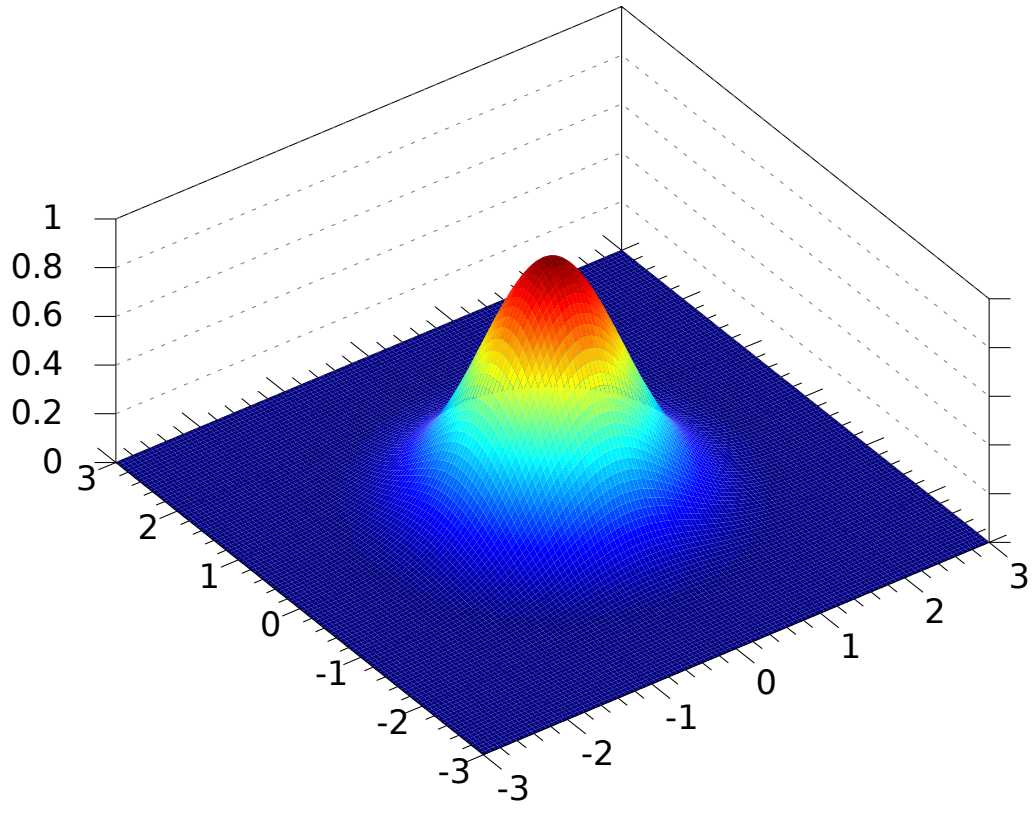
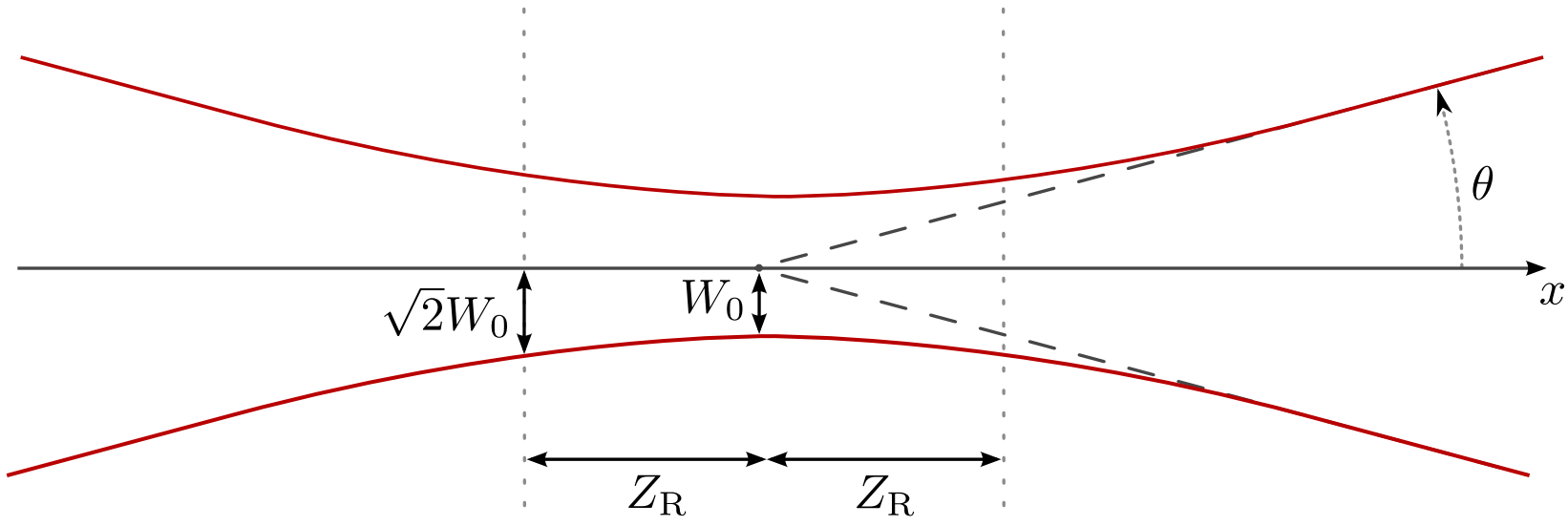
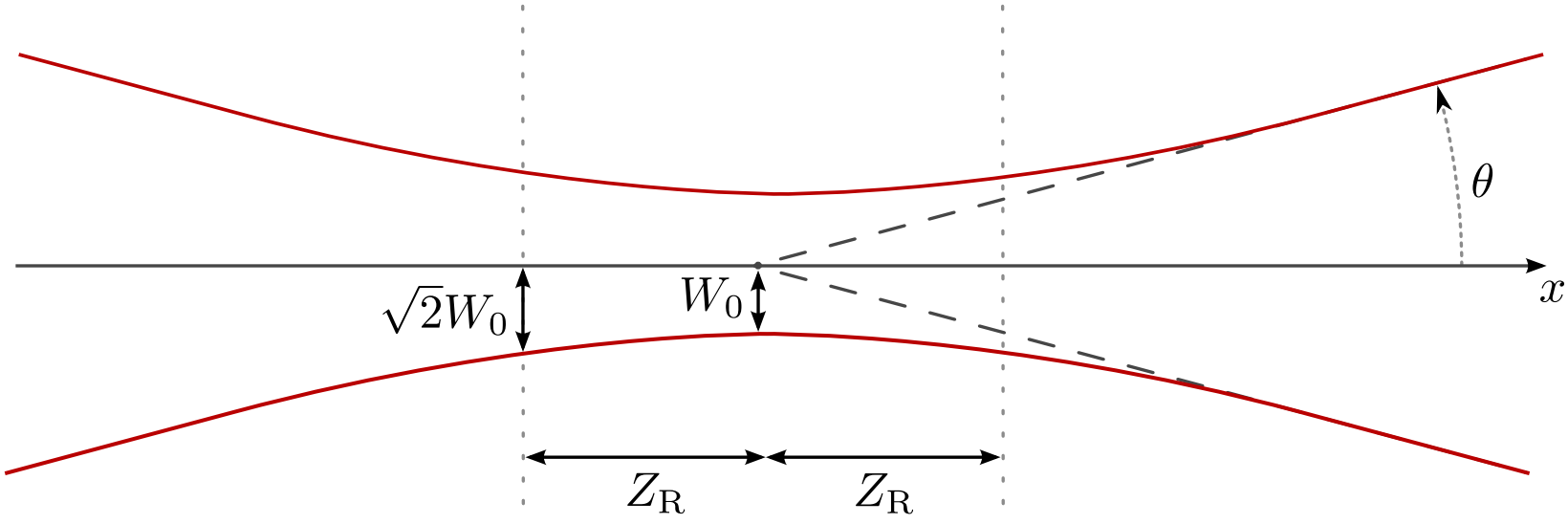
Studies of near-gaussian beams

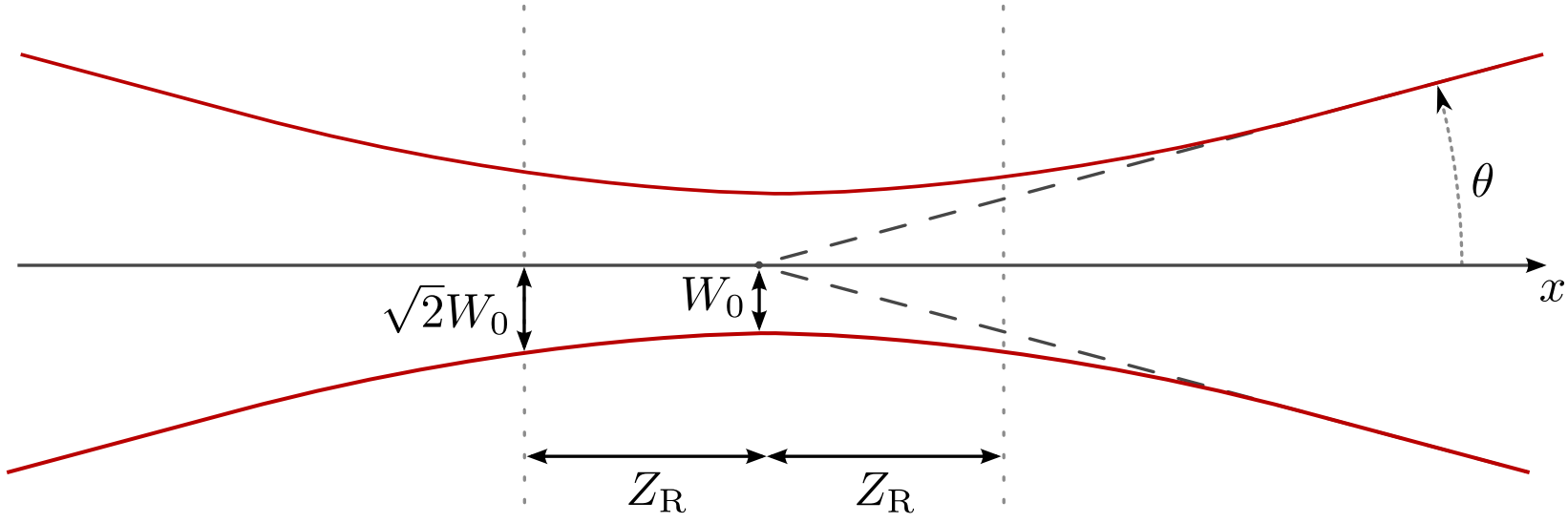


Jonas van den Brink


θ
x
$\sqrt{2}W_0$
W_0
Z_R
Z_R



For en gaussisk beam har vi $\theta = \dfrac{\lambda}{\pi w_0}$.

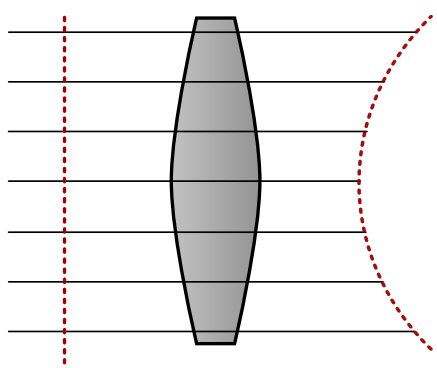


For en gaussisk beam har vi $\theta = \dfrac{\lambda}{\pi w_0}$.

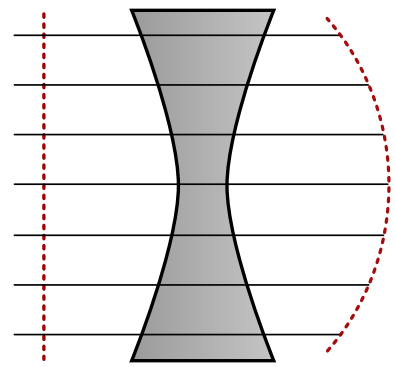
Definerer strålekvalitet

$$\mathrm{BPP} = \theta \cdot w_0, \qquad M^2 = \frac{\mathrm{BPP}}{\mathrm{BPP_G}}.$$

Linser endrer krumningsradien

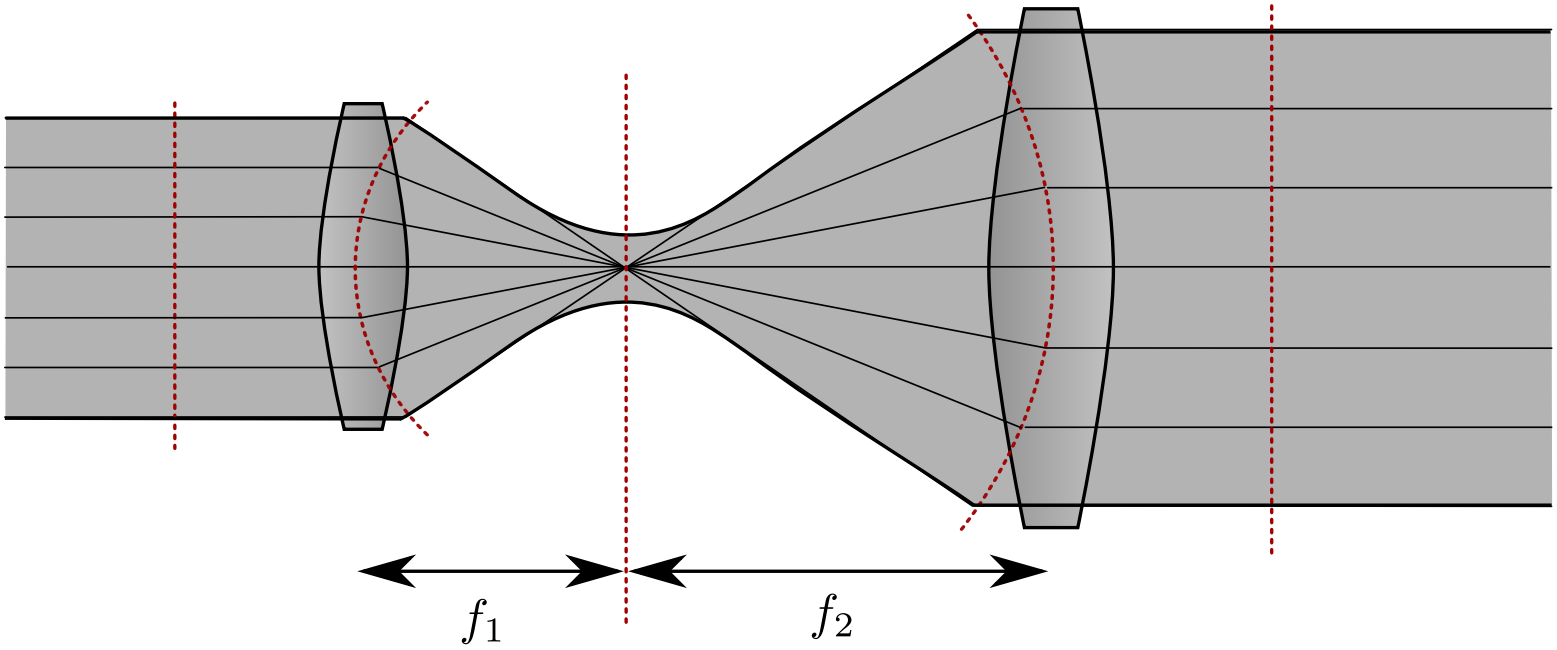


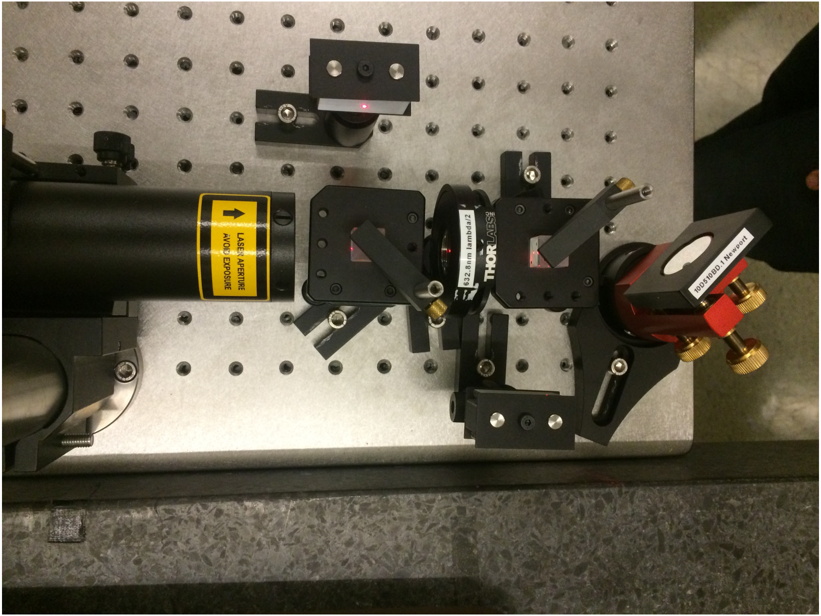
Convex



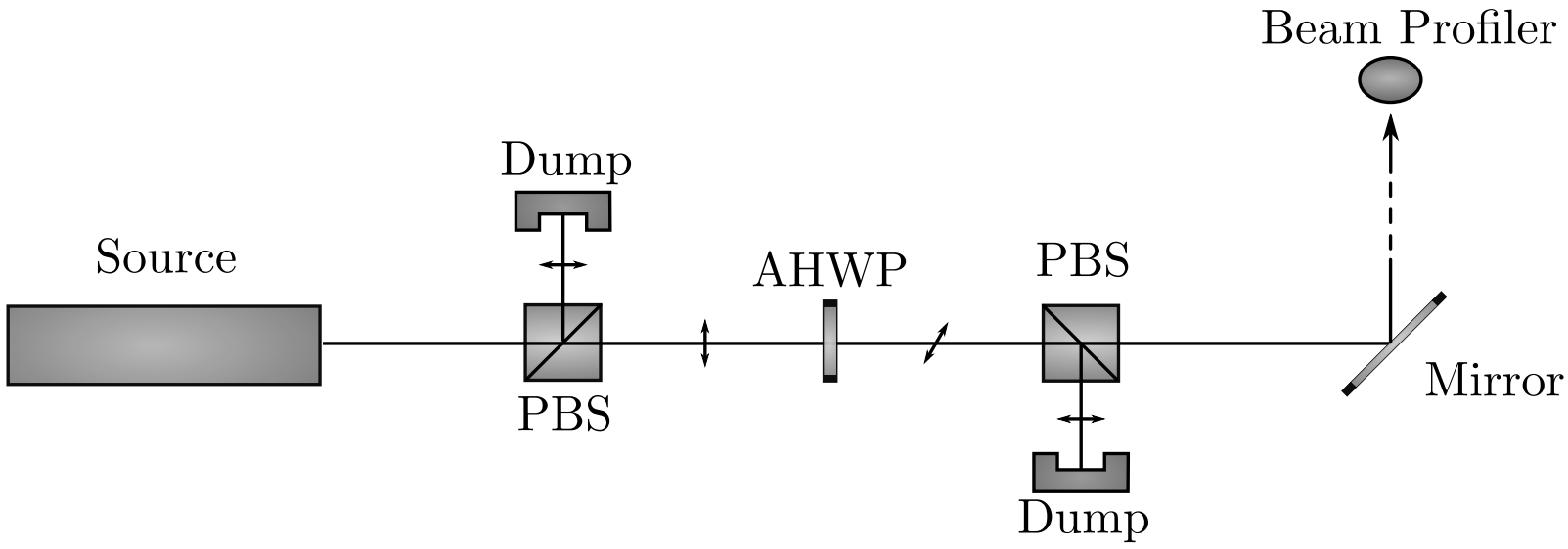
Concave

Vi kan lage en beam expander fra to bikonvekse linser

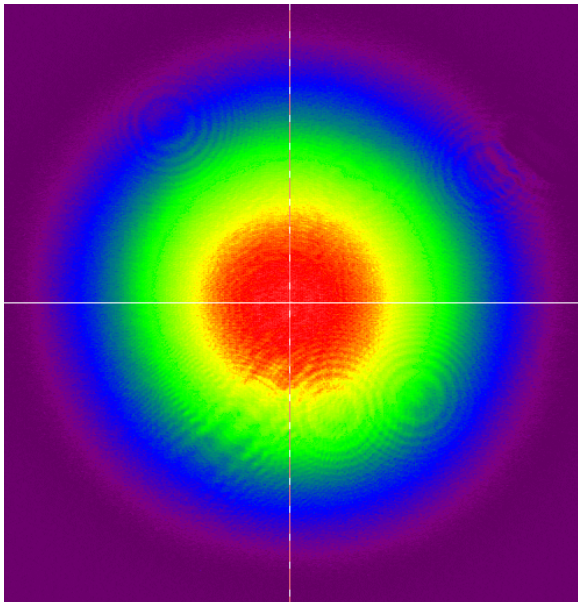


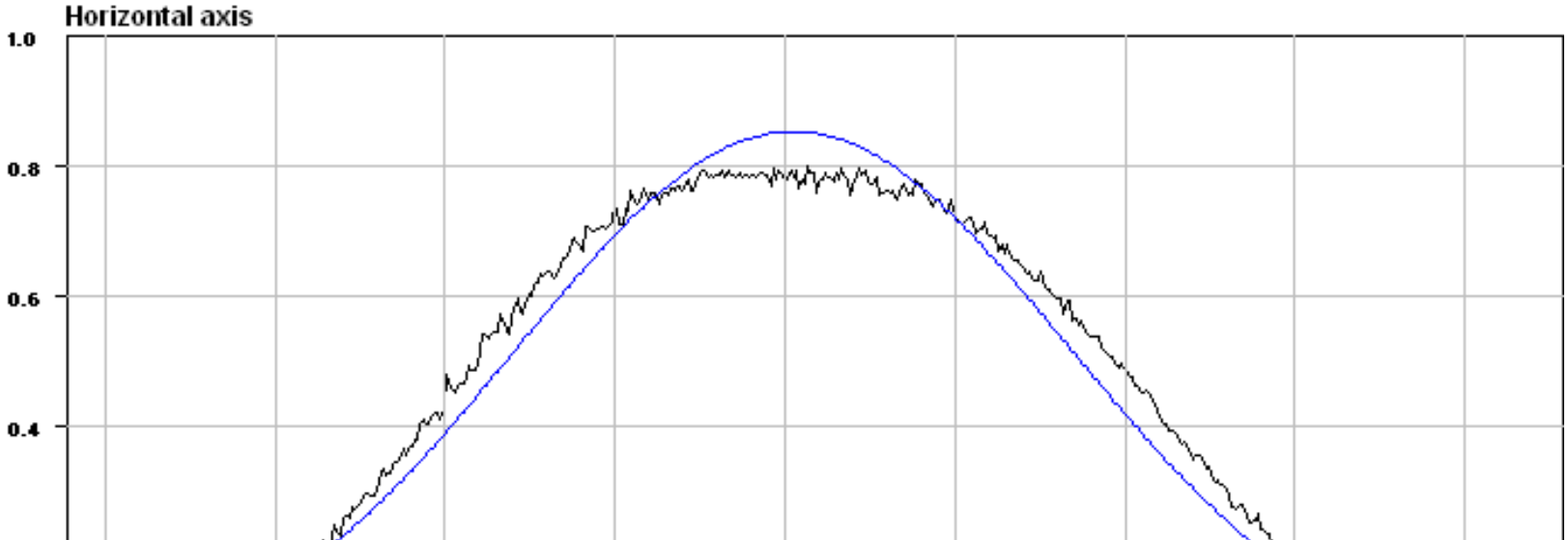


LASER APERTURE
AVOID EXPOSURE
632.8nm lambda/2
THORLABS
10D510BD.1 Newport

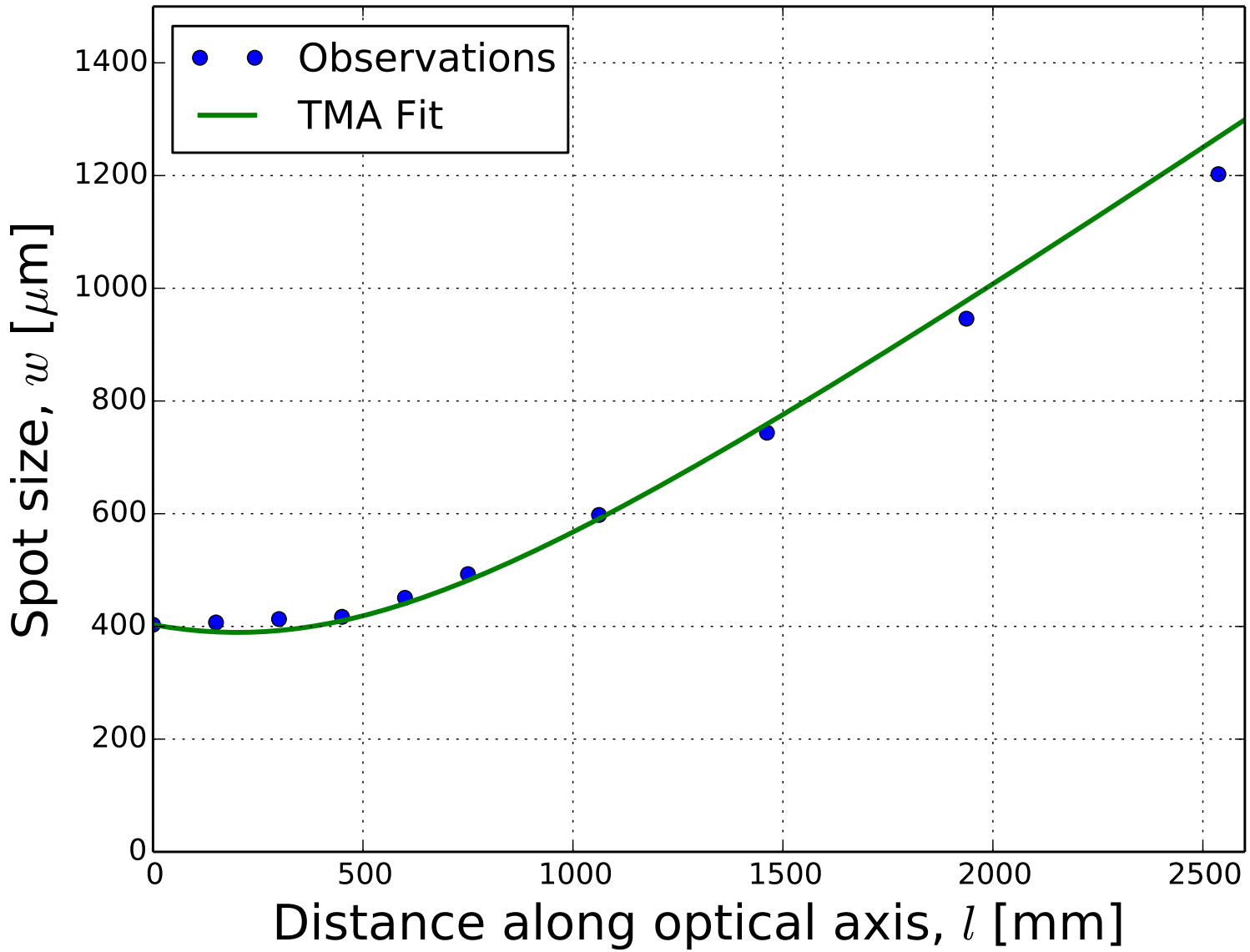

Beam Profiler
Dump
Source
AHWP
PBS
PBS
Mirror
Dump

Ser at profilen er tilnærmet gaussisk

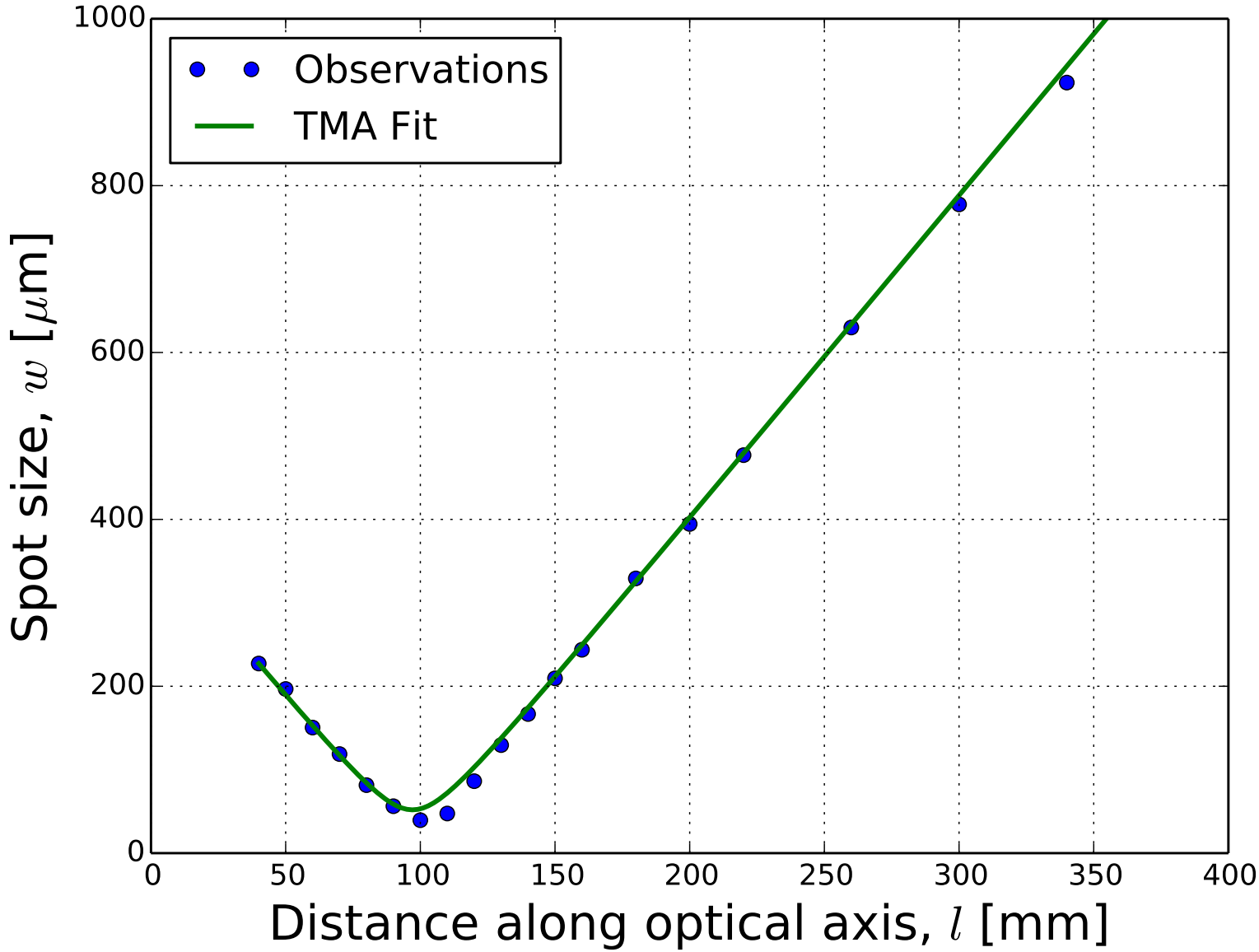




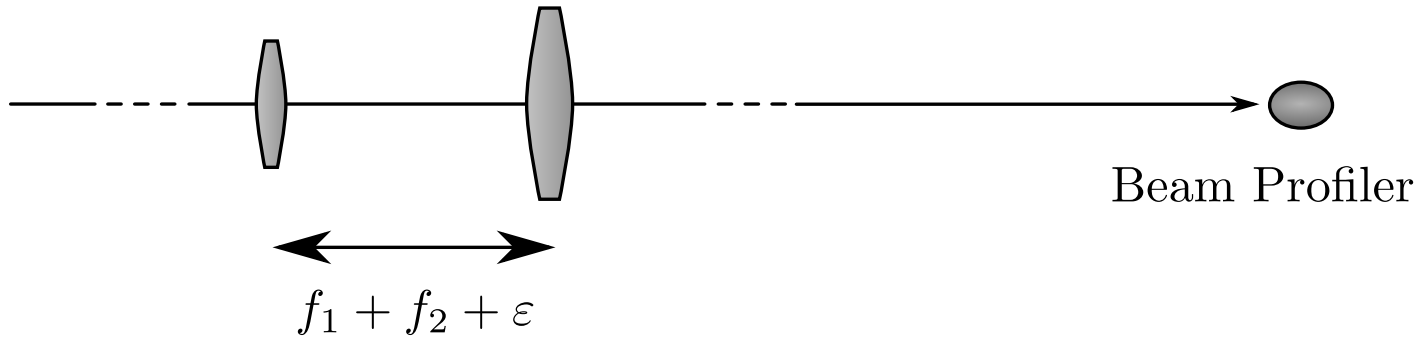
Bruker TMA for å tilnærme krumningsradien



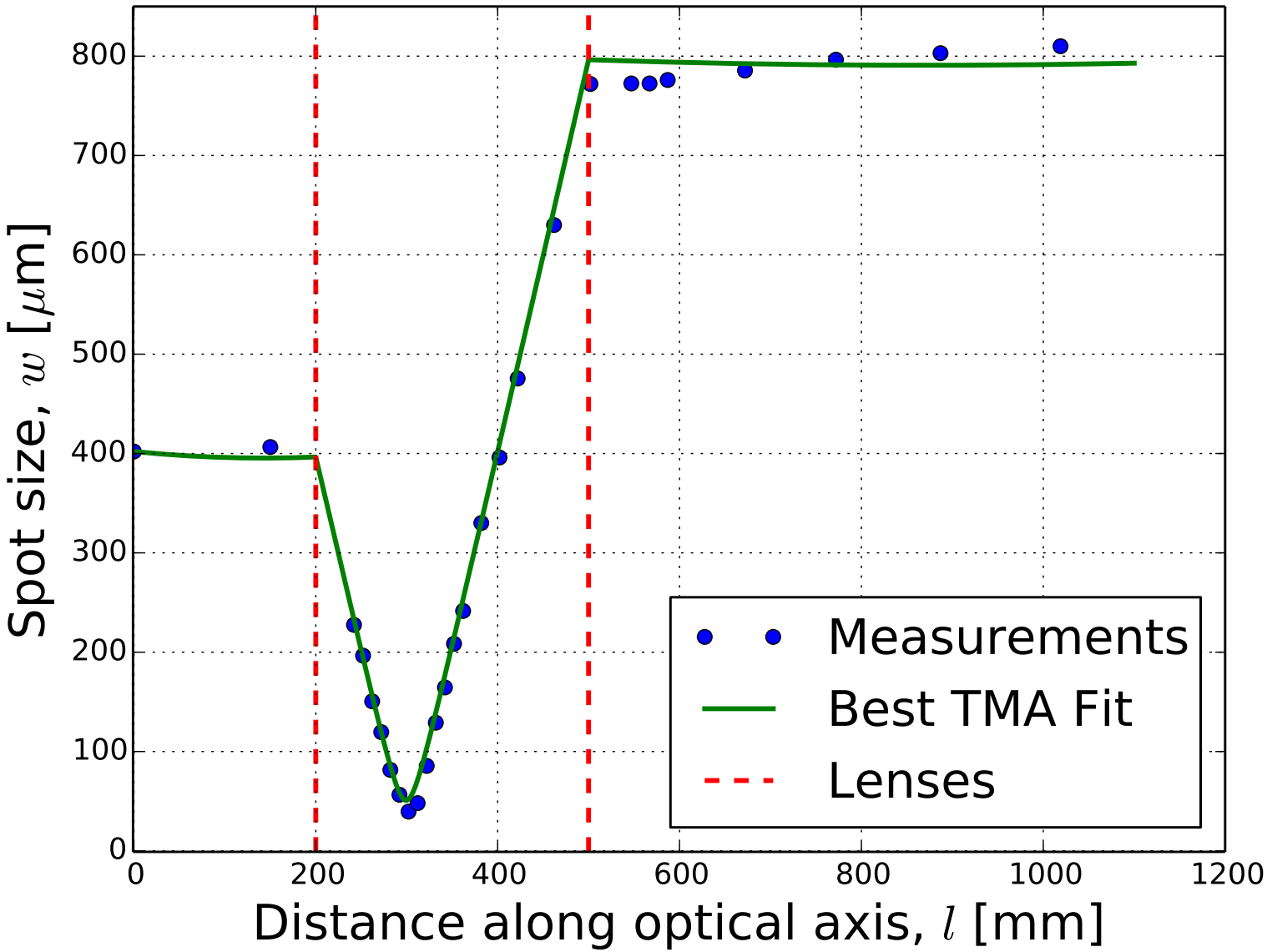
Tester strålen i nærheten av midjen



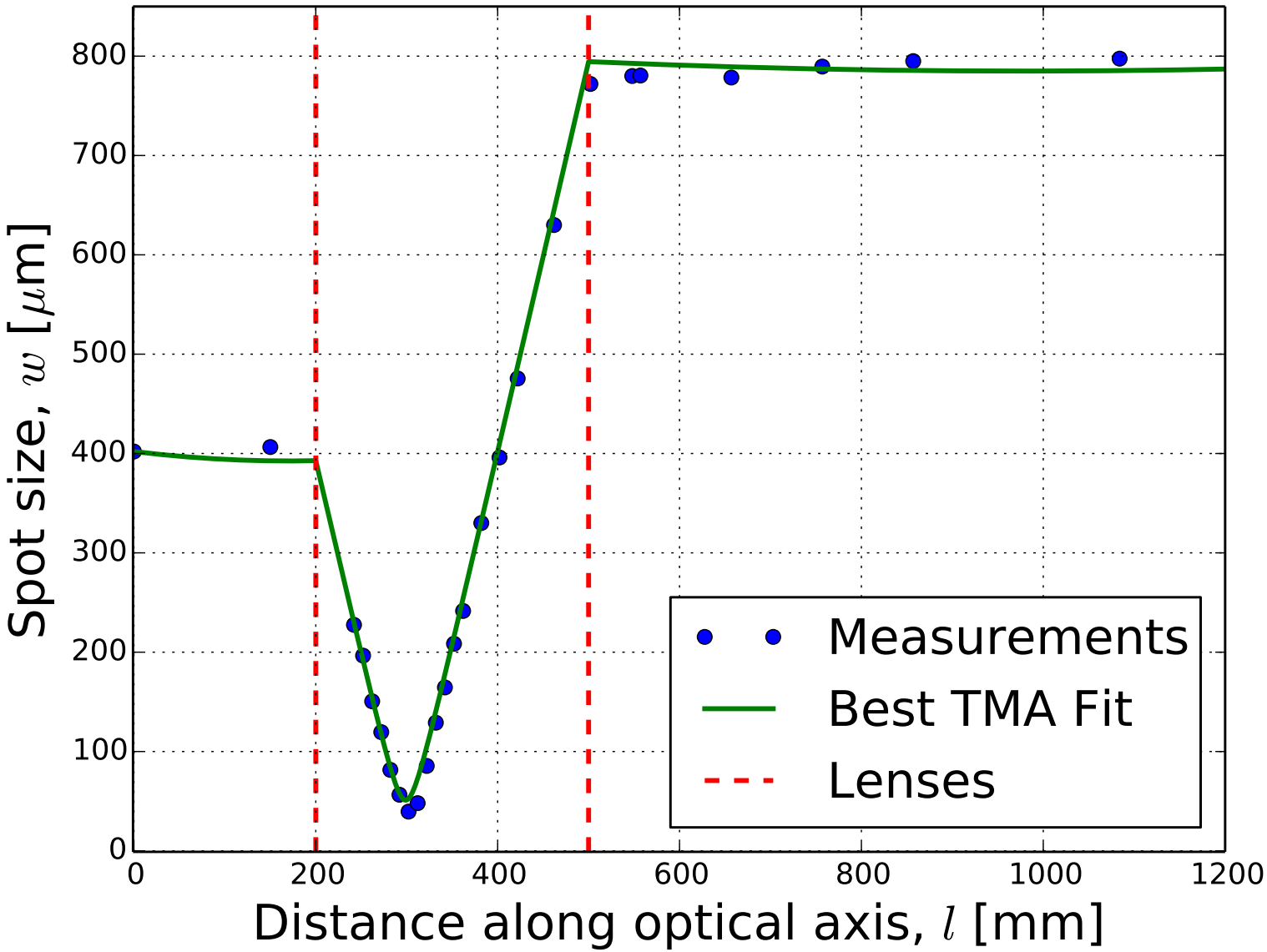
Lager en beam expander der avstanden småjusteres



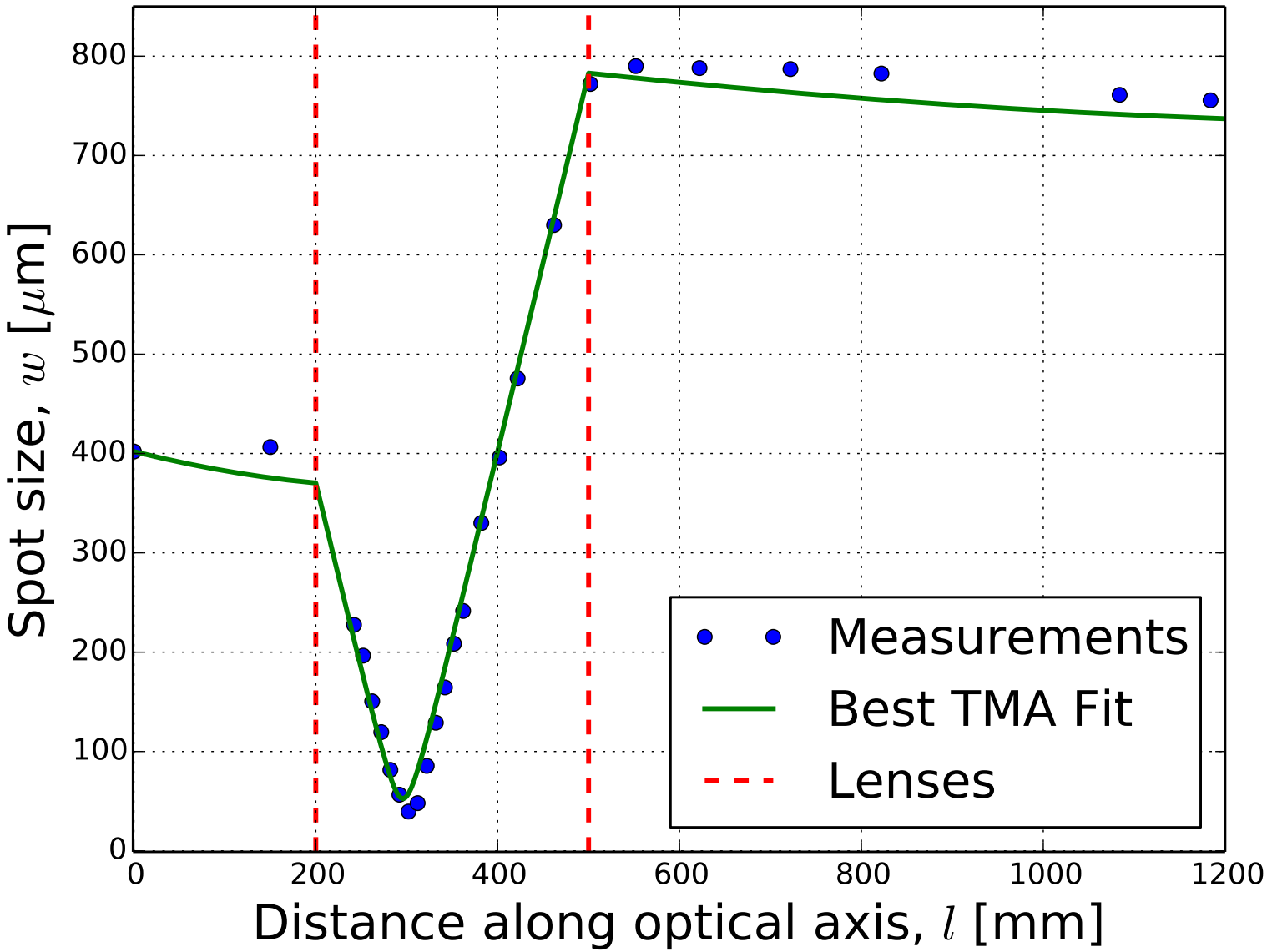
Avstanden har mye å si for den endelige krumningen



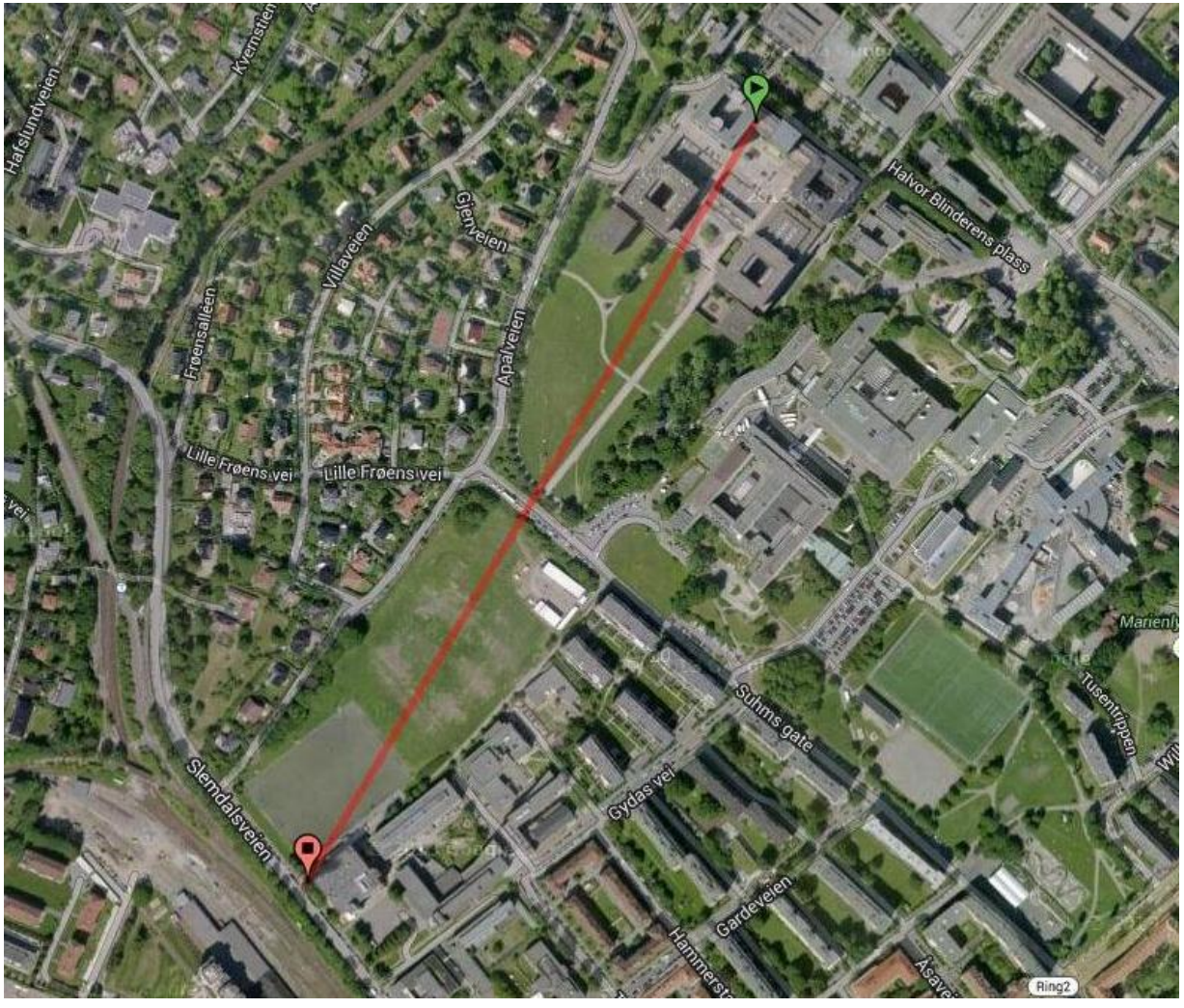
Avstanden har mye å si for den endelige krumningen



Avstanden har mye å si for den endelige krumningen

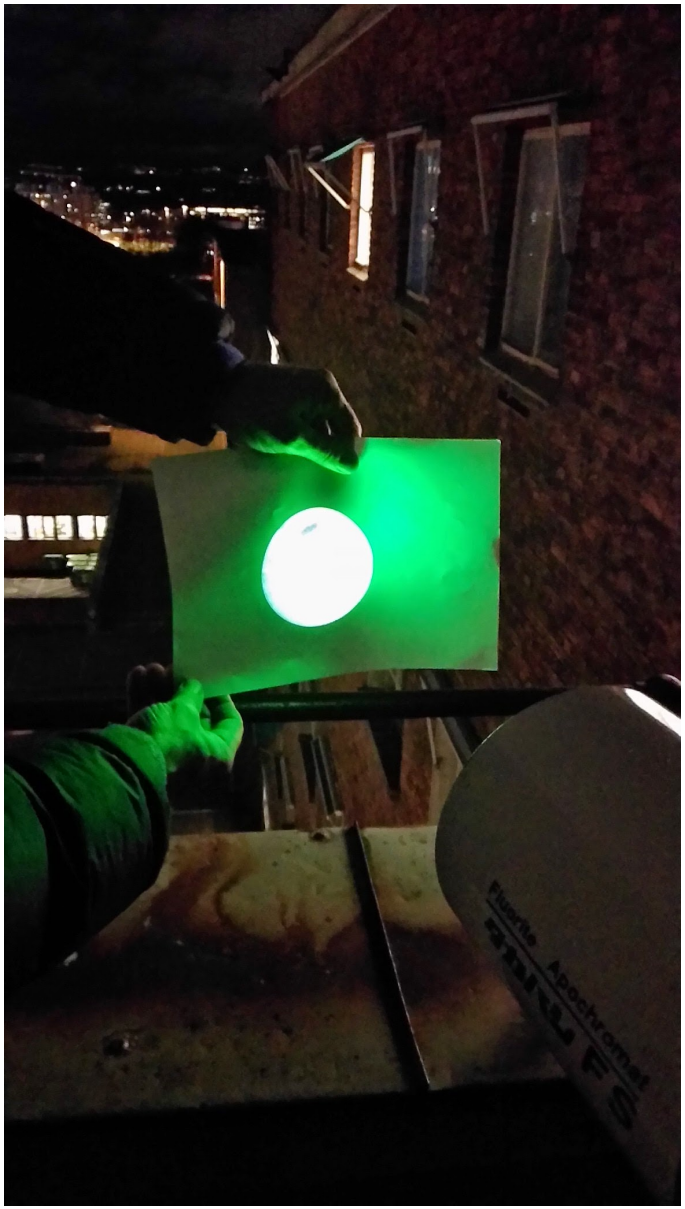


Skal sende strålen fra en laserpenn en lang avstand

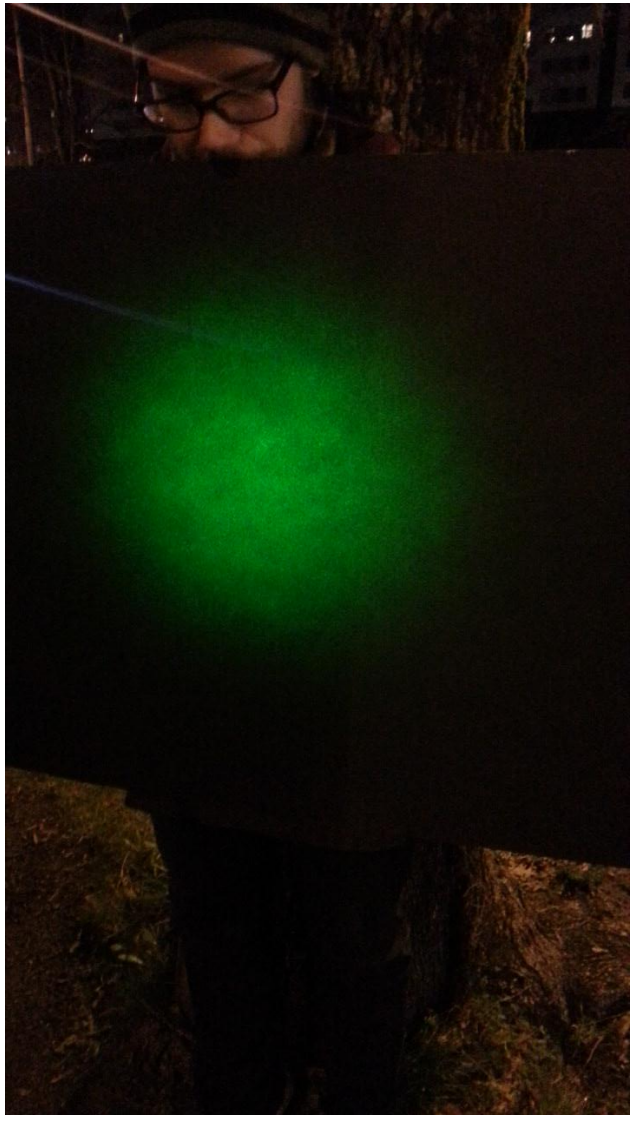


$$d \approx 710 \text{ m}$$

Et teleskop brukes som beam expander



Strålen som starter bredt har lav divergensvinkel



Gaussiske stråler har gunstige egenskaper som gjør dem meget lette å regne på, og gjør dem gunstige i industri.

Strålegangen kan forutsies av TMA-metoden, men man må gjøre mange tilnærminger.

En stråle som skal holde konstant bredde må starte bredt, dette er fordi $\theta \propto 1/w_0$.