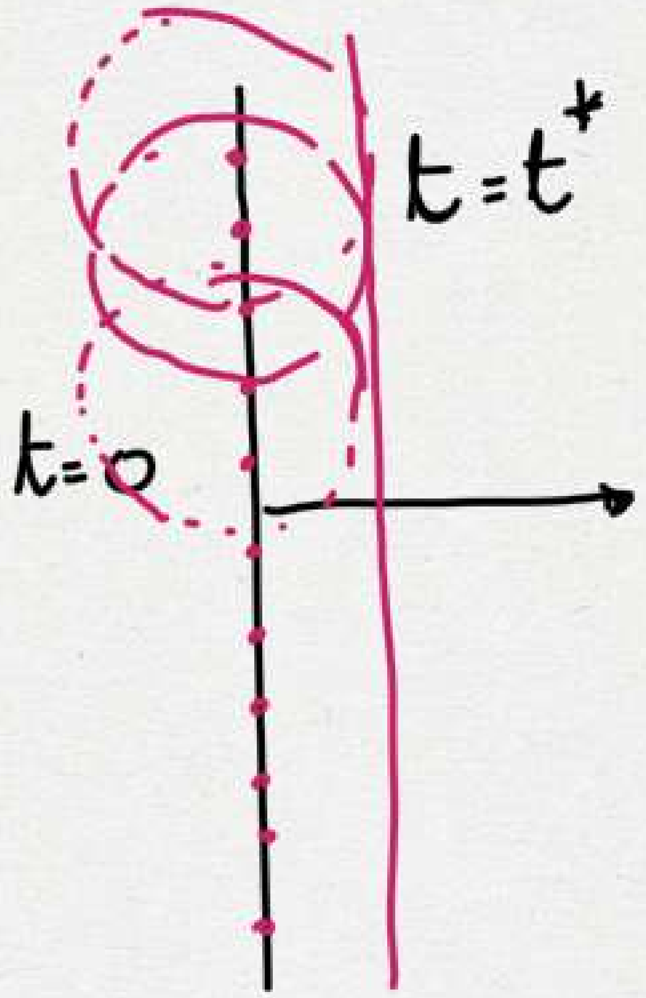


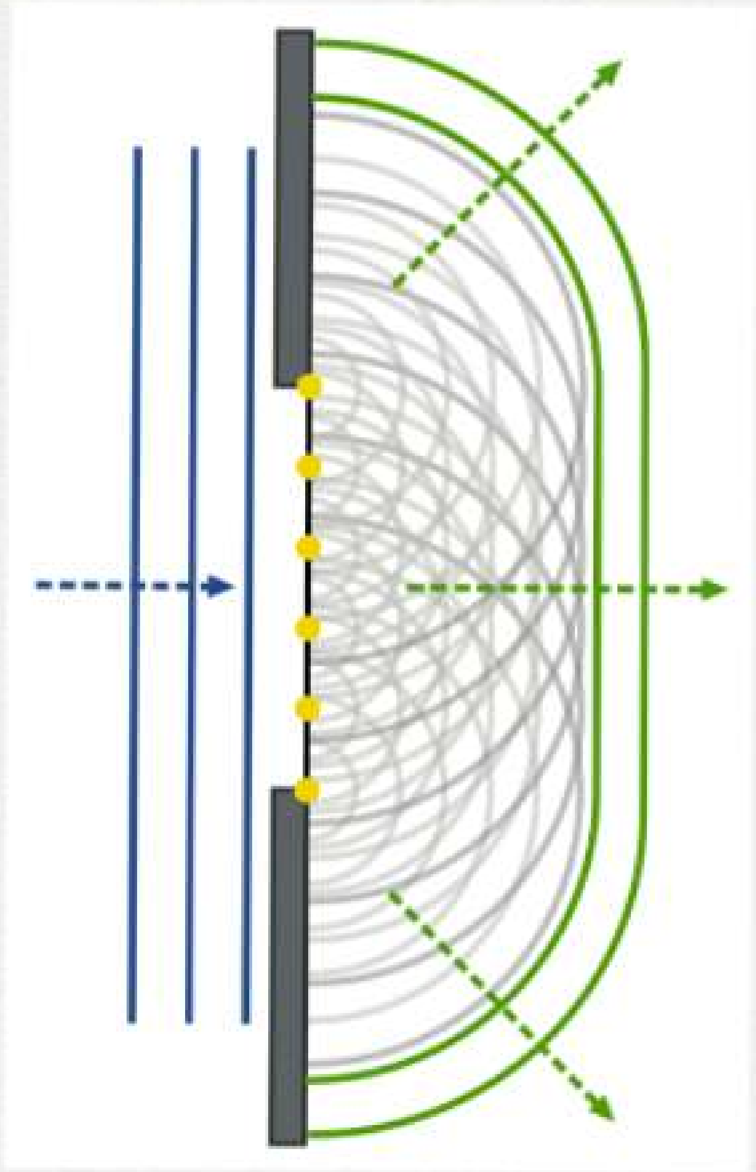
DIFFRAZIONE

è un'interferenza di un'onda con se stessa

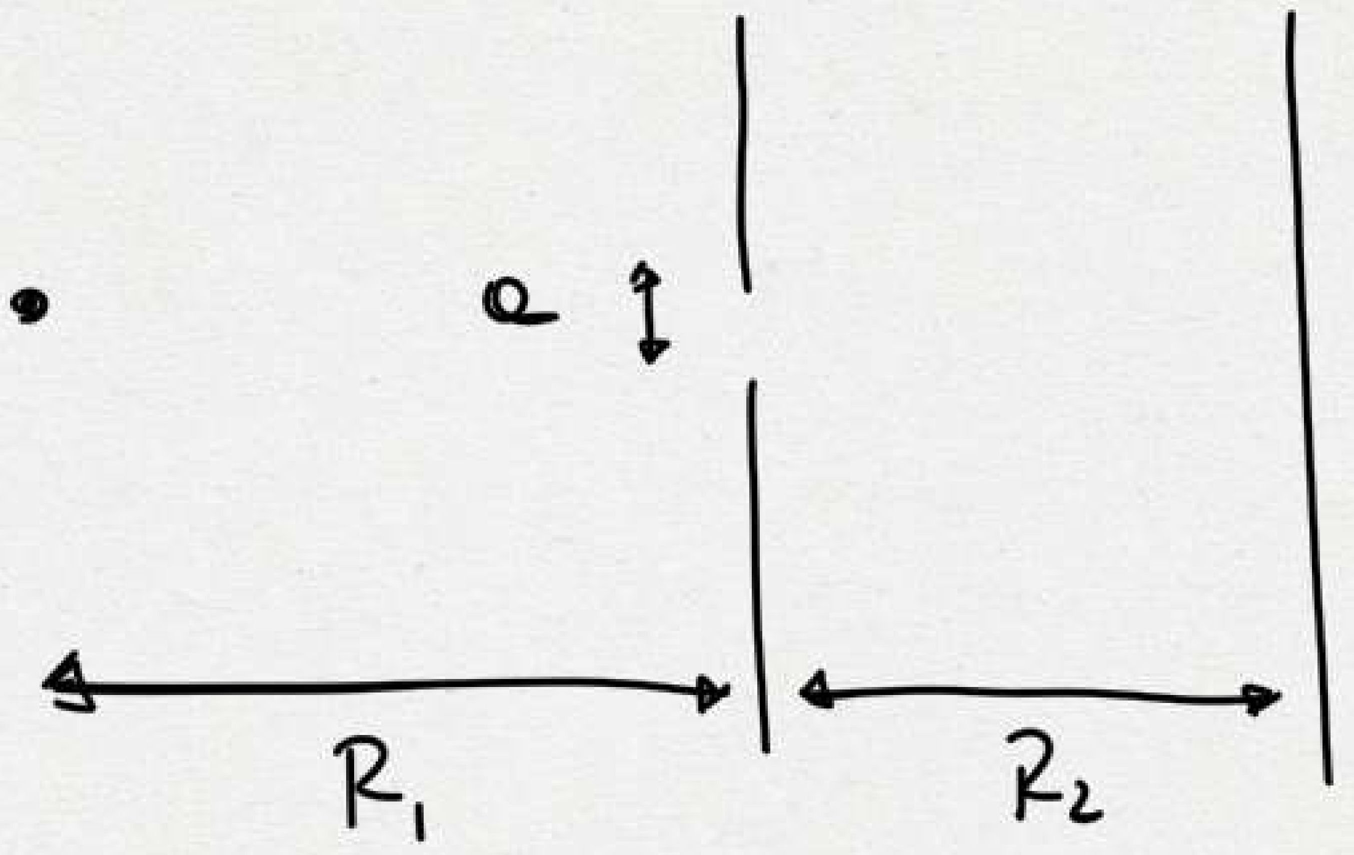
se l'ostacolo / fenditura ha dimensione $\sim a$, si osserva diffrazione se $\lambda \sim a$

PRINCIPIO DI HUYGENS-FRESNEL

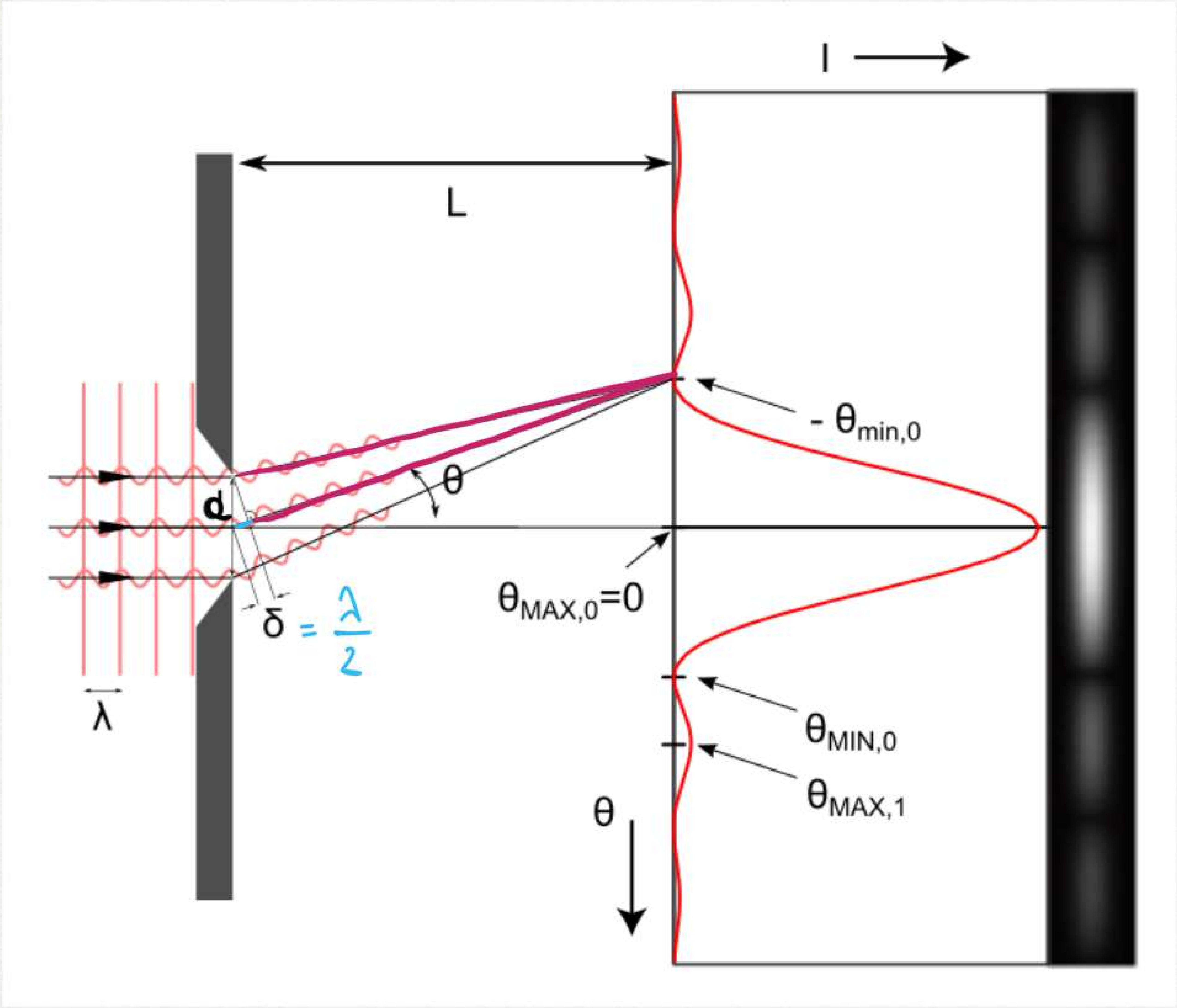


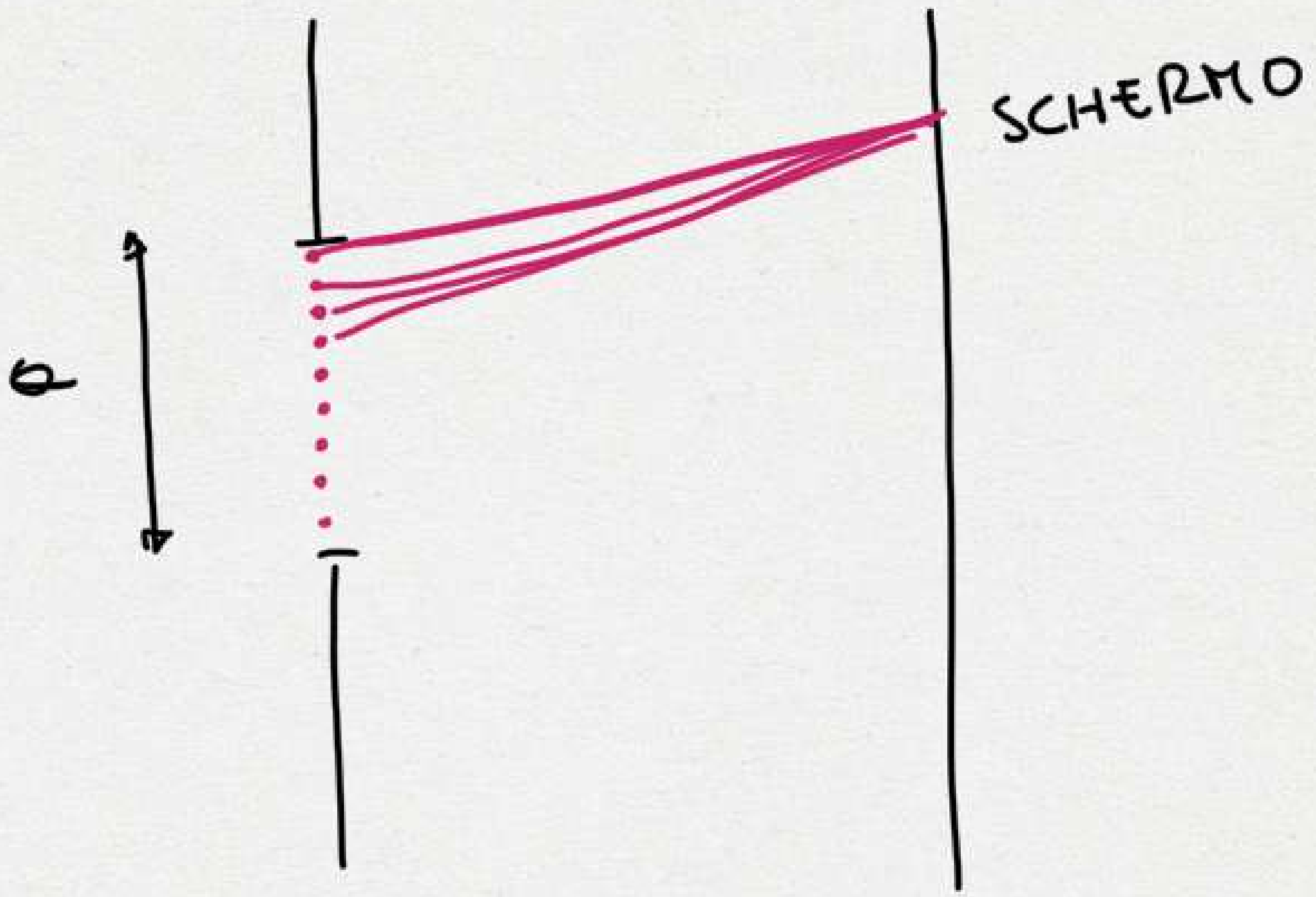


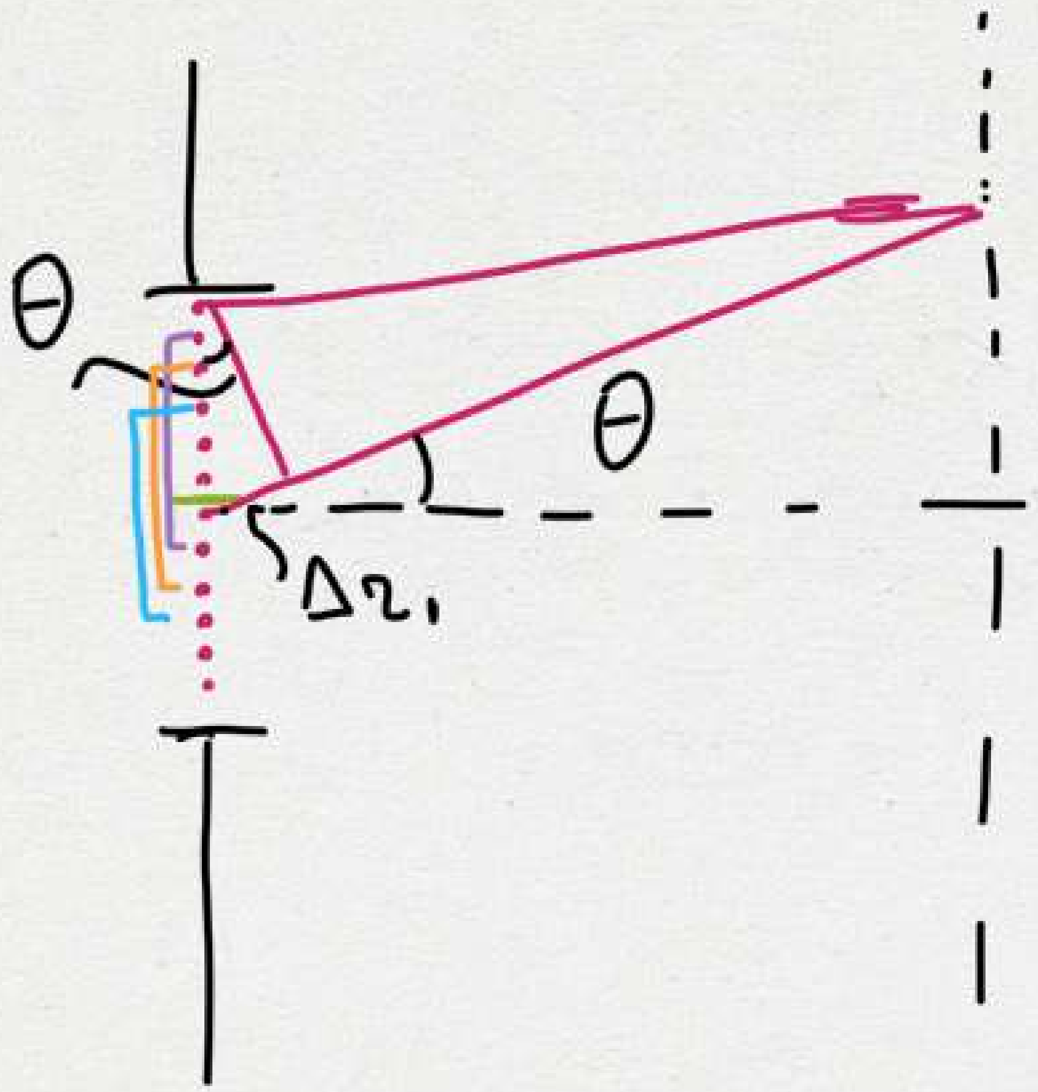
DIFFRAZIONE DI FRAUNHOFER



$R_1 \gg a$
$R_2 \gg a$

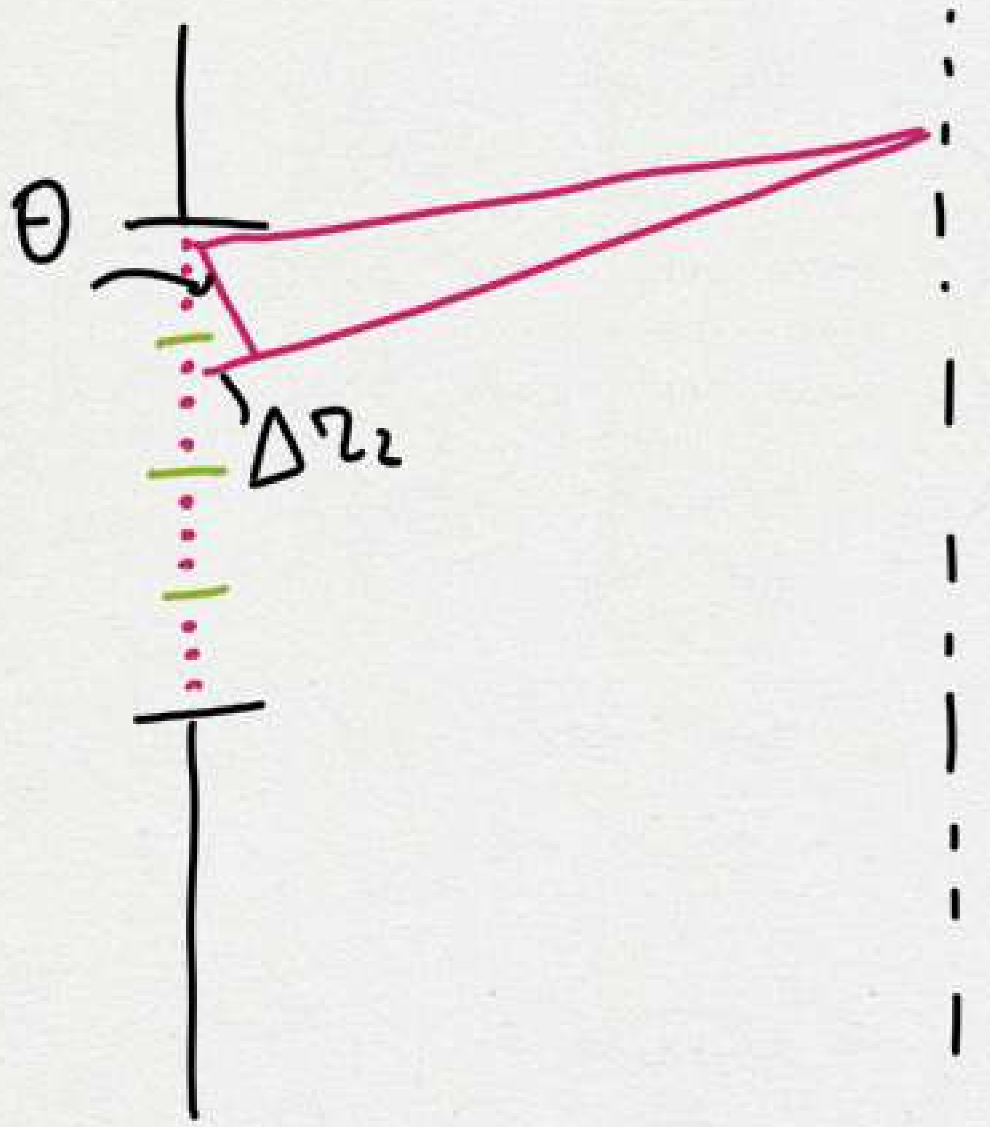






$$\Delta r_1 = \frac{a}{2}\sin\theta = \frac{\lambda}{2} \Rightarrow$$

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

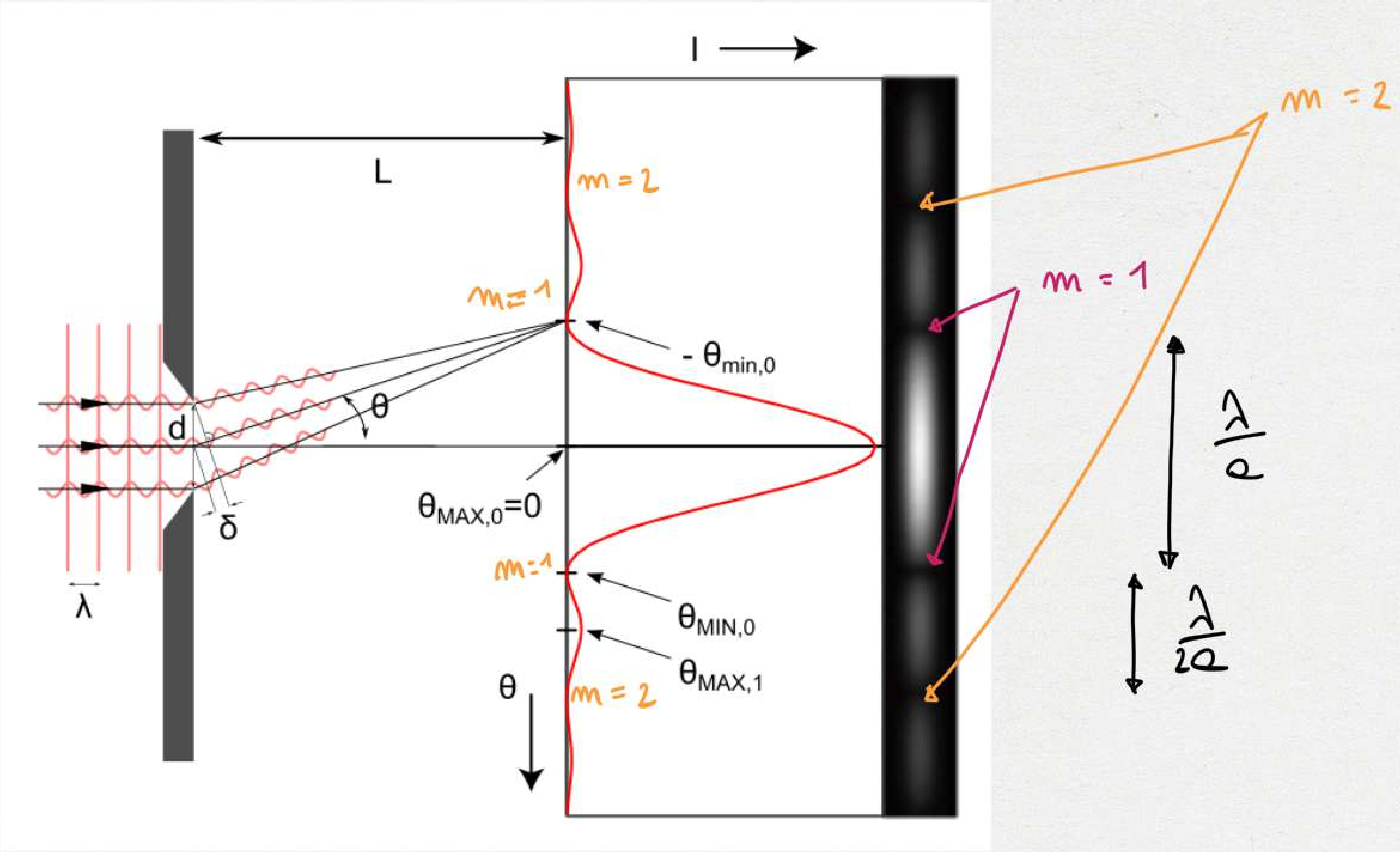


$$\Delta r_2 = \frac{a}{4}\sin\theta = \frac{\lambda}{2} \Rightarrow$$

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

$$\vdots$$

$\sin\theta = \dfrac{m\lambda}{a}$, 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