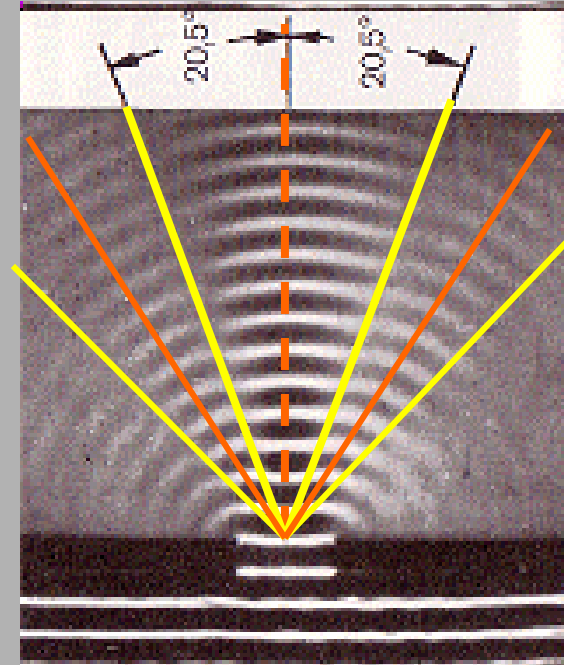
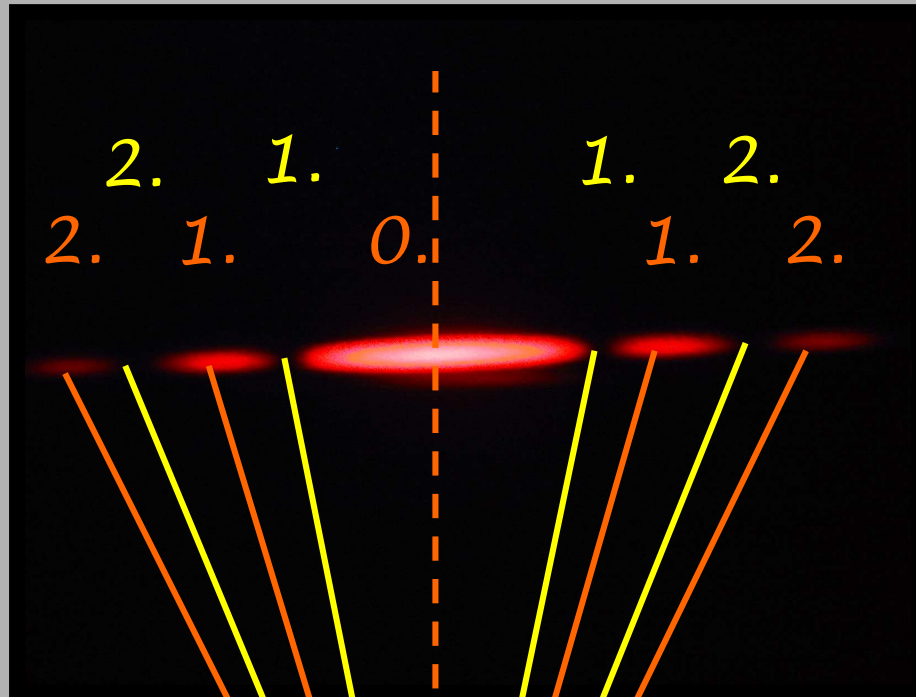




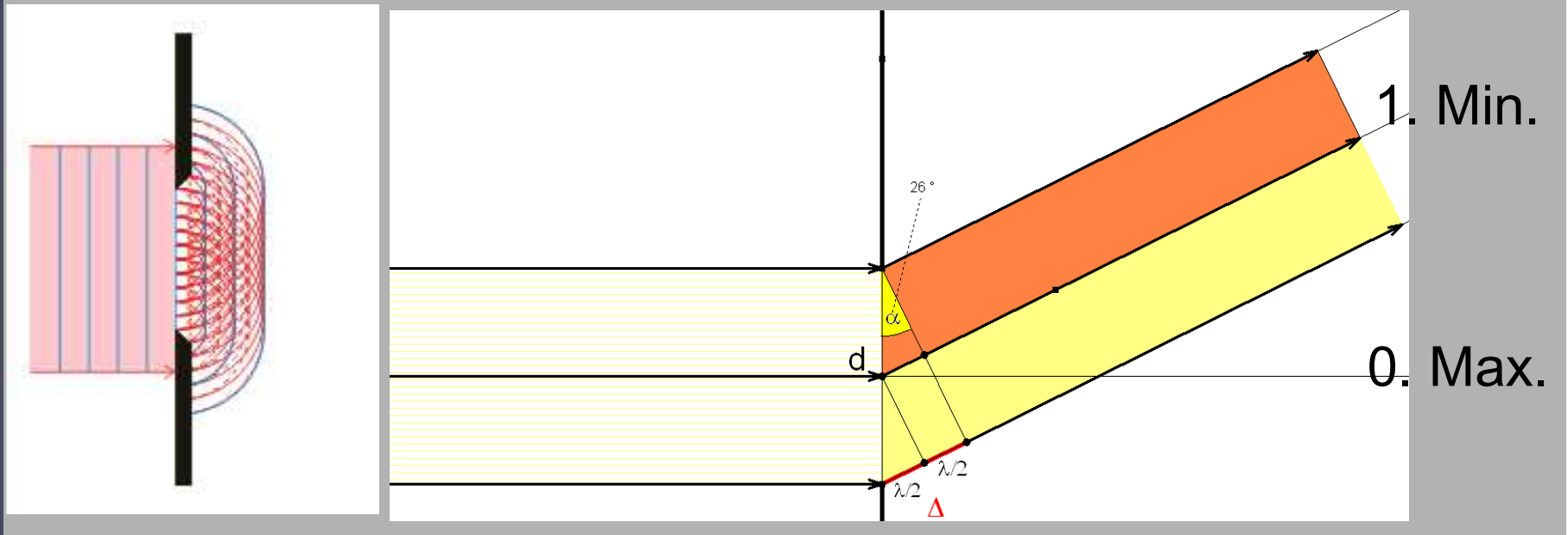
Laser Beugung am Spalt



Das Beugungsbild mit Laserlicht entspricht dem Beugungsbild bei Wasserwellen.



Beugung am Spalt - Lage der Minima-

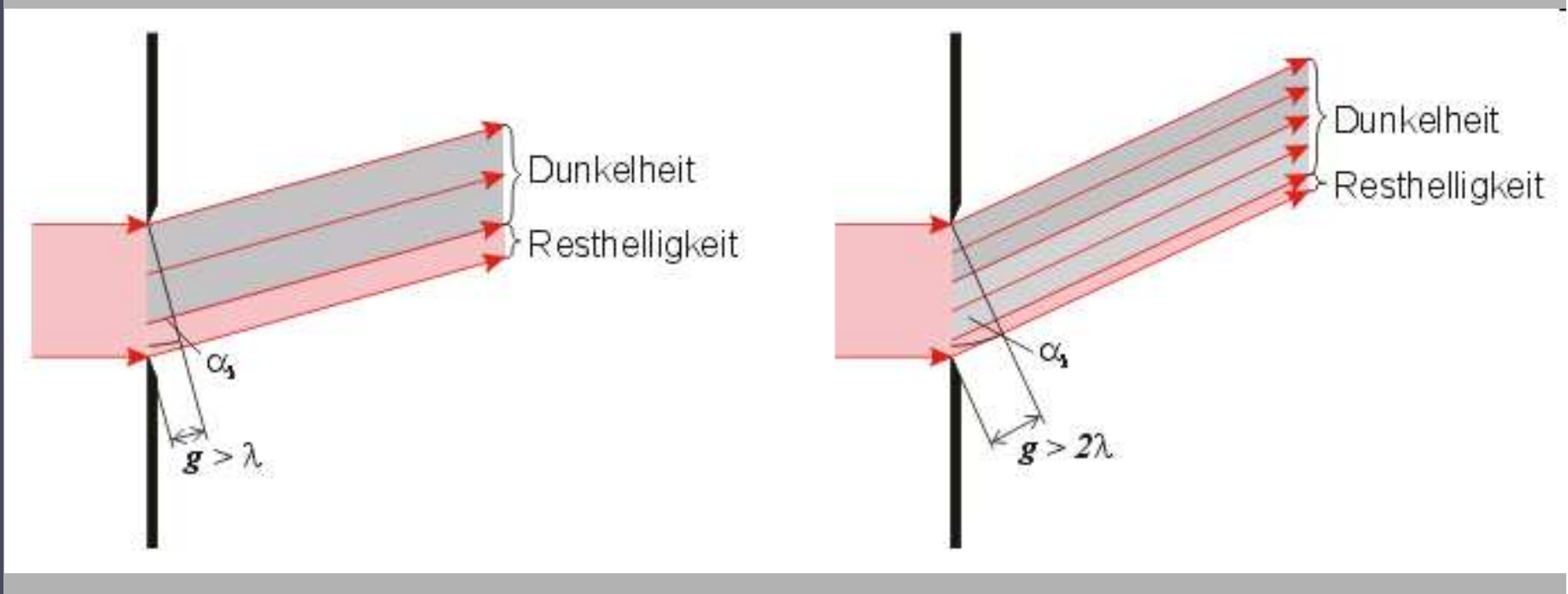
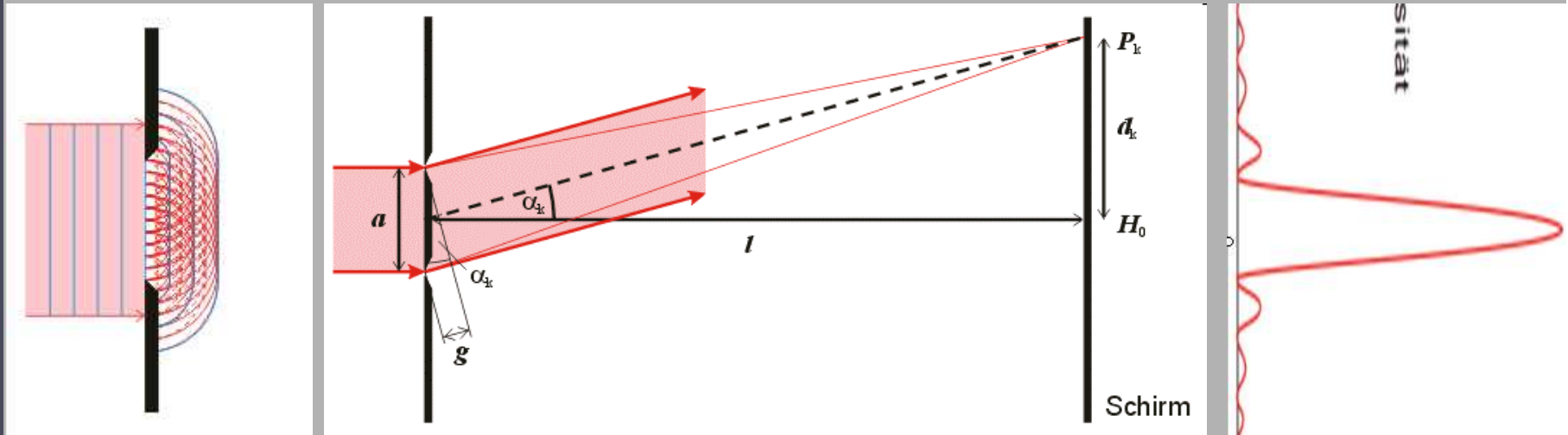


Auslöschung (Minima), wenn die Randstrahlen einen Gangunterschied von $\Delta = n \cdot \lambda$ haben. „Dann hat jeder Strahl im gelben Feld einen Strahl im orangenen Feld, mit dem er einen Gangunterschied von $\lambda/2$ hat und damit destruktiv interferieren kann“.

$$\Delta = n \cdot \lambda \quad d \cdot \sin \alpha_n = n \cdot \lambda$$

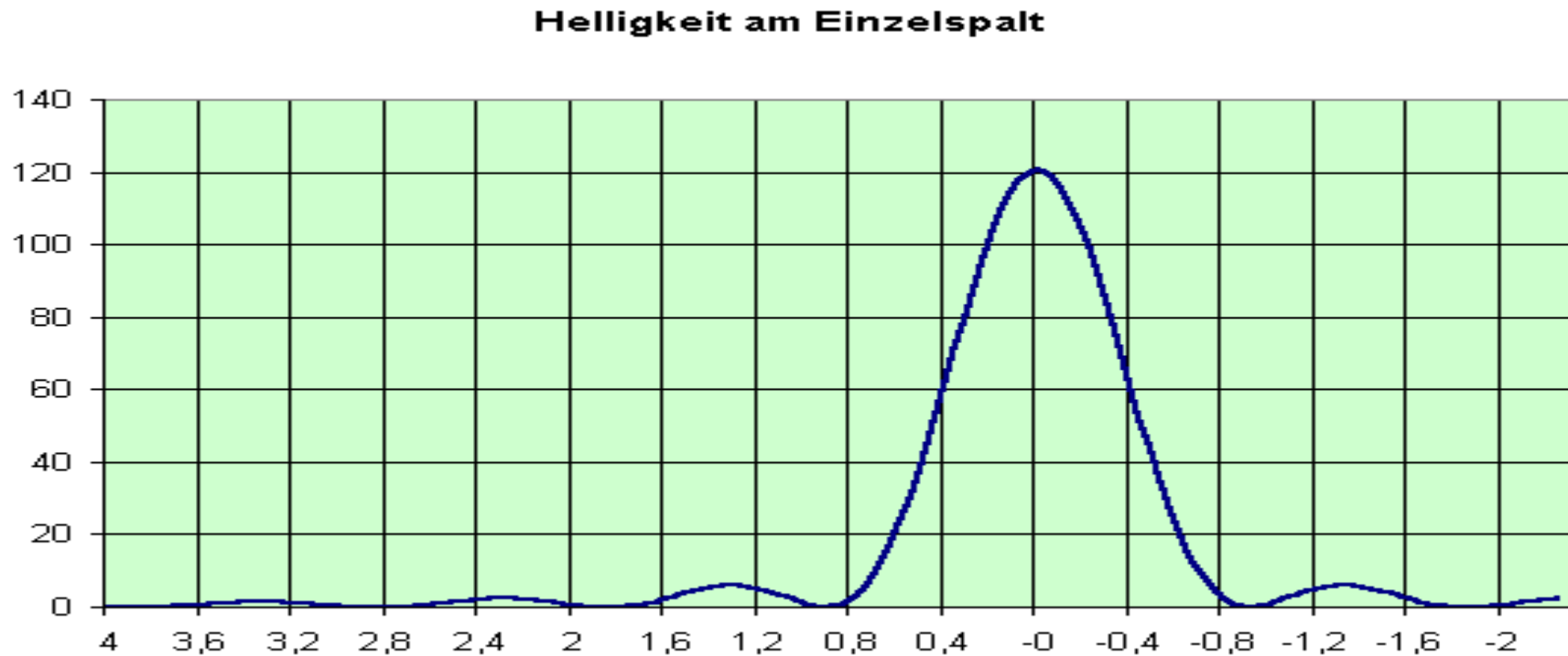


Beugung am Spalt





Beugung am Spalt - Intensitätsverteilung-



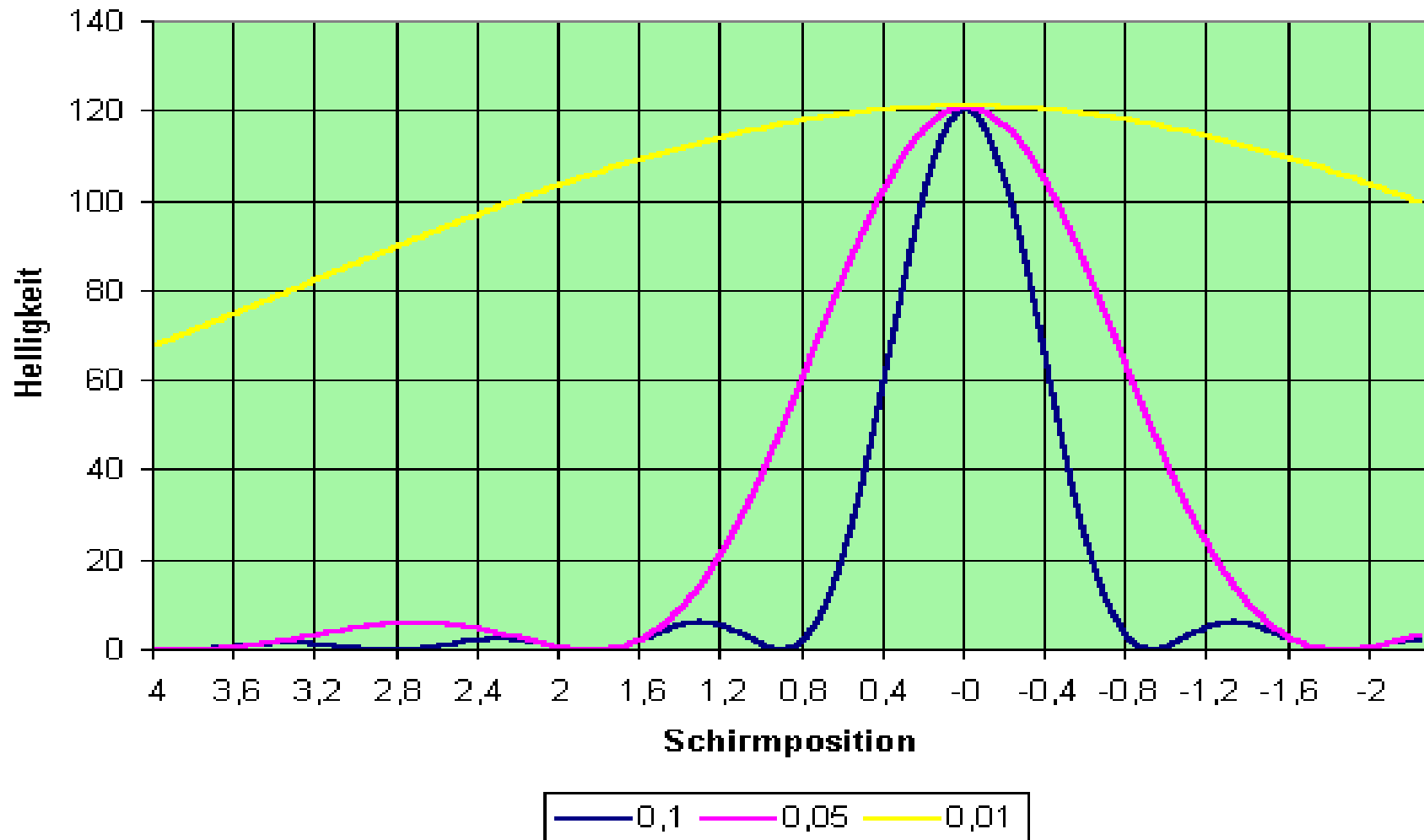
Lage der Minima: $\Delta = n \cdot \lambda$ $d \cdot \sin \alpha_n = n \cdot \lambda$

Lage der Maxima: $\Delta = (2n + 1) \cdot \frac{\lambda}{2}$ $d \cdot \sin \alpha_n = (2n + 1) \cdot \frac{\lambda}{2}$



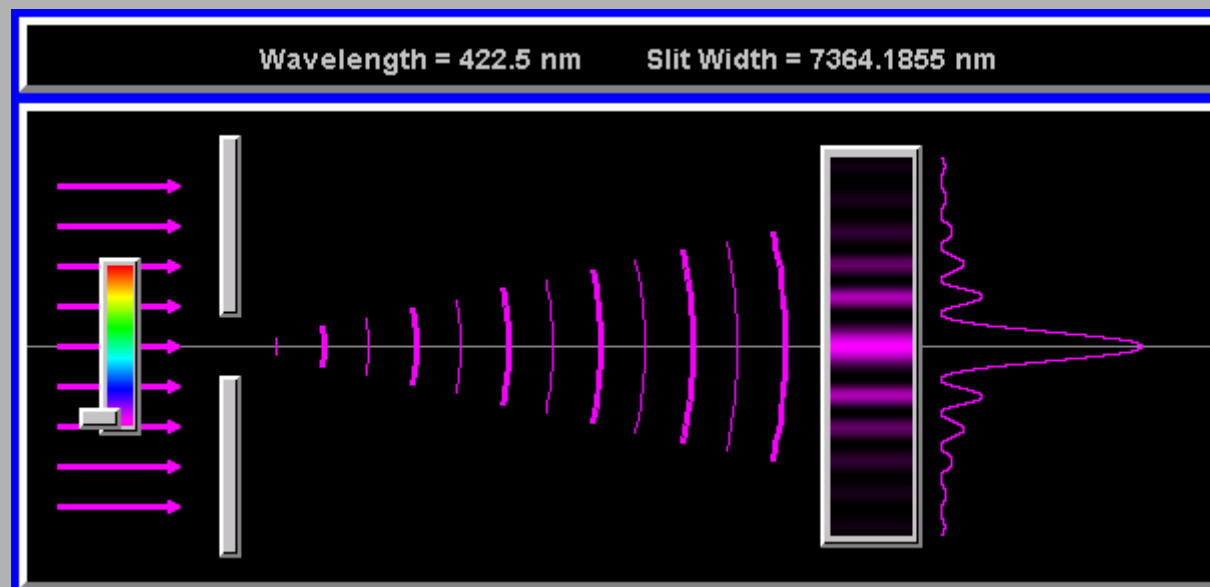
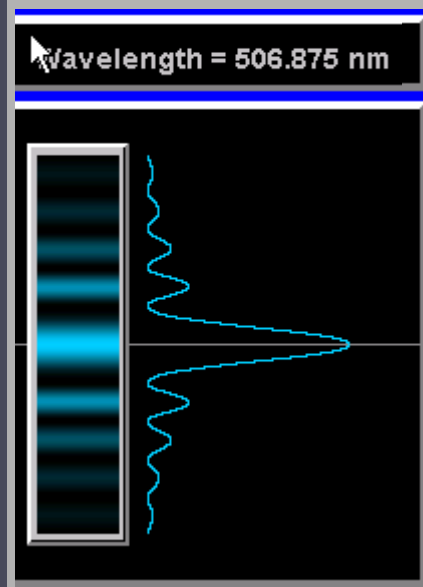
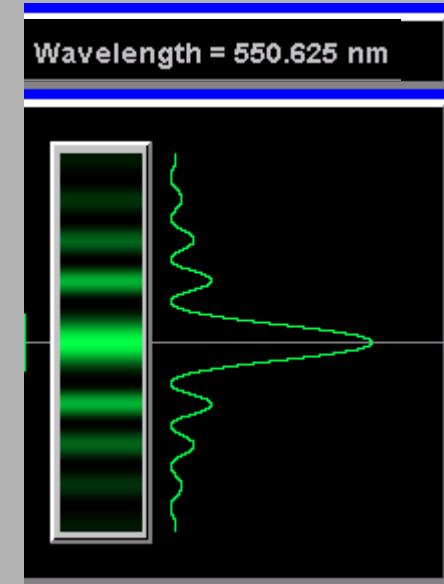
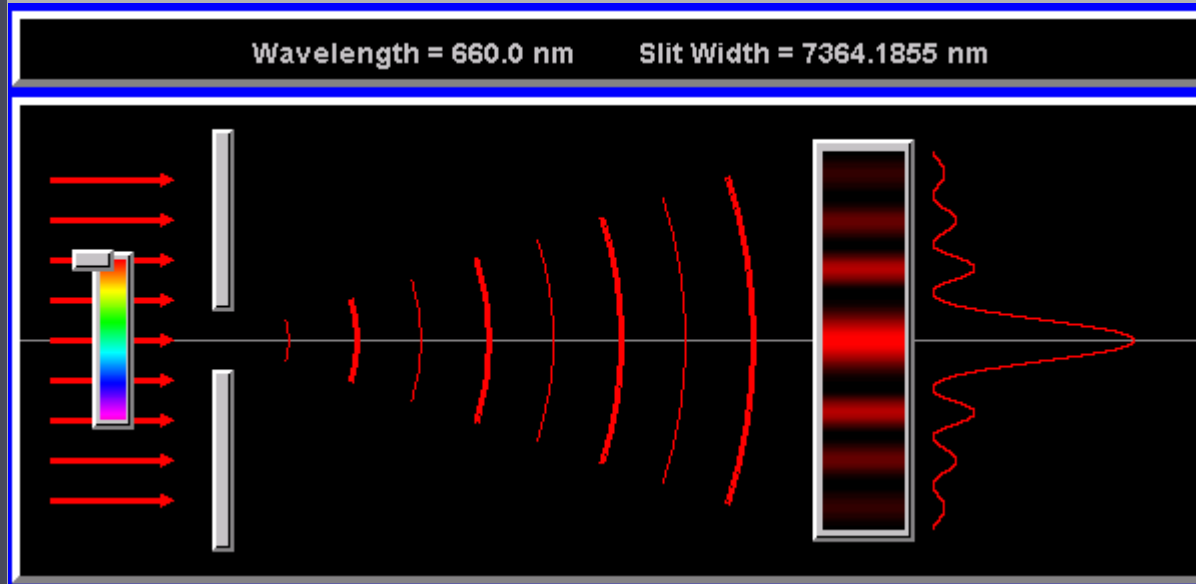
Beugung am Spalt - Intensitätsverteilung -

Helligkeitsverteilung bei unterschiedlichen Spaltbreiten



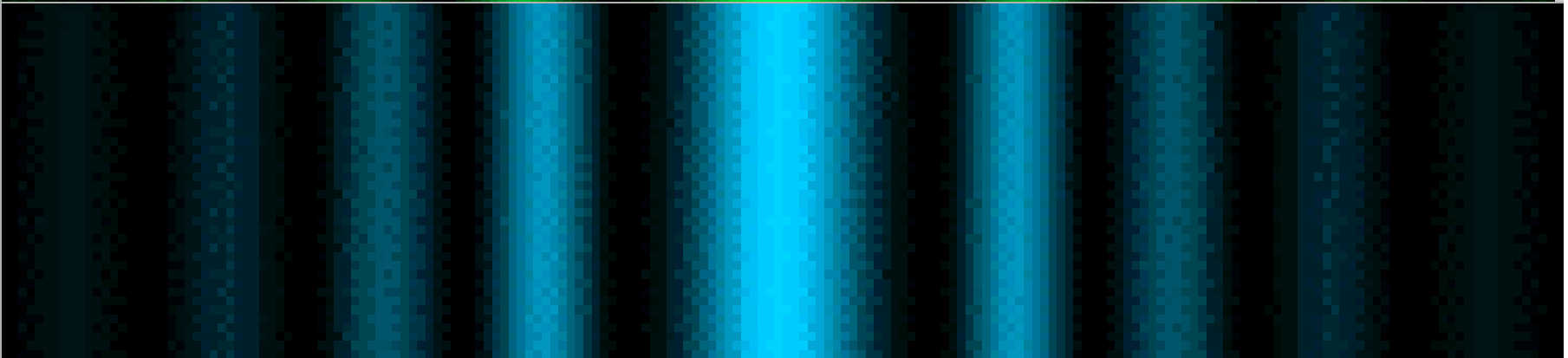
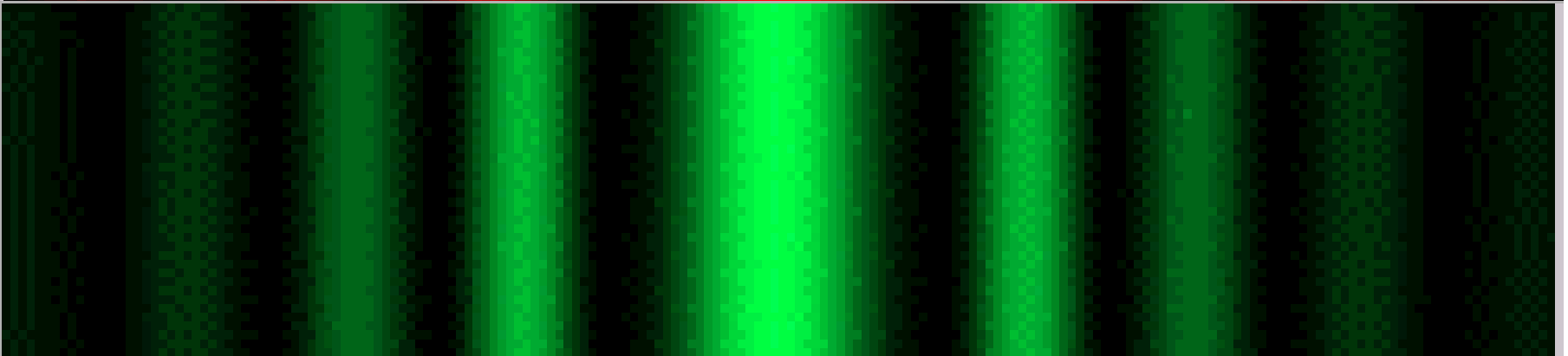
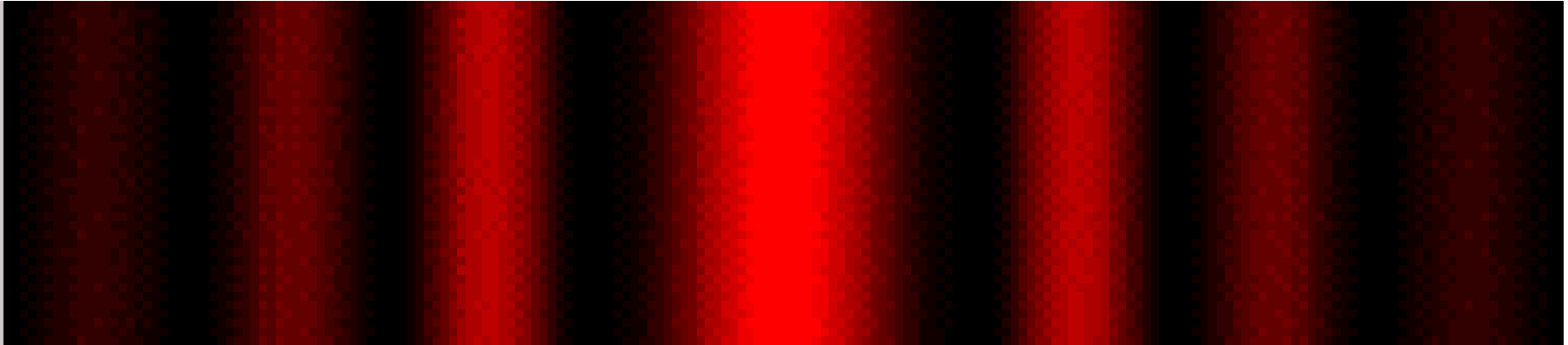


Beugungsbilder am Spalt -Dispersion-





Beugungsbilder am Spalt -Dispersion-

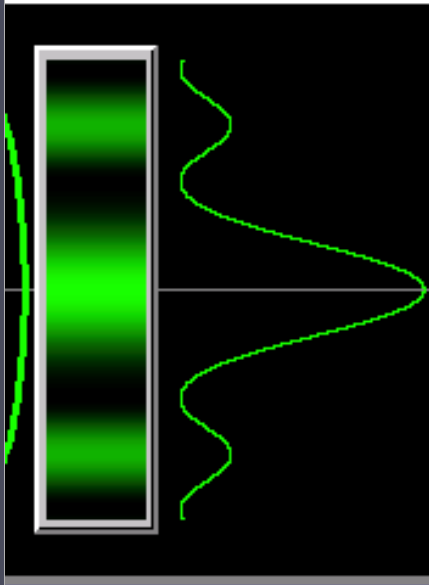




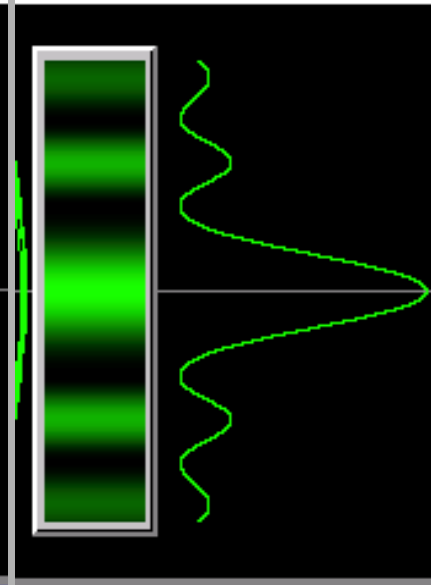
Beugungsbilder am Spalt -Spaltbreite-

Wavelength = 569.375 nm

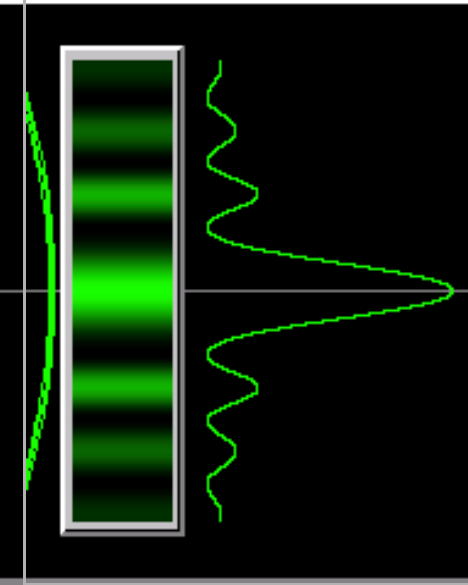
d = 3436.62 nm



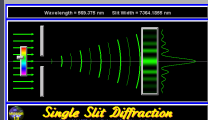
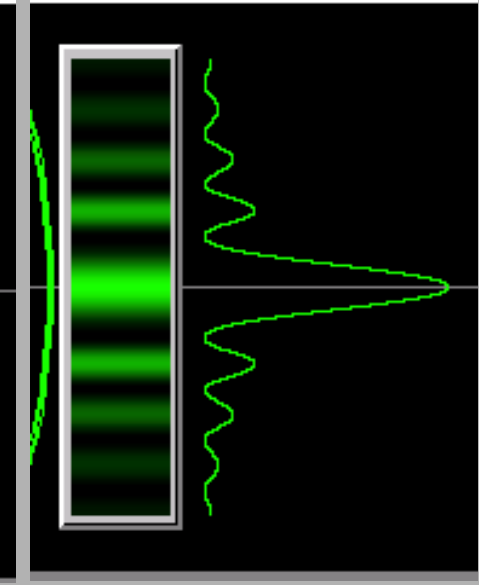
d = 4418.511 nm



d = 5891.3486 nm



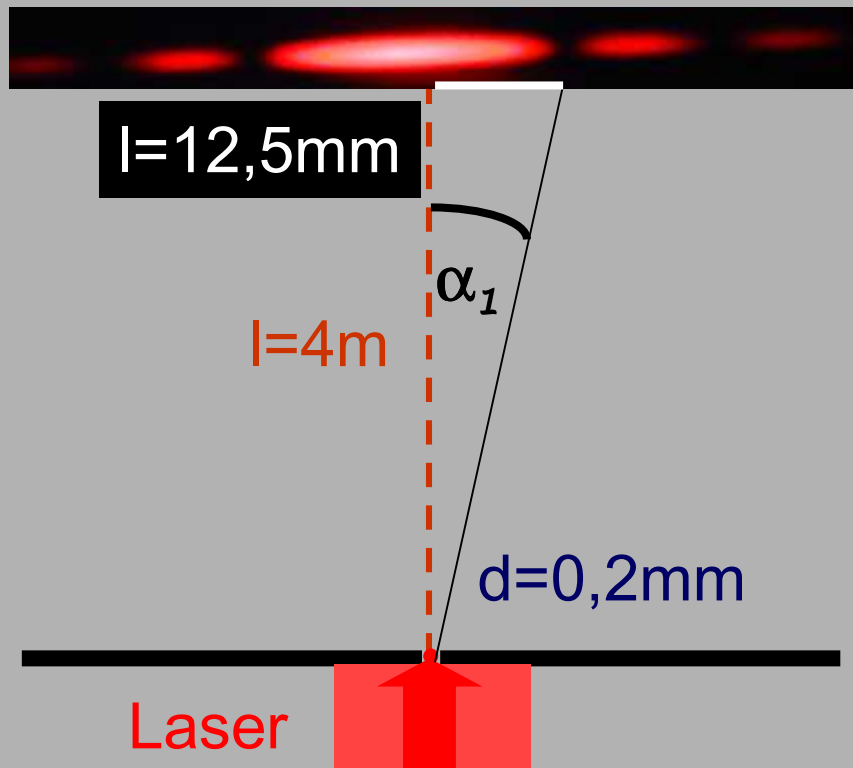
d = 7364.1855 nm



Single Slit Diffraction



Beugung am Spalt

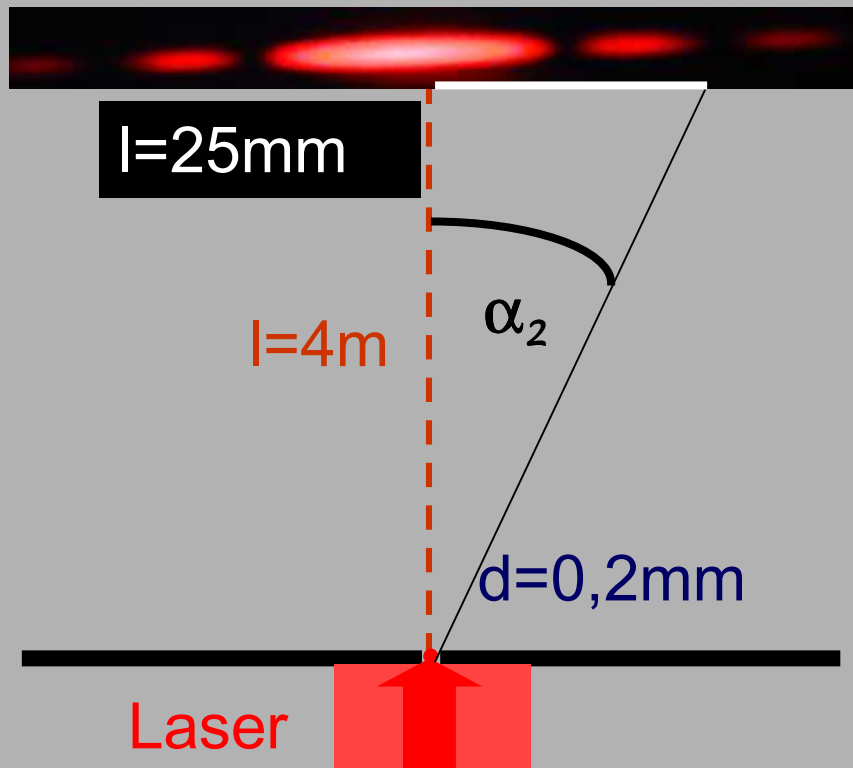
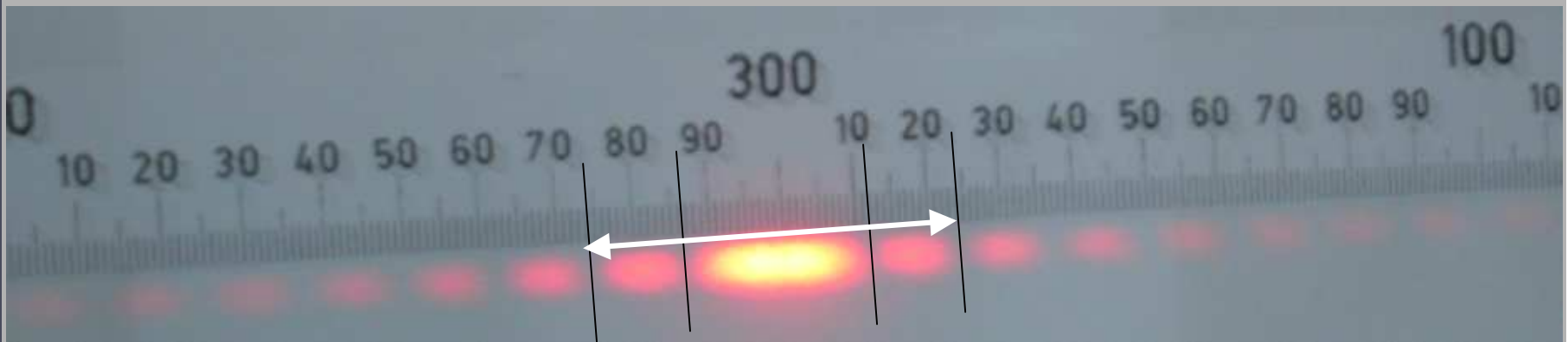


$$\tan \alpha_1 = \frac{0,0125}{4} \Rightarrow \alpha_1 \approx 0,179^\circ$$

$$\begin{aligned} \lambda &= d \cdot \sin \alpha_1 \\ &\approx 0,0002 \cdot 0,003125 \text{ m} \\ &\approx 0,000000625\text{m} \\ &\approx \mathbf{625\text{nm}} \end{aligned}$$



Beugung am Spalt



$$\tan \alpha_2 = \frac{0,025}{4} \Rightarrow \alpha_2 \approx 0,358^\circ$$

$$\lambda = \frac{d}{2} \cdot \sin \alpha_2$$

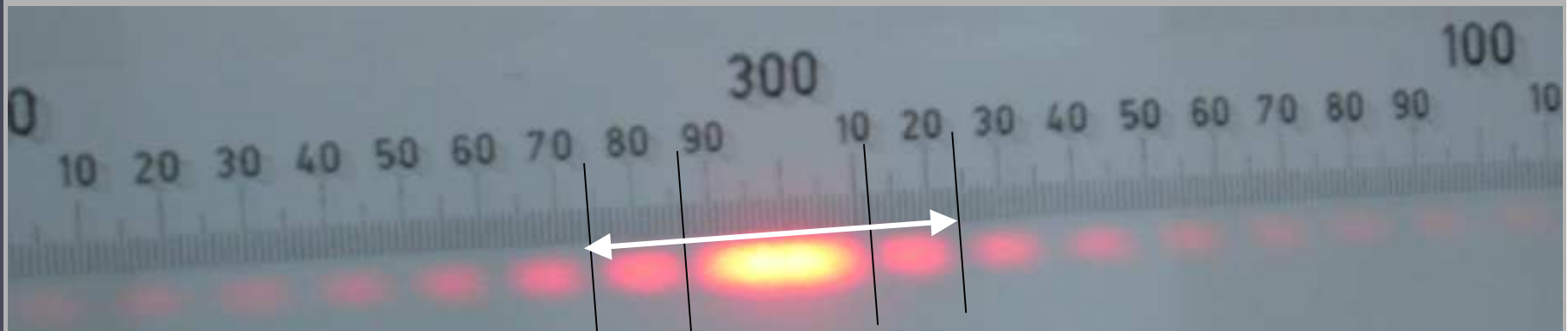
$$\approx 0,0001 \cdot 0,00625 \text{ m}$$

$$\approx 0,000000625\text{m}$$

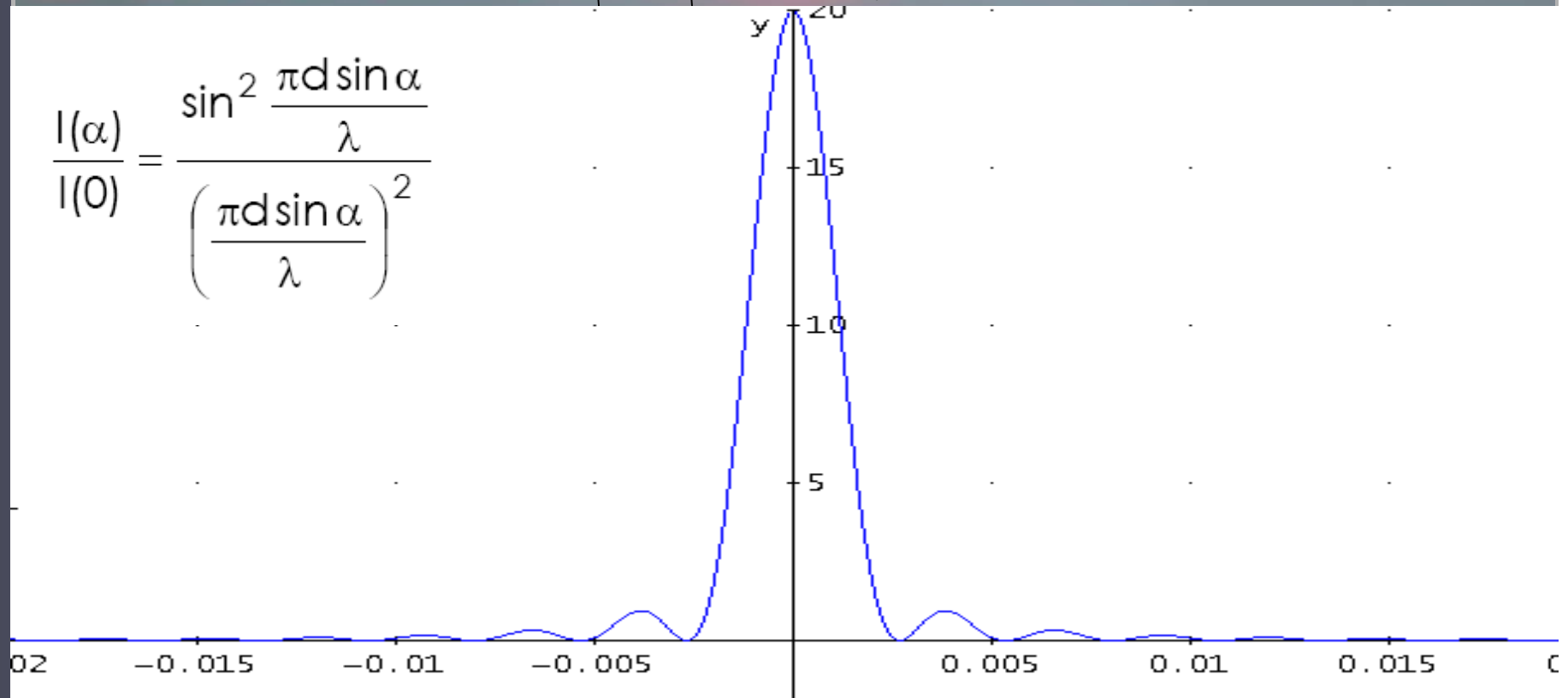
$$= 625\text{nm}$$



Beugung am Spalt



$$\frac{I(\alpha)}{I(0)} = \frac{\sin^2 \frac{\pi d \sin \alpha}{\lambda}}{\left(\frac{\pi d \sin \alpha}{\lambda} \right)^2}$$





Beugung am Spalt - Intensitätsverlauf-

