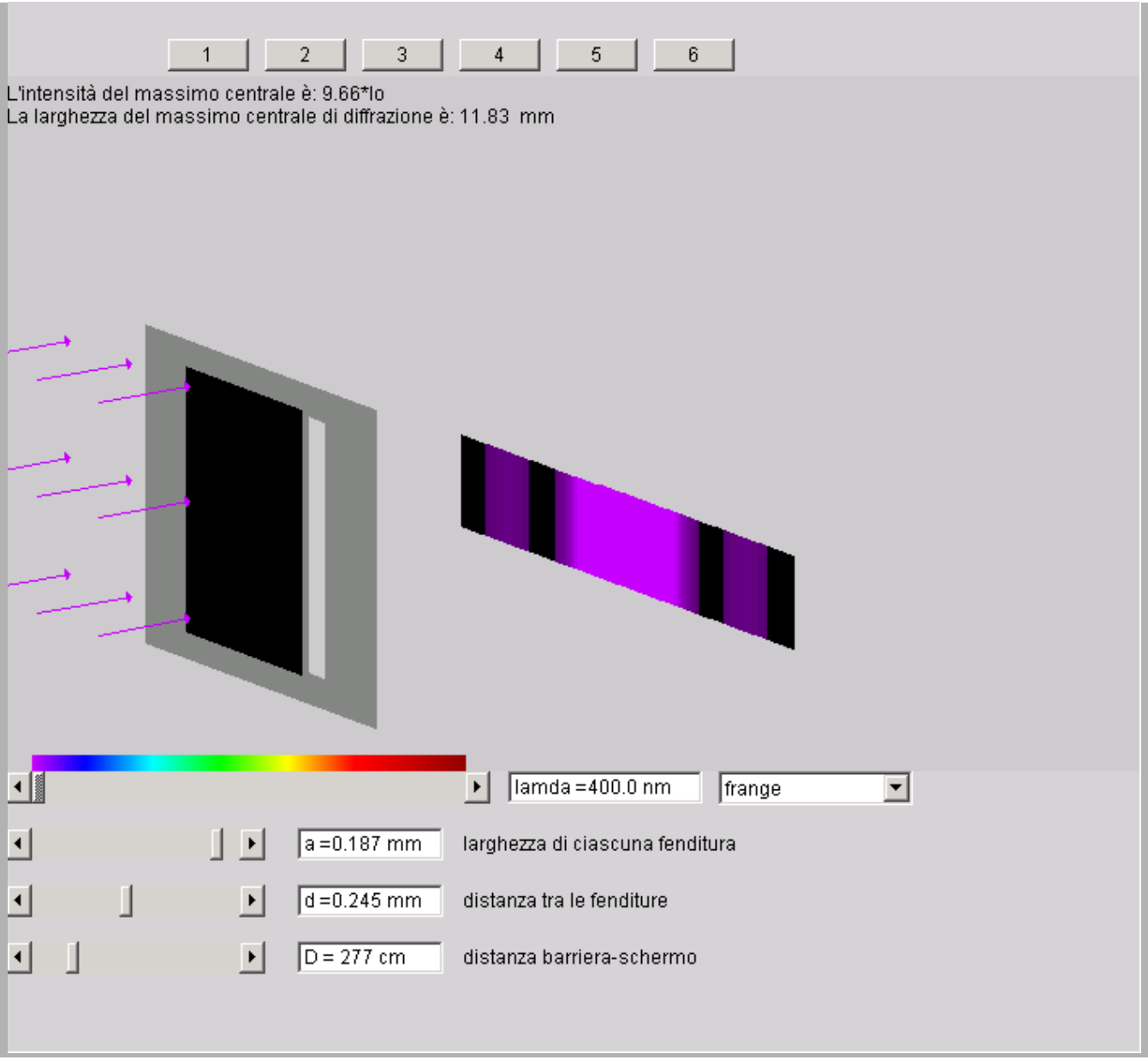
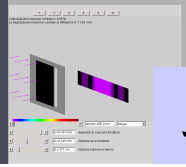
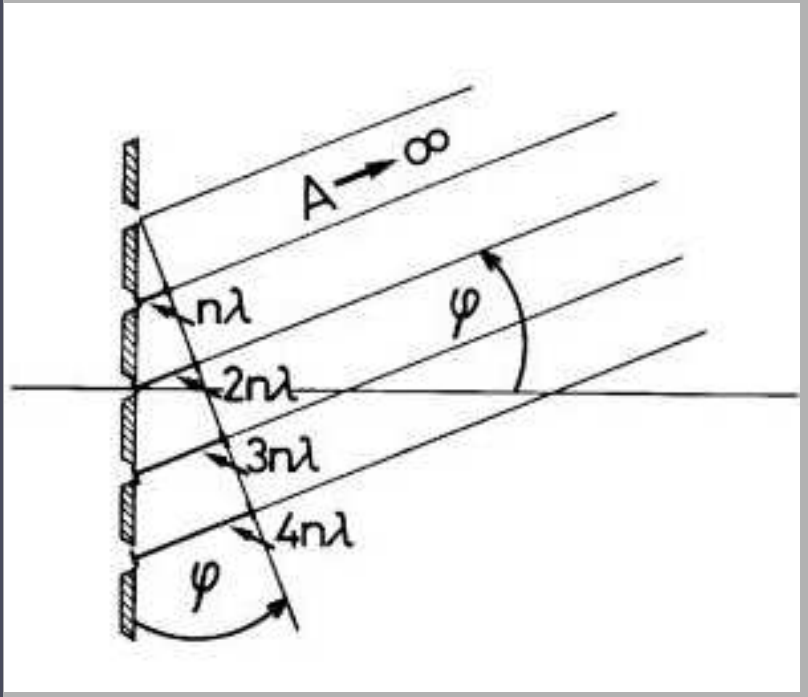
Beugung an Mehrfachspalten (Gittern) Animation





Beugung an Gittern

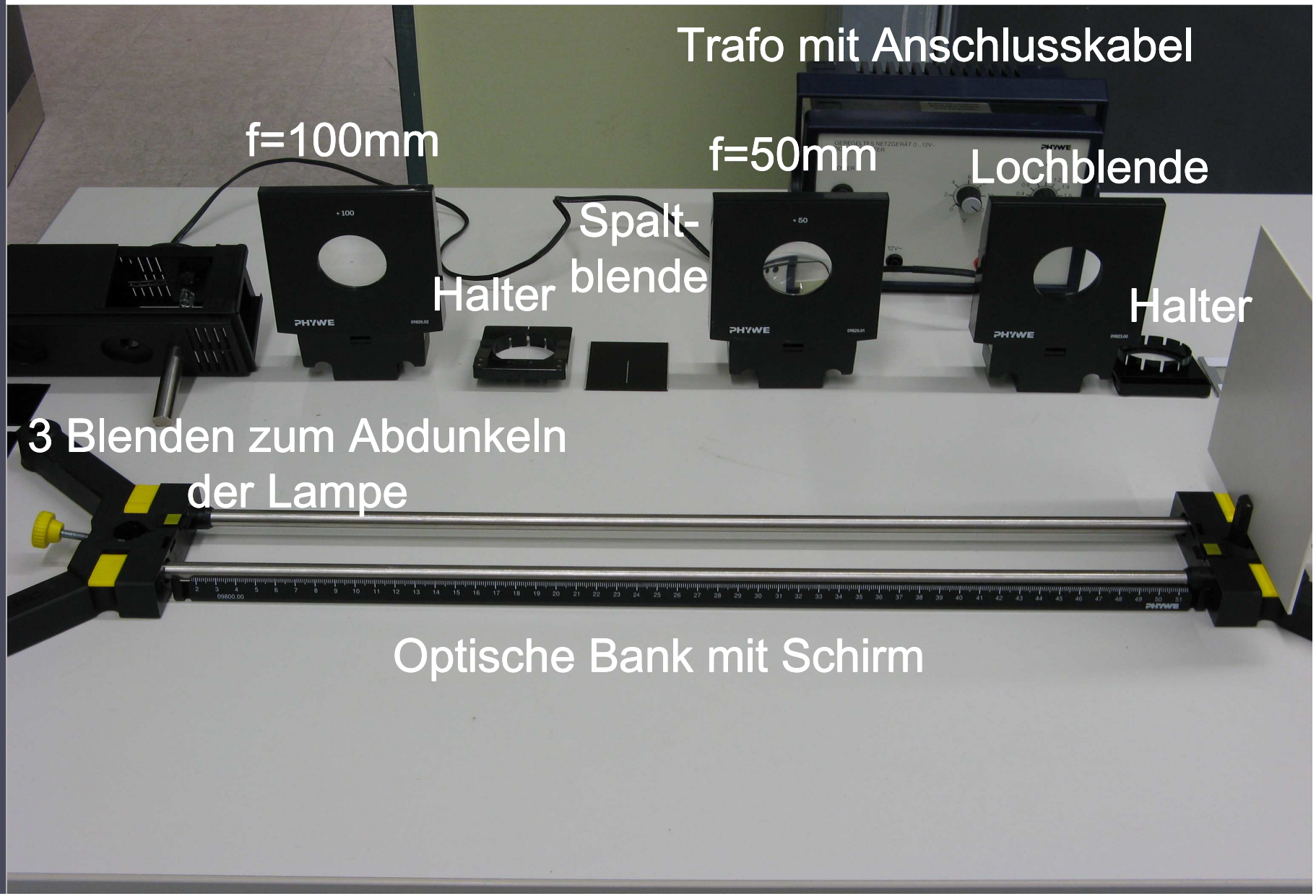


Maxima, wenn

$$\Delta = n \cdot \lambda$$

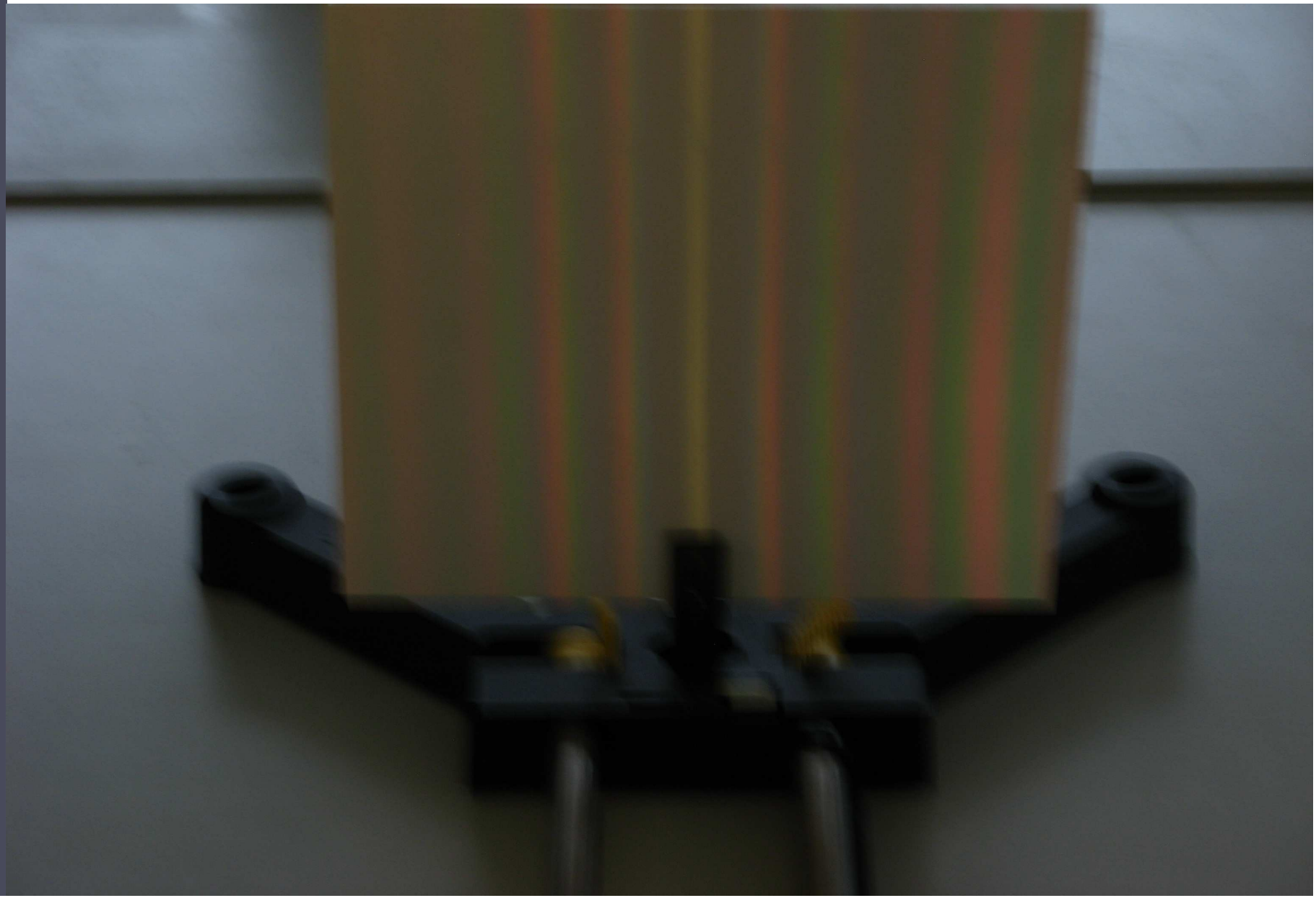
$$g \cdot \sin(\alpha) = n \cdot \lambda$$

Beugung an Gittern -Schülerexperiment



Zuerst wird ein scharfes Bild des Spalts erzeugt

Beugung an einem Gitter 80/mm

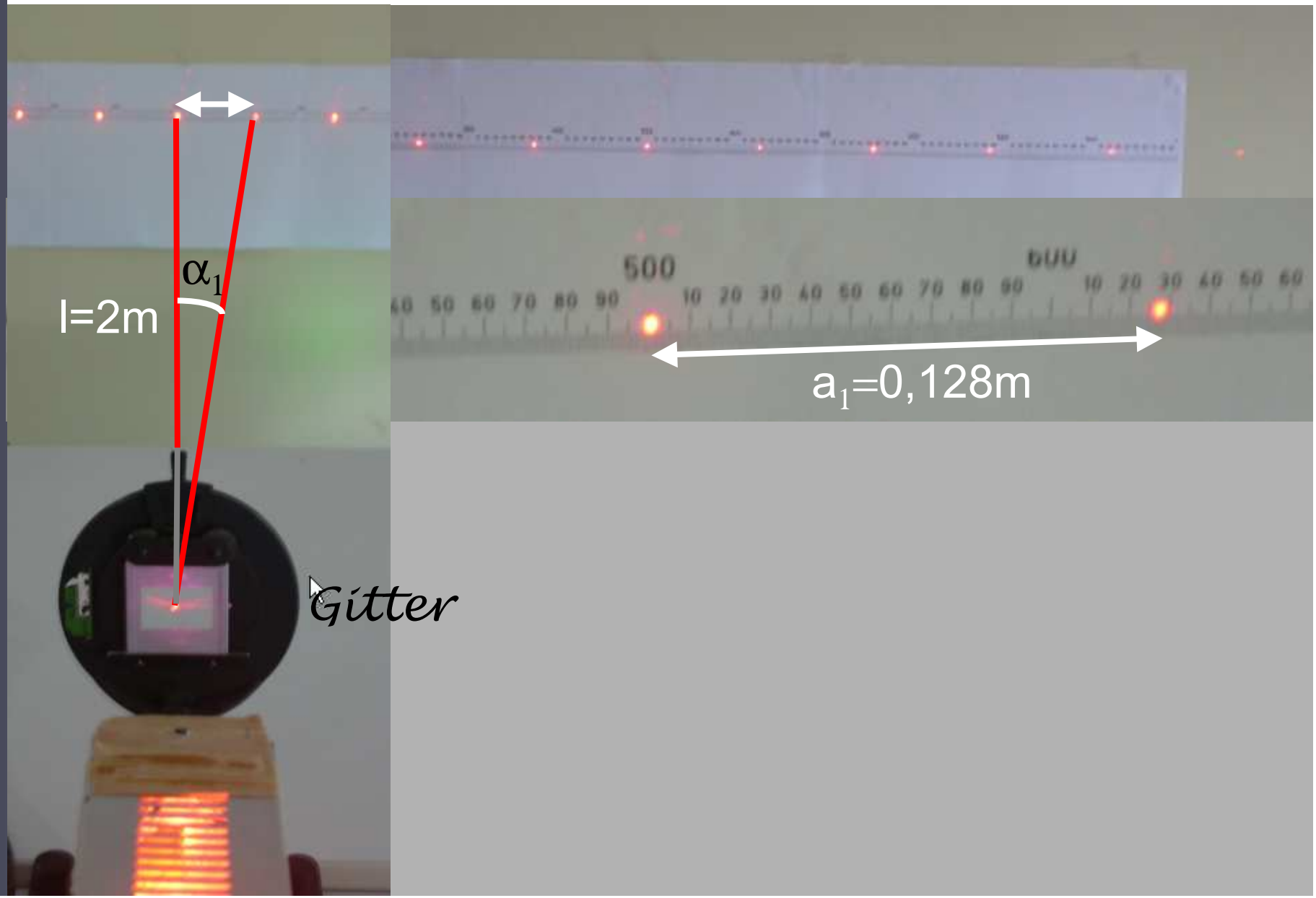


Beugung an Gittern

Entfernung Gitter-Schirm: a=0,3m

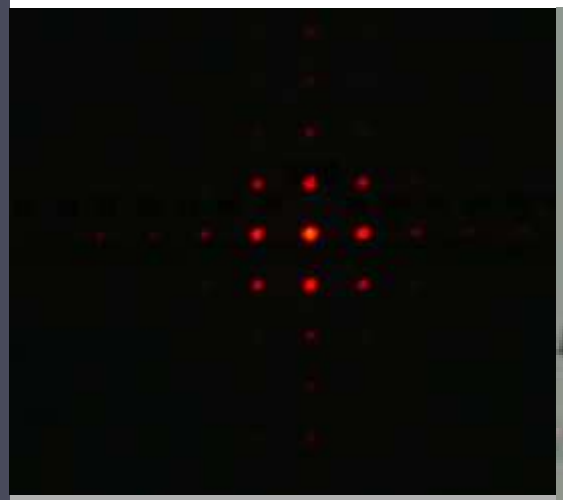
Beugung an Gittern

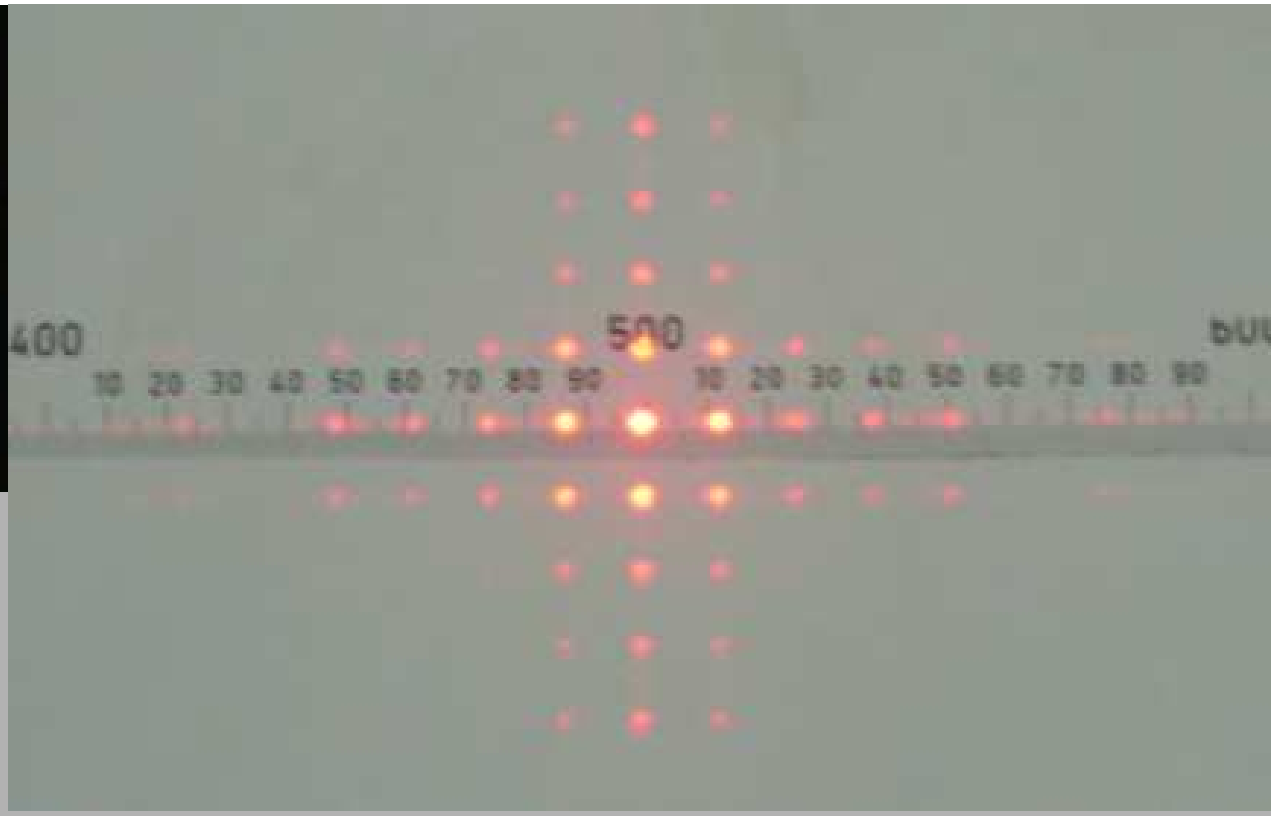
Beugung an Gittern



Beugung an Gittern

Beugung an Kruezgittern





Beugung an einer CD

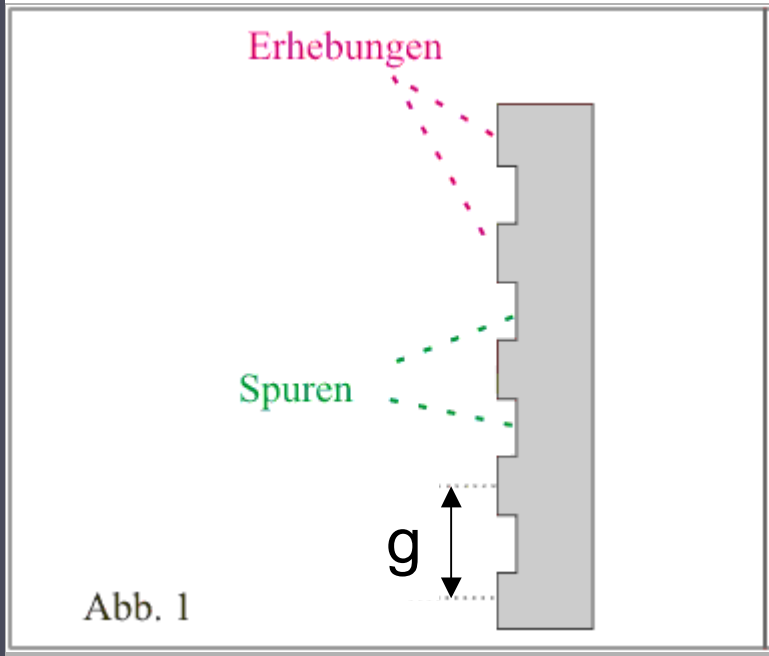


Abb. 1

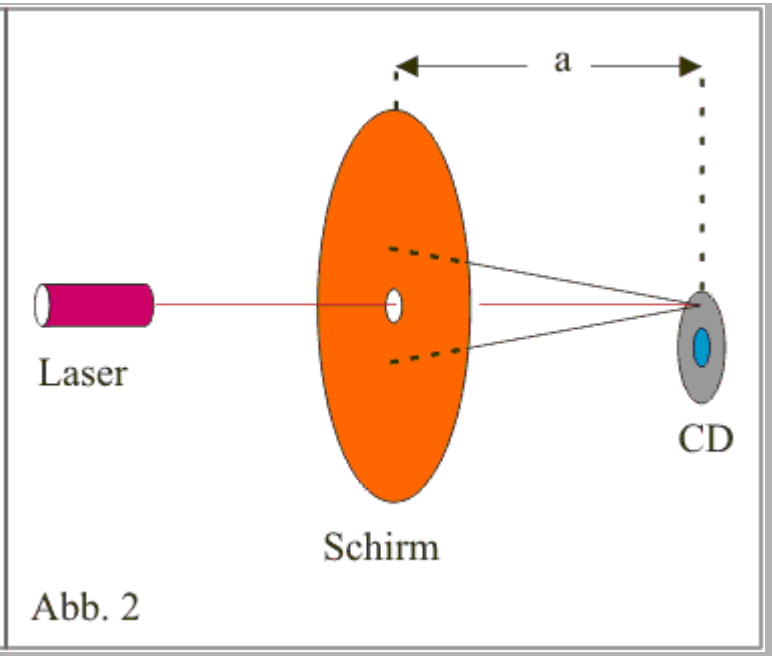
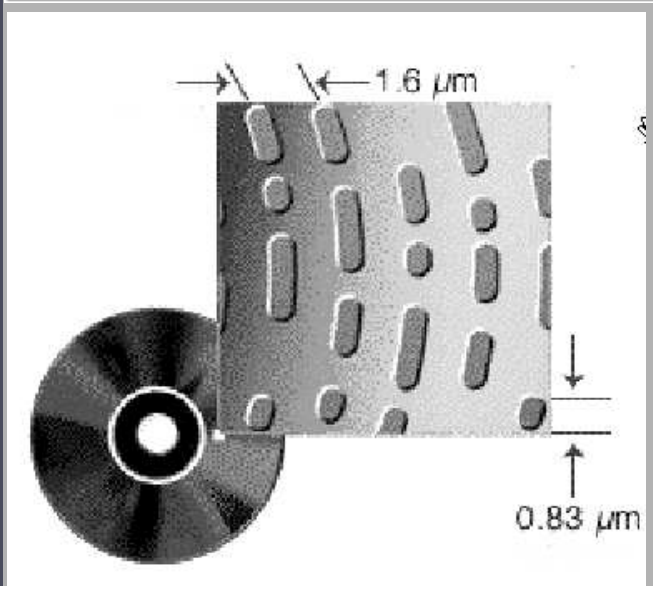
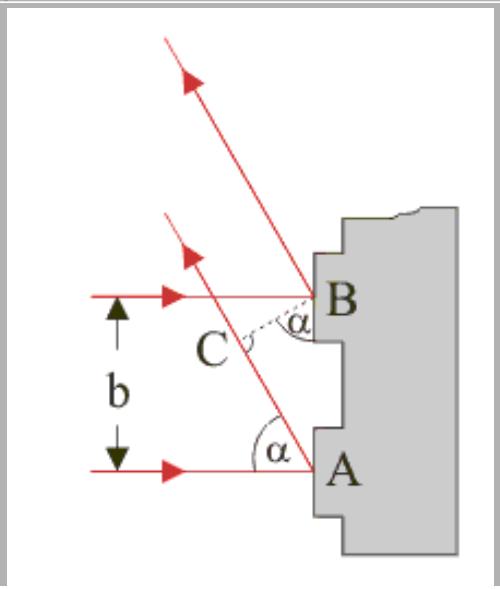


Abb. 2

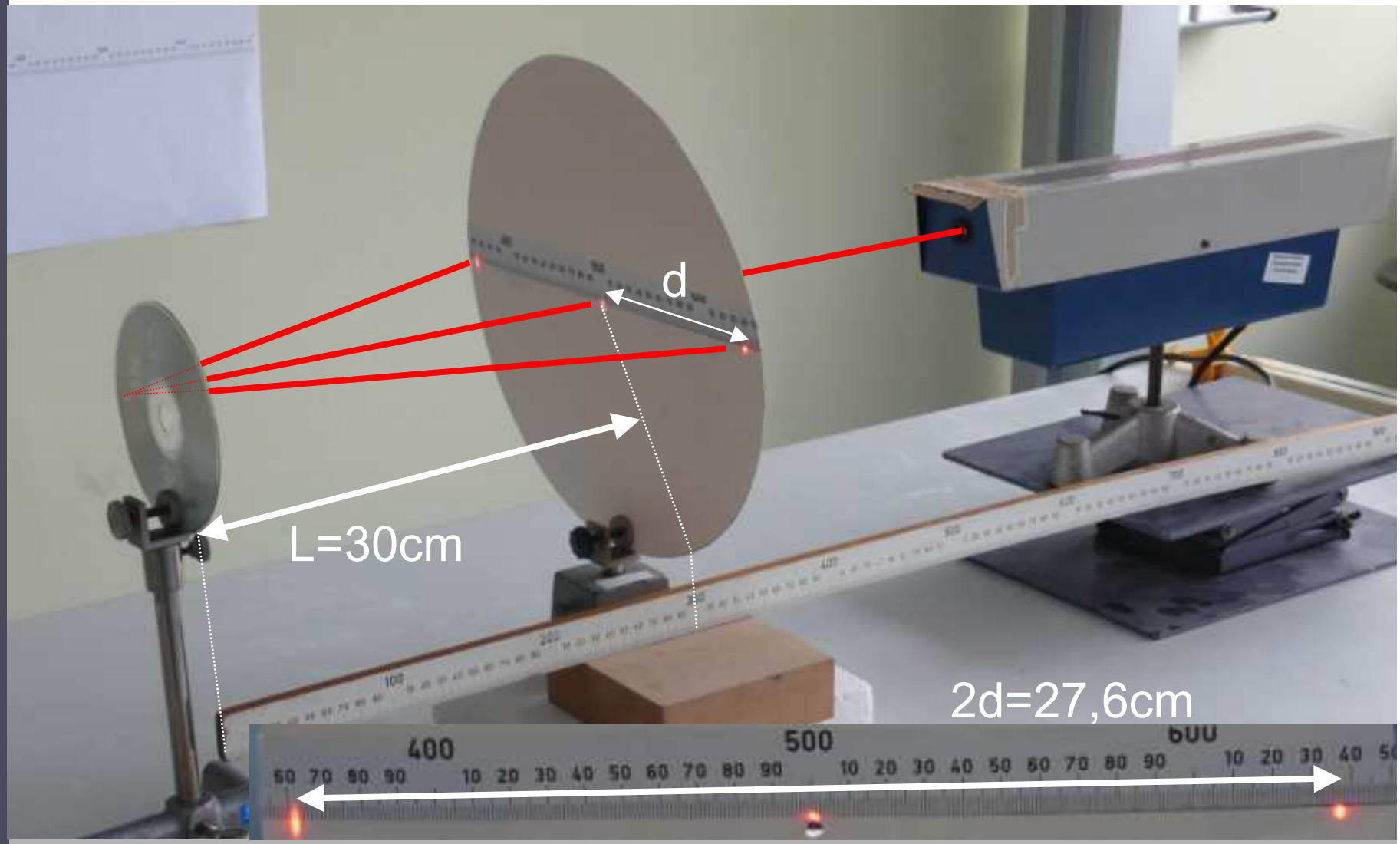




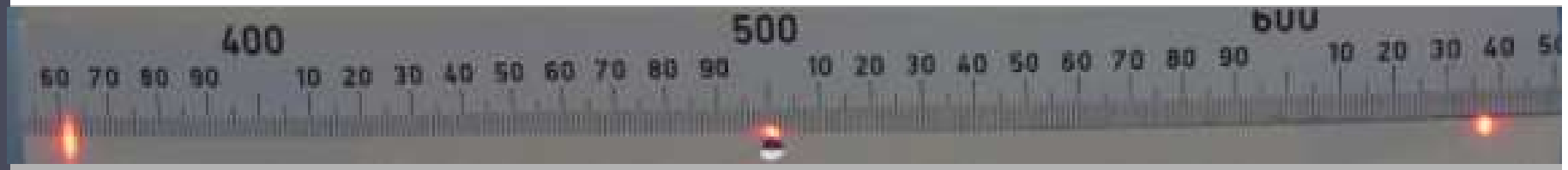
Beugung an einer DVD / CD

$$\sin \alpha_k = \frac{k\lambda}{g}$$

Beugung an einer CD-ROM (700MB)

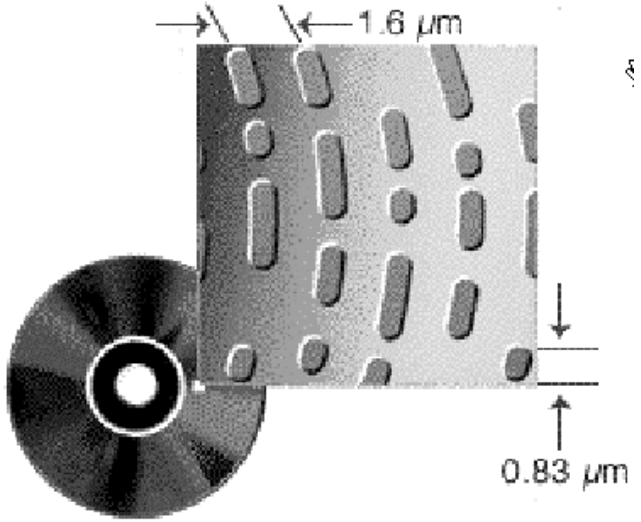


Gitterkonstante einer CD-ROM



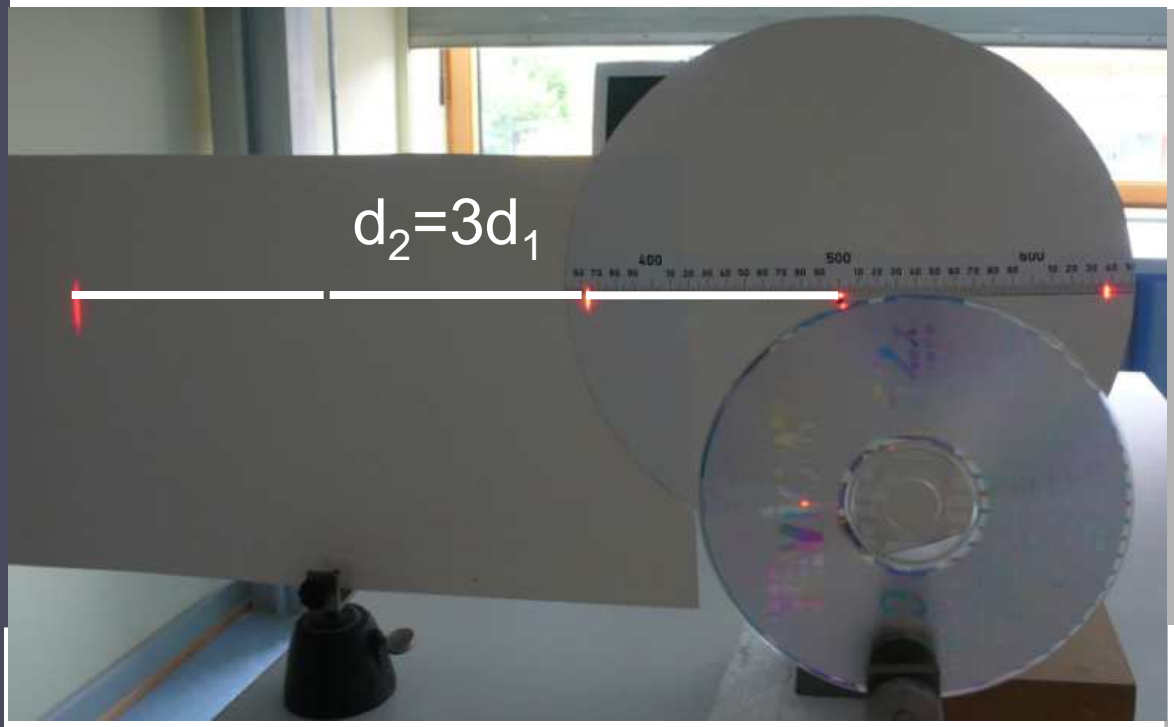
$$\tan(\alpha_1) = \frac{0{,}138}{0{,}3} \Rightarrow \alpha_1 \approx 24{,}7°$$

$$g = \frac{\lambda}{\sin(\alpha_1)} = \frac{630\text{nm}}{\sin(24{,}7°)} \approx 1{,}6\,\mu\text{m}$$



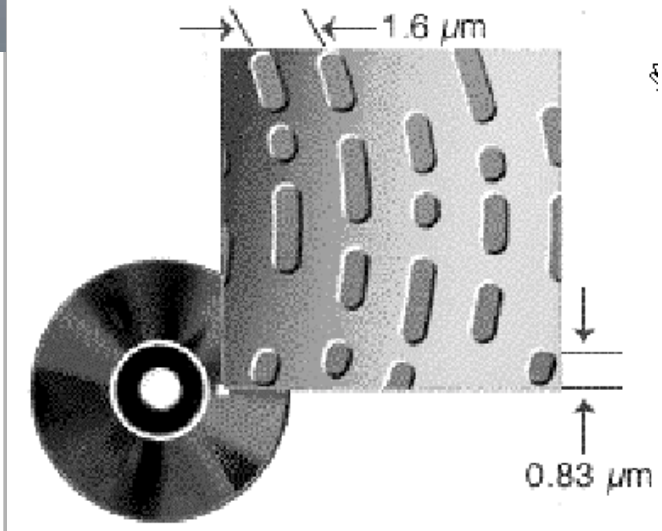
α_1

Gitterkonstante einer CD-ROM



$$\tan(\alpha_2) = \frac{0{,}415}{0{,}3} \Rightarrow \alpha_1 \approx 54{,}1°$$

$$g = \frac{2\lambda}{\sin(\alpha_2)} = \frac{1260\text{nm}}{\sin(54{,}1°)} \approx 1{,}6\,\mu\text{m}$$

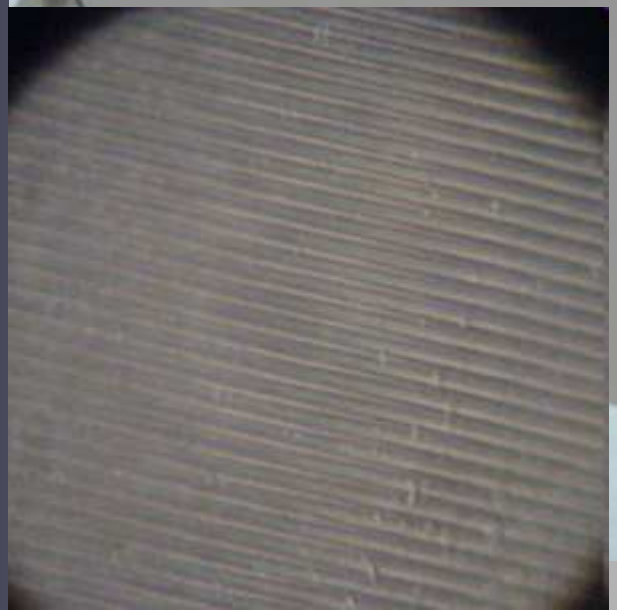


Gitterkonstante einer DVD(4,7GB)

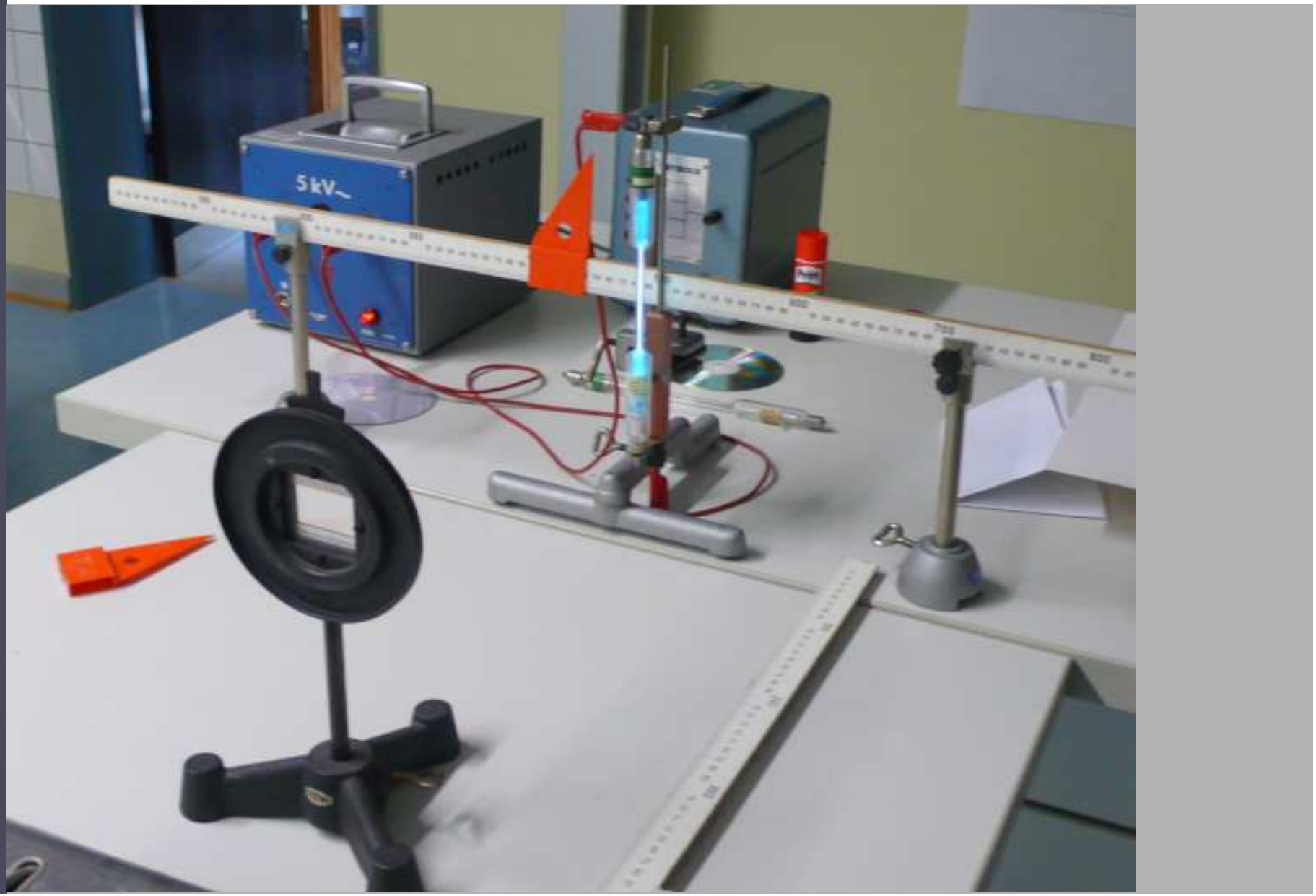
$$\tan(\alpha_1) = \frac{0{,}145}{0{,}075} \Rightarrow \alpha_1 \approx 62{,}6°$$

L=7,5cm

$$g = \frac{\lambda}{\sin(\alpha_1)} = \frac{630\text{nm}}{\sin(62{,}6°)} \approx 710\text{nm} = 0{,}71\mu\text{m}$$



Spektrum von Quecksilber (Hg)



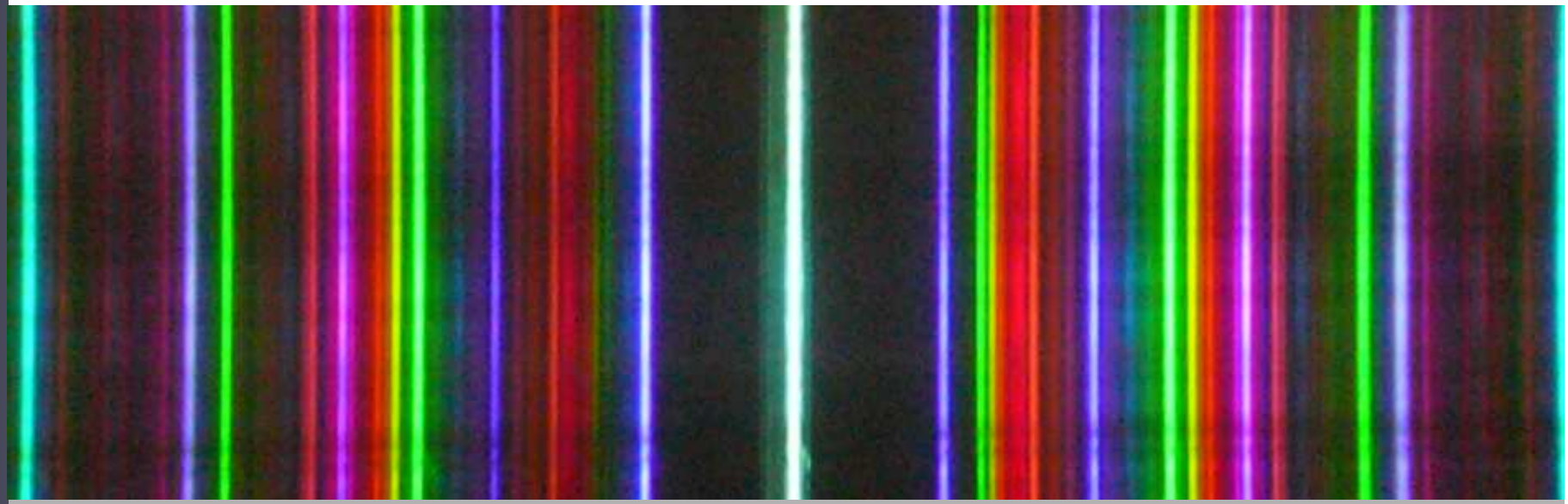
Spektrum von Quecksilber (g=1/1000 cm)

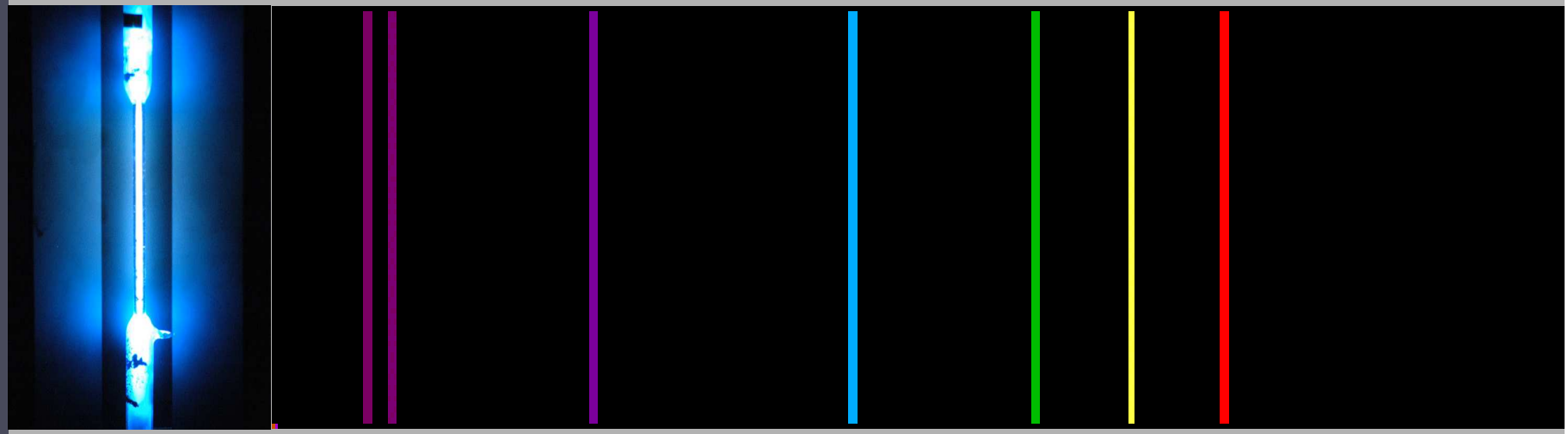
L=0,45m

$$\tan(\alpha_1) = \frac{0,018}{0,40} \Rightarrow \alpha_1 \approx 2,6°$$

$$\lambda_{blau} = g \cdot \sin(\alpha_1) = 10^{-5} \cdot \sin(2,6°) \approx 450nm$$

Spektrum einer Hg-Lampe



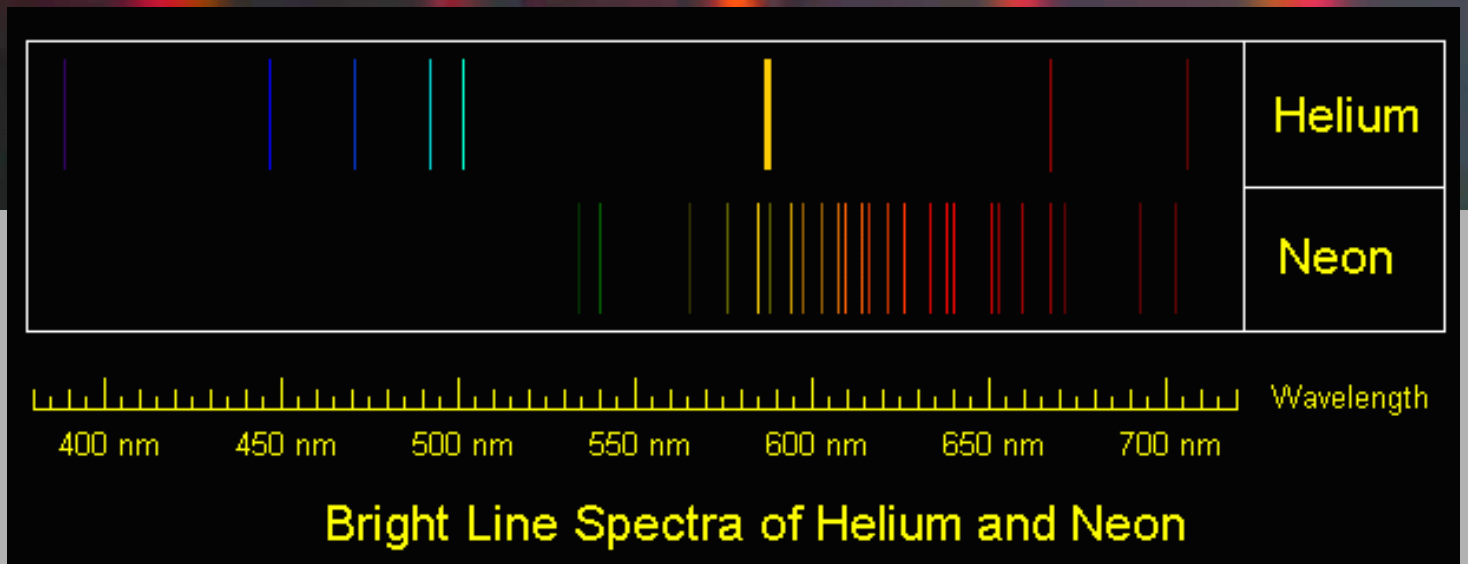


Spektrum von Neon (Gitter g=1/1000 cm)

L=0,85m

$$\tan(\alpha_1) = \frac{0{,}05}{0{,}85} \Rightarrow \alpha_1 \approx 3{,}4°$$

$$\lambda_{gelb} = g \cdot \sin(\alpha_1) = 10^{-5} \cdot \sin(3{,}4°) \approx 590nm$$



Spektrum einer Ne-Lampe