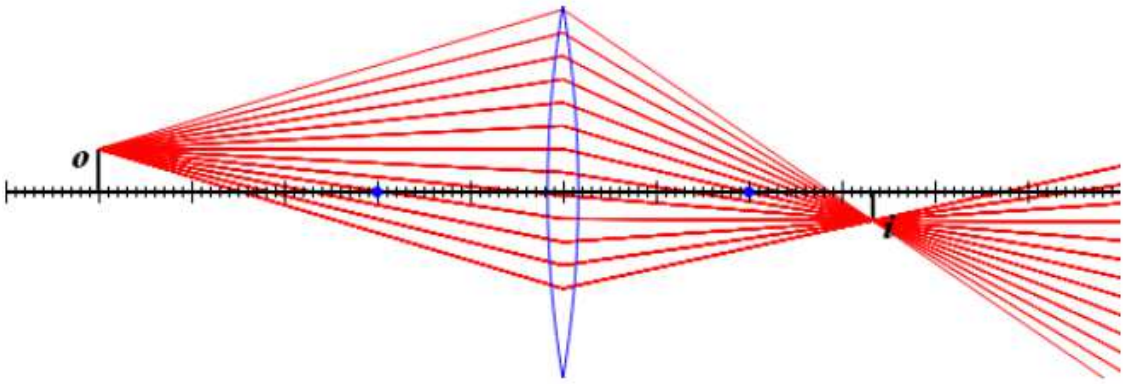
27. Optik

Jan. 28 2019

Abbildungsgleichung für dünne Linsen



$$x_i = \frac{f x_o}{f + x_o}$$

$$y_i = y_o \left(\frac{f}{f + x_o} \right)$$

$$\frac{1}{x_i} - \frac{1}{x_o} = \frac{1}{f}$$

$$m = \frac{y_i}{y_o} = \left(\frac{f}{f + x_o} \right)$$

Reelle und virtuelle Bilder

$f =$ 1 [cm] f↑ f↓

$x_o =$ -5 [cm] xo ← xo →

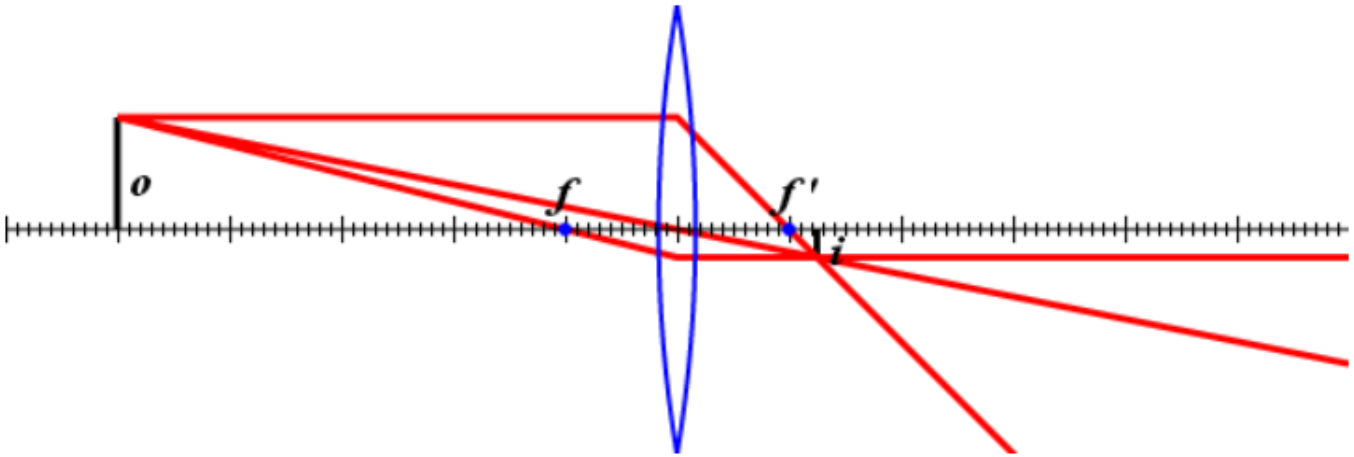
$y_o =$ 1 [cm] yo↑ yo↓

$x_i =$ 1.25000 [cm] $D =$ 100.000 [m^{-1}]

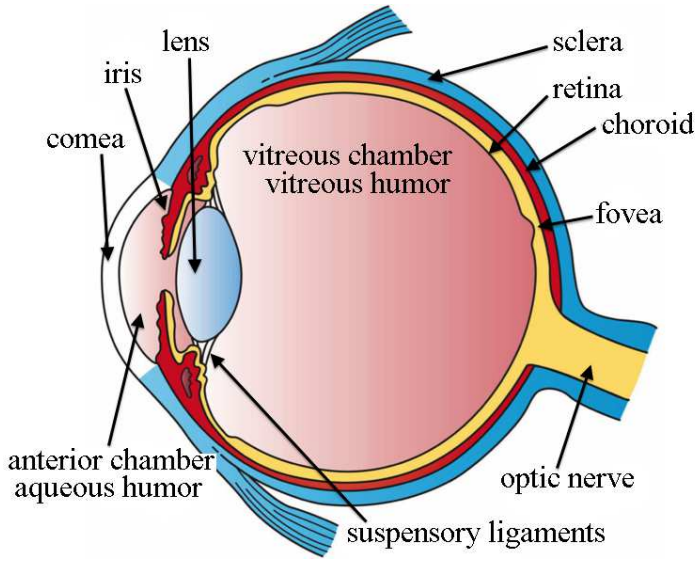
$y_i =$ -0.250000 [cm] $m =$ -0.250000

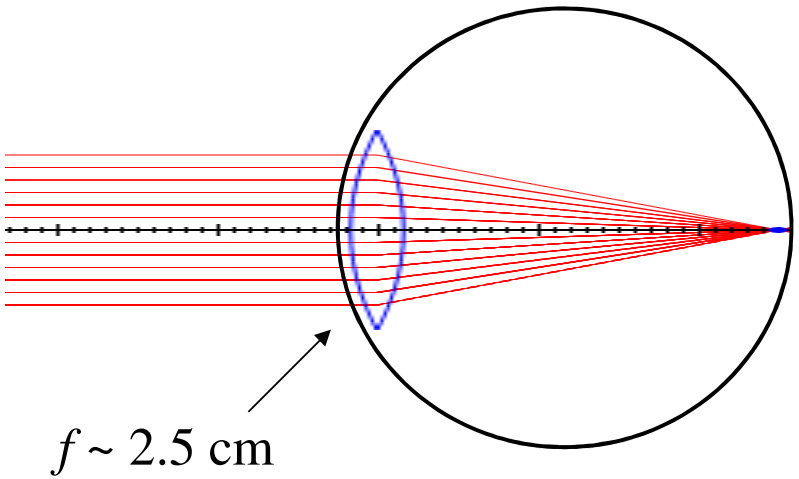
plot

The image is real and inverted.



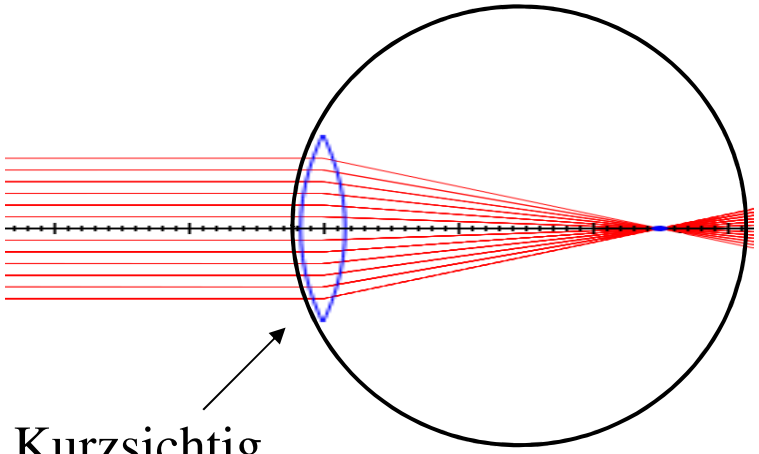
Auge



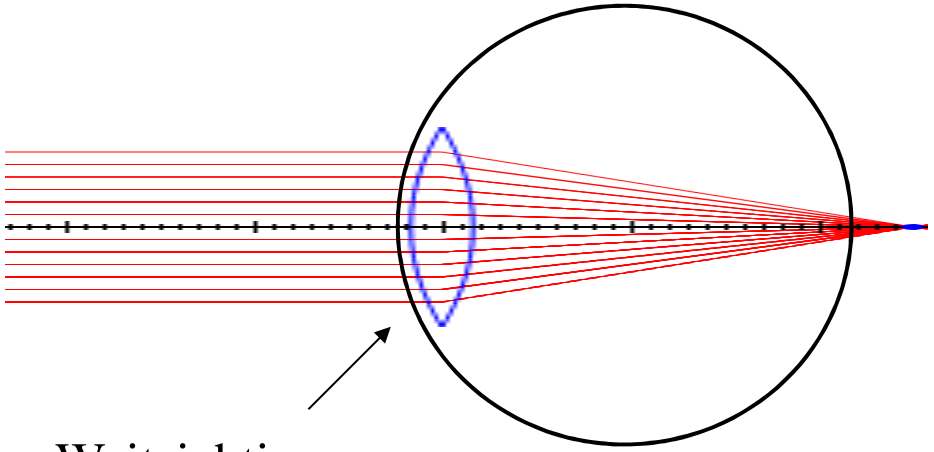


http://upload.wikimedia.org/wikipedia/commons/d/d0/Three_Main_Layers_of_the_Eye.png

Auge



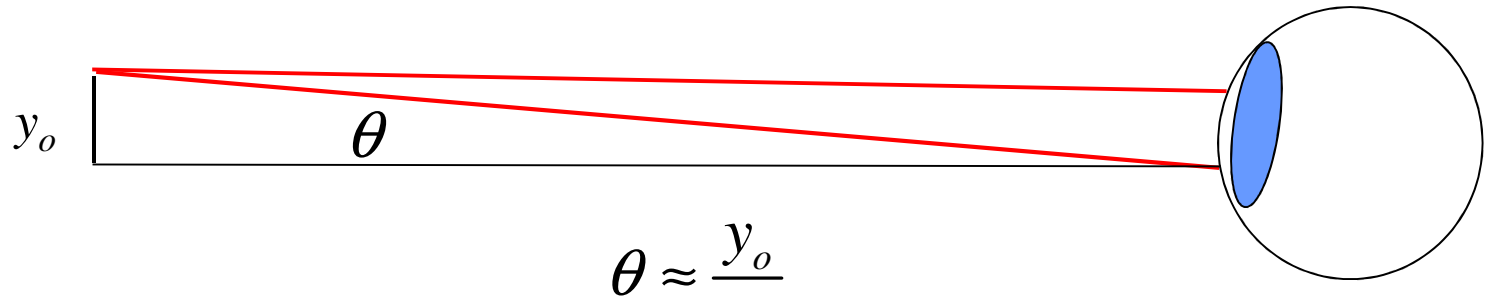
Kurzsichtig



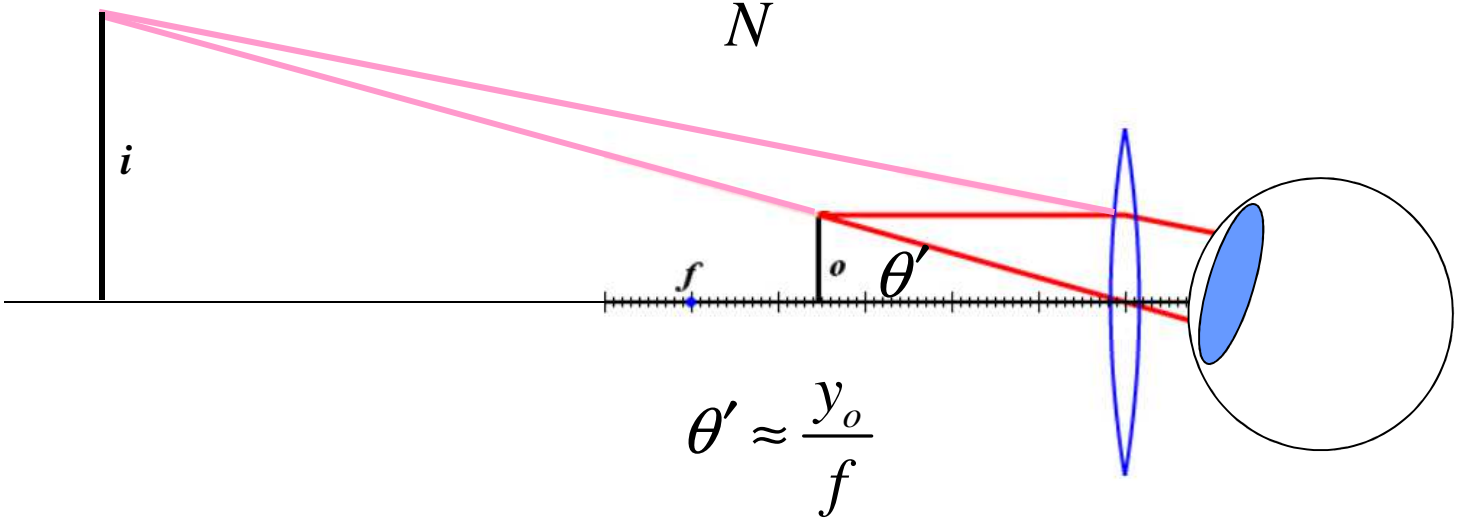
Weitsichtig

Lupe

Nahpunkt N ~ 25 cm



$$\theta \approx \frac{y_o}{N}$$



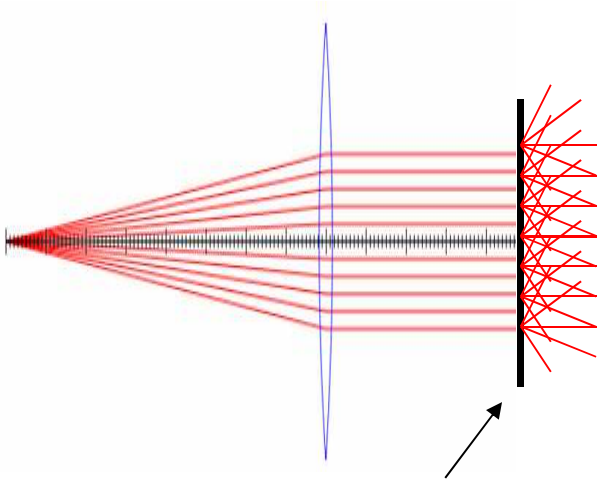
$$\theta' \approx \frac{y_o}{f}$$

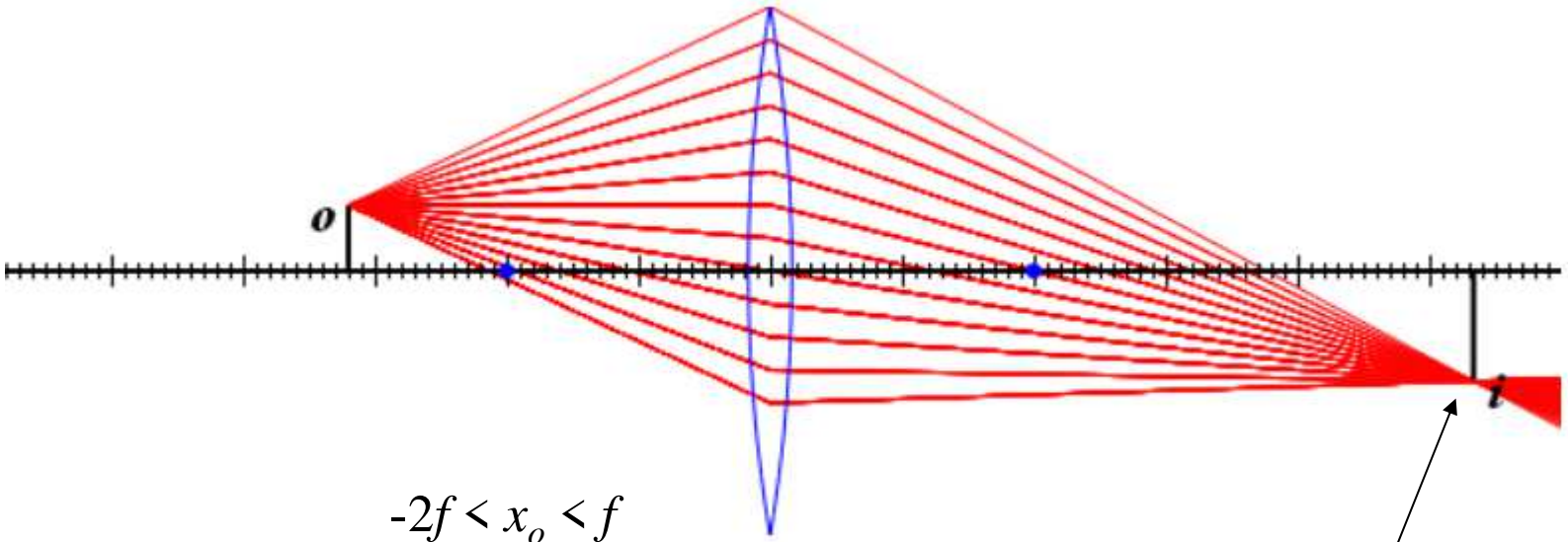
Vergrößerung $m \sim N/f$

Diaprojektor

de.wikipedia.org/wiki/Datei:Diaprojektor_offen_IMGP1009.jpg

Diaprojektor

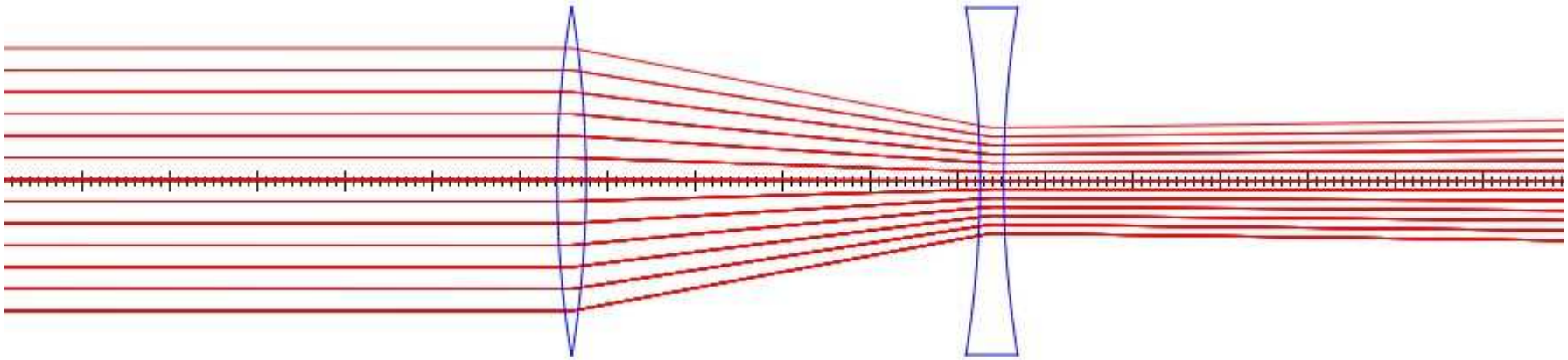




$-2f < x_o < f$

Schirm

Galilei'sches Teleskop

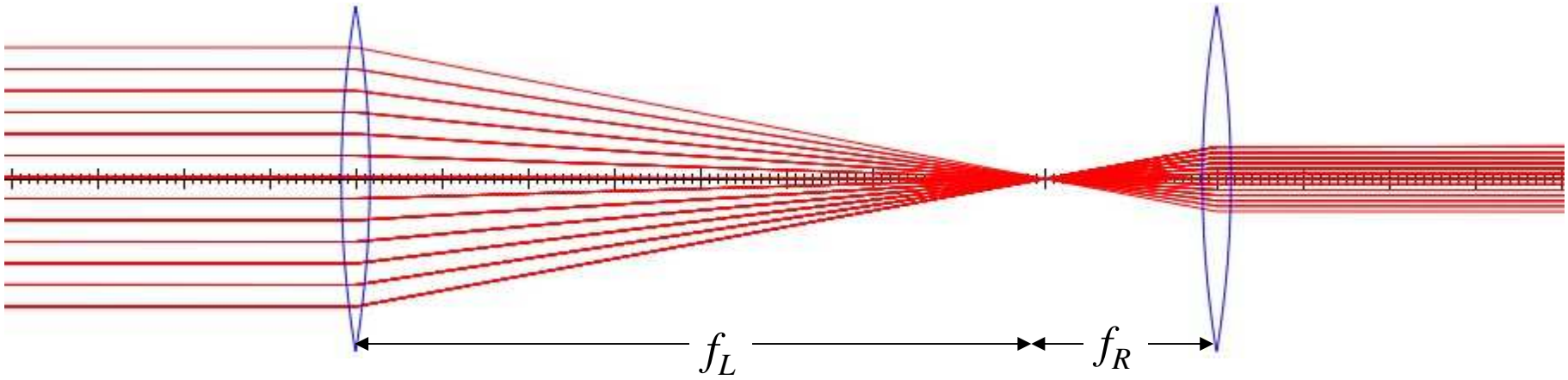


$$m = \frac{\theta_i}{\theta_o} = \frac{y_i x_o}{y_o x_i}$$

APPs: Optische Instrumente

Ray tracing mittels Transfermatrixmethode

Keplersches Teleskop

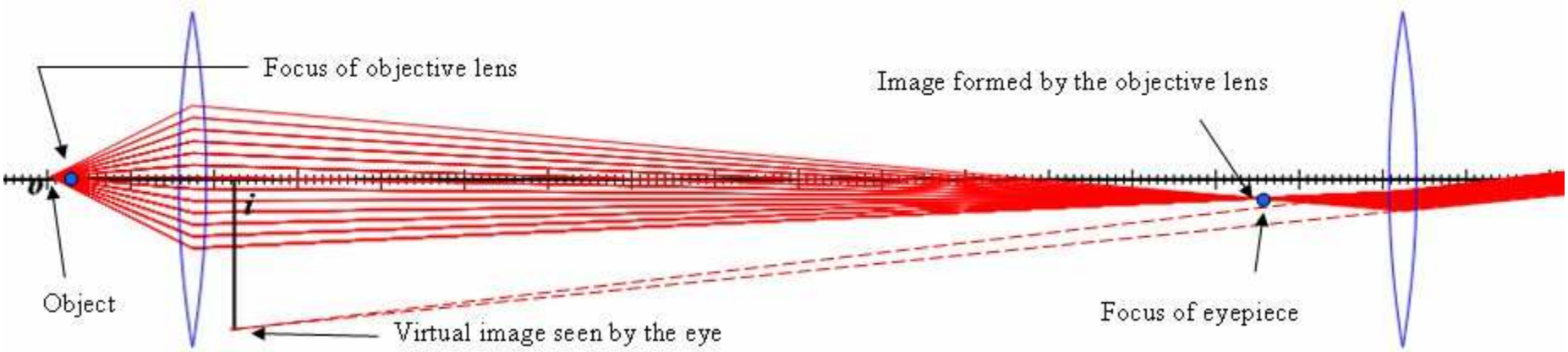


$$m = \frac{\theta_i}{\theta_o} = \frac{y_i x_o}{y_o x_i}$$

APPs: Optische Instrumente

Ray tracing mittels Transfermatrixmethode

Mikroskop



APPs: Optische Instrumente

Ray tracing mittels Transfermatrixmethode