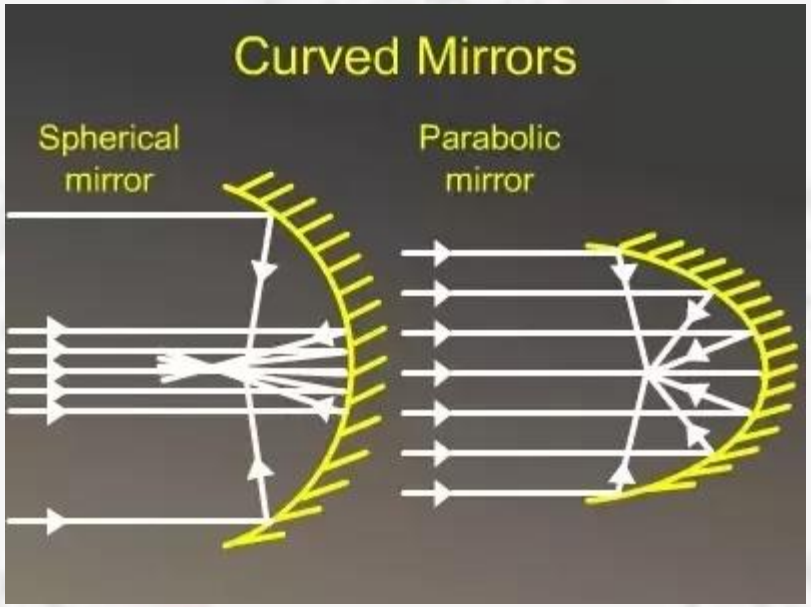
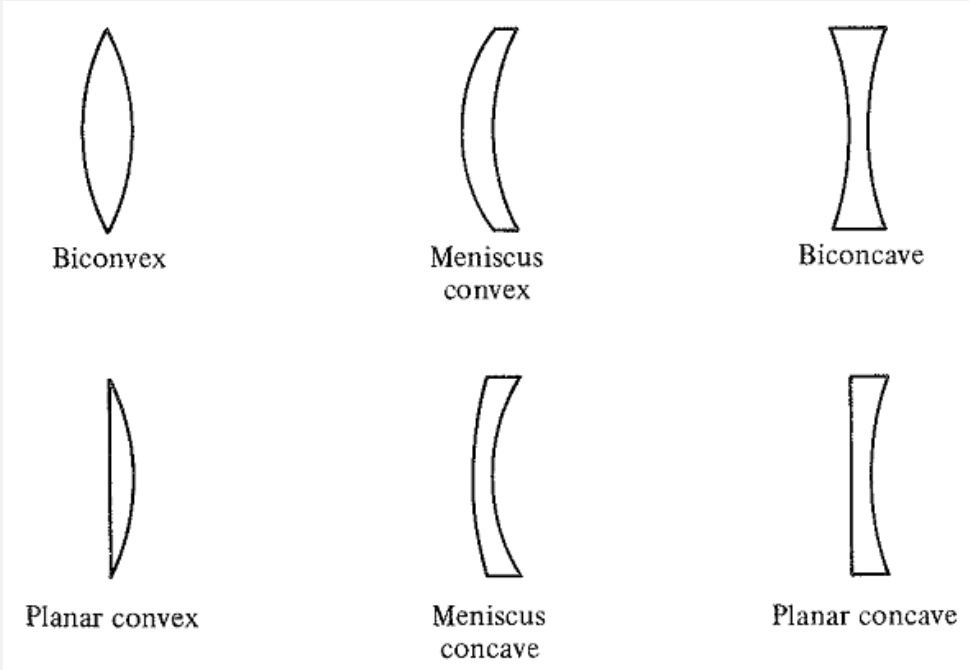
C2 IntrodSpect 971019wed

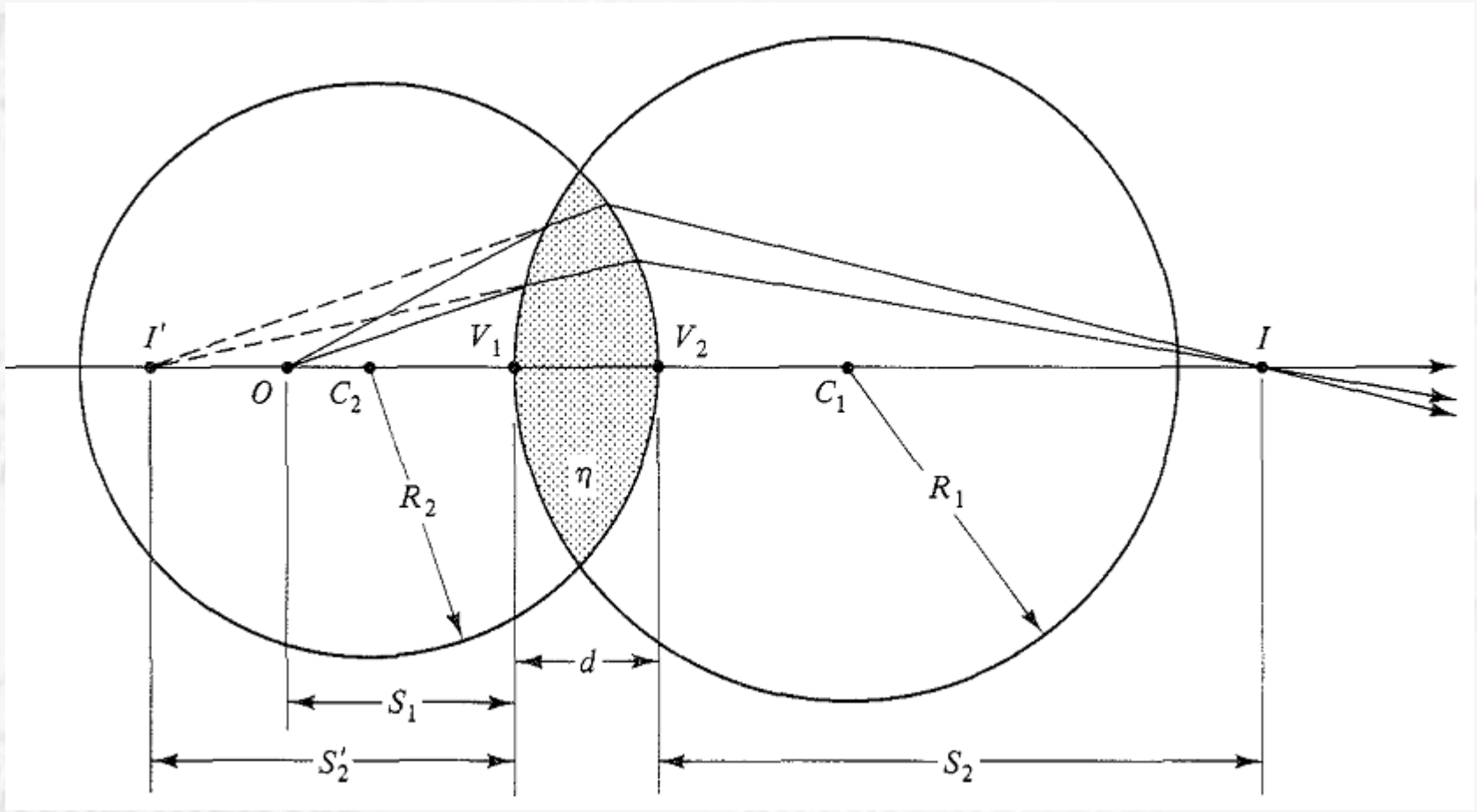
Mirrors:

- Spherical
- Aspherical (Parabilic, Hyperbolic) :
  Lower aberation



Lenses:



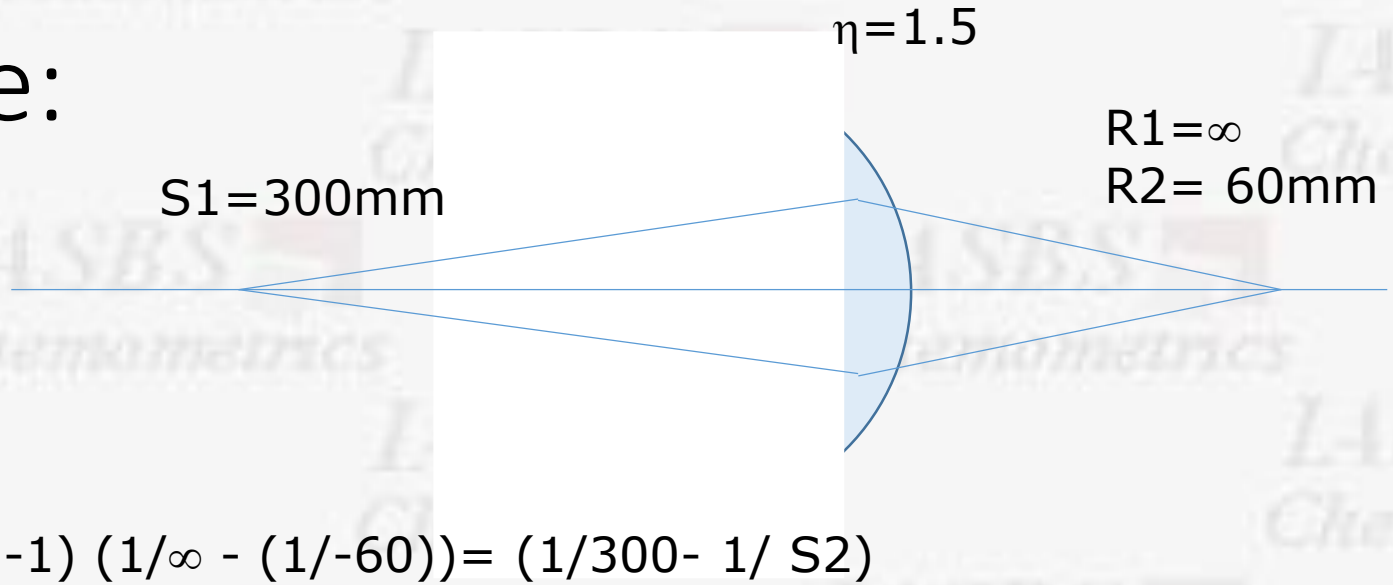


$$\frac{1}{S_1} + \frac{1}{S_2} = (\eta - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right) = 1/f$$

Lense coating → lower reflection loss

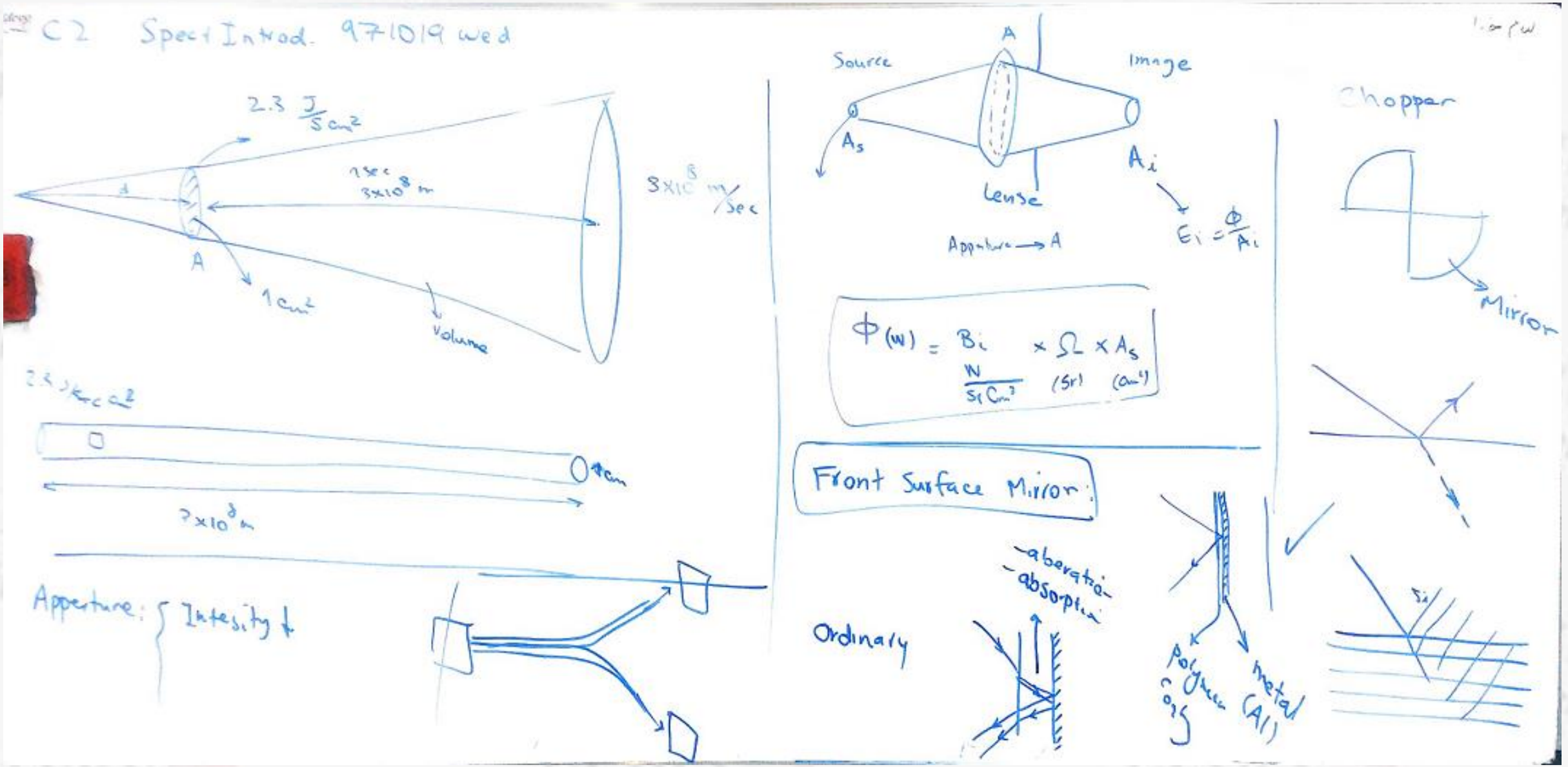
$\eta_{air} < \eta_{coat} < \eta_{glass}$

Example:



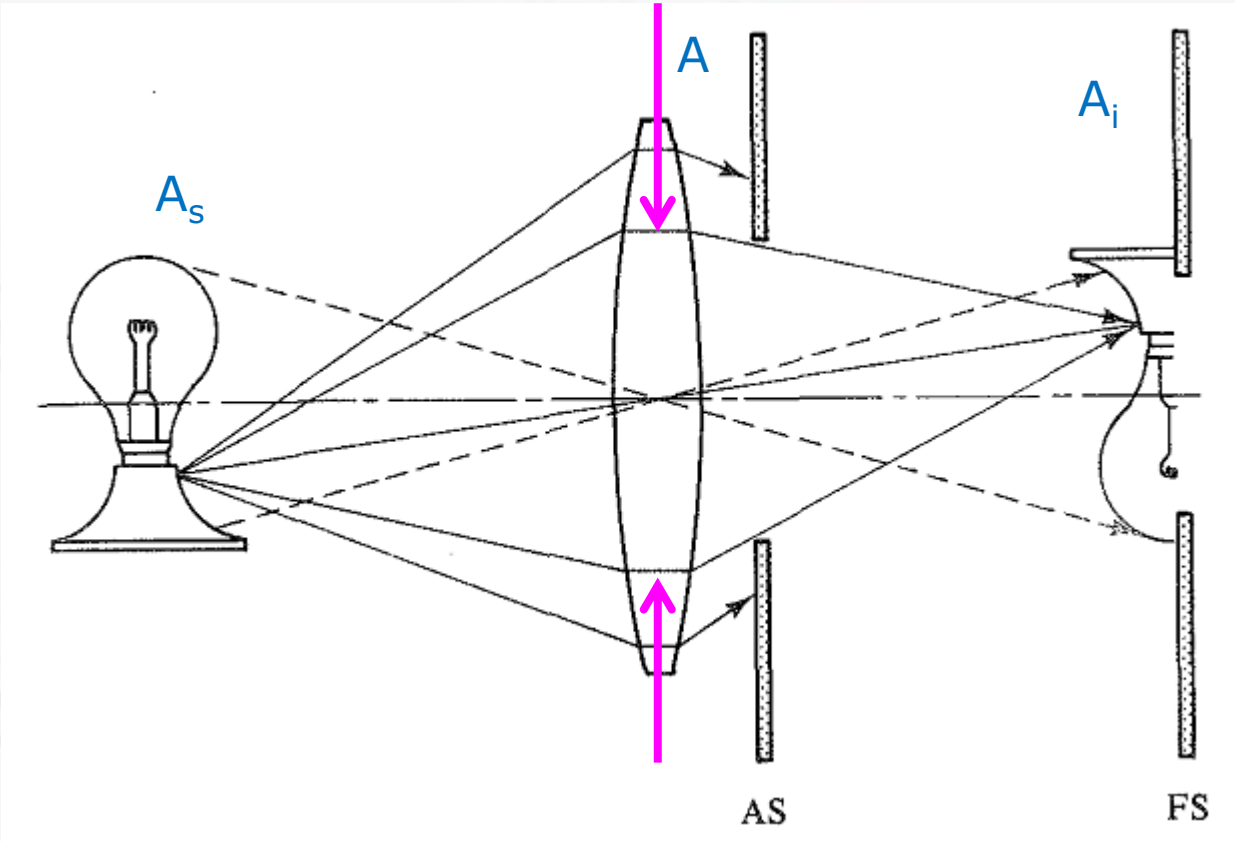
1/f = (1.5 -1) (1/∞ - (1/-60))= (1/300- 1/ S2)

➔ f=120mm , S2= 200mm


C2 Spect Introd. 971019 wed
2.3 J/5cm²
1sec 3x10⁸ m
3x10⁸ m/sec
A
1cm²
Volume
Source
Image
A
As
Ai
Lense
Aperture → A
Ei = Φ/Ai
Chopper
Mirror
Φ(W) = Bi × Ω × As
W/Sr Cm² (Sr) (cm²)
Front Surface Mirror:
Aperture: { Intesity t
Ordinary
-aberratio-
-absorptio-
Polymer coat
metal (Al)
Si

Apperture

D



Apperture Stop

Field Stop

Image irradiance (W/cm^2):

$Ei = \phi / Ai = Bi$ (w/Sr cm2) Ω A_s / A_i

$= B_i (A/S_1^2) A_s / A_i$

$= B_i ([\pi(D/2)^2]/S_1^2) A_s / A_i$

Magnification

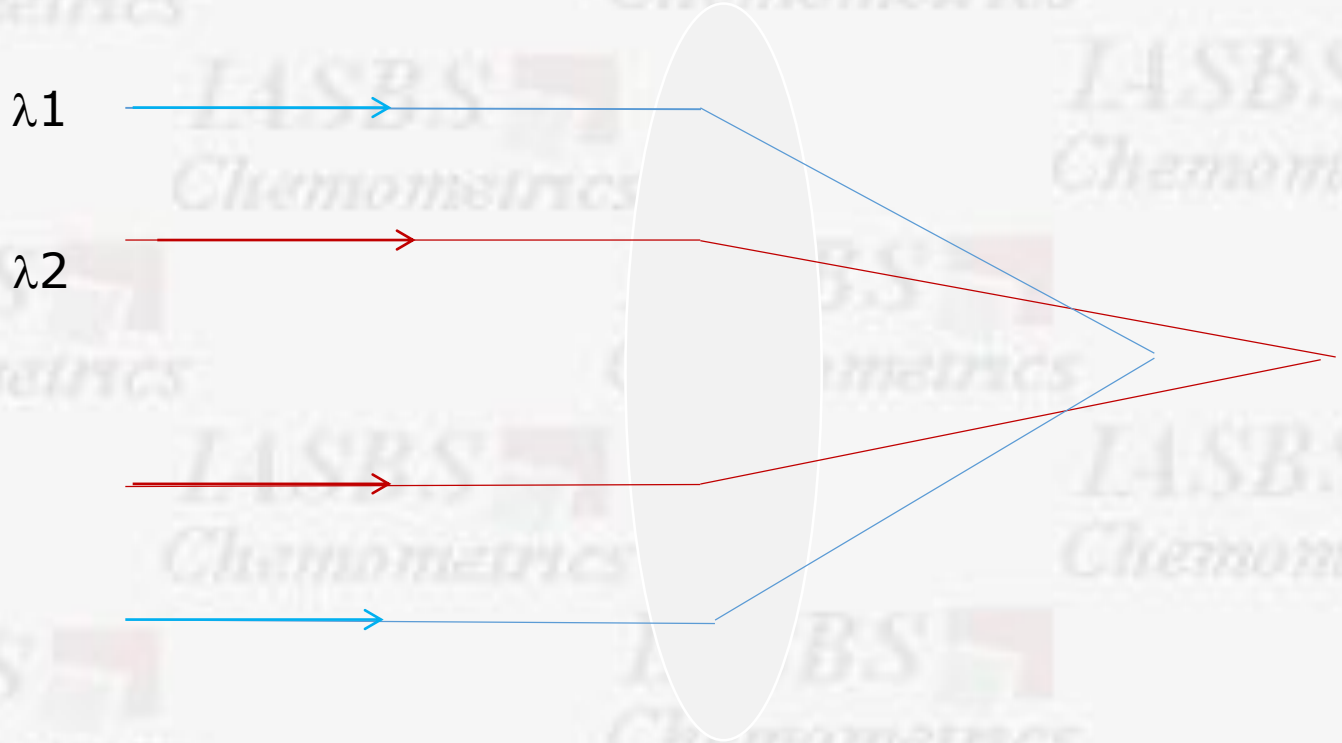
$F_{/n} = F/D$ F-number

Optical aberation:

♣Chromatic aberration,

$\eta = f(\lambda)$

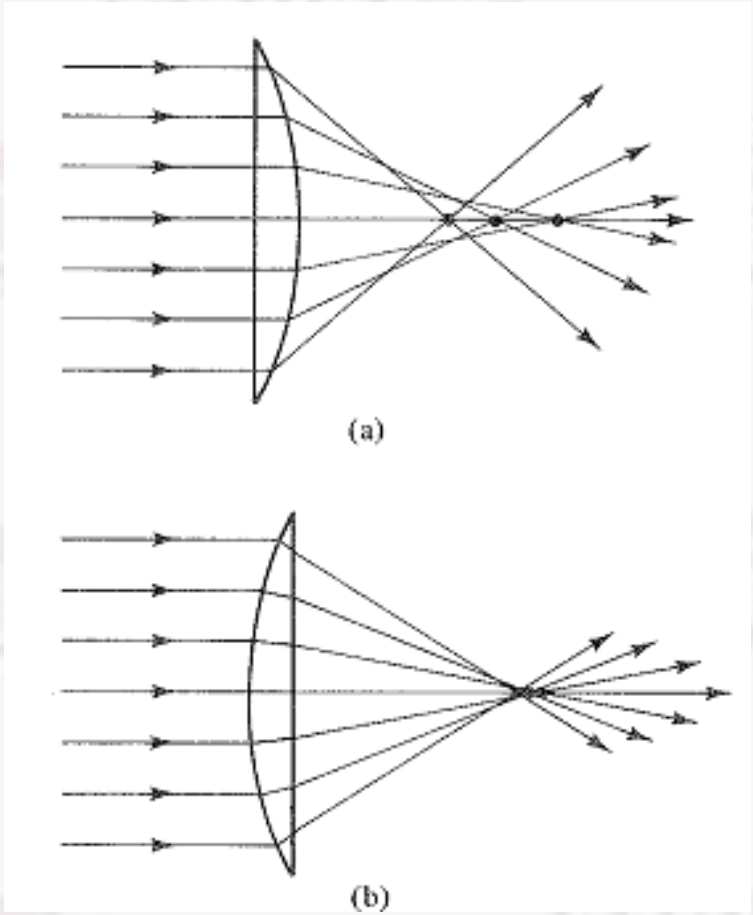
→ different λs → different η → different f



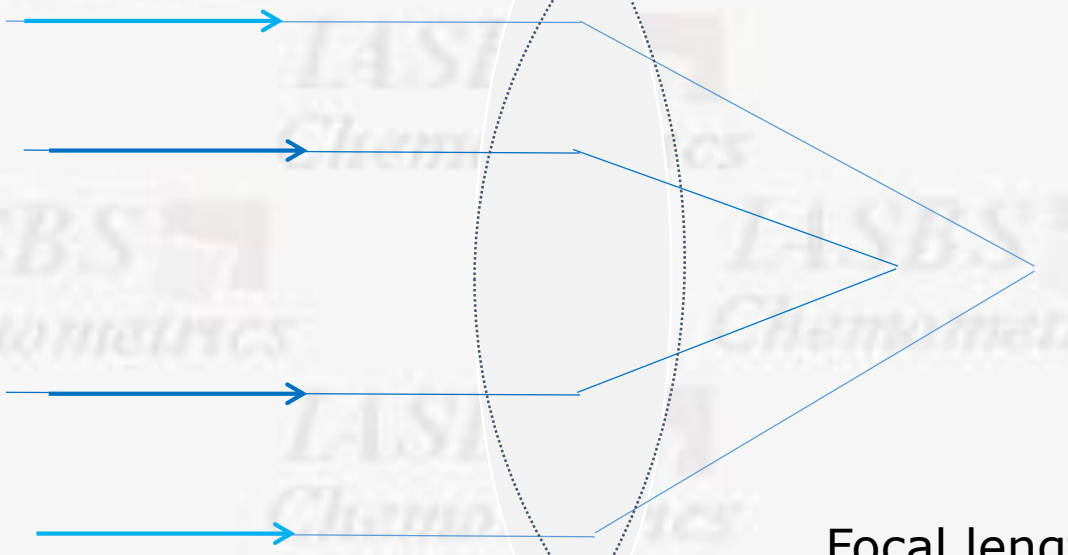
Solutions of problem:

-Front surface Mirror

- Doublet lense.


(a)
(b)

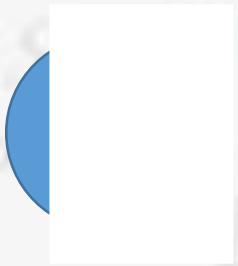
♣Spherical aberation



Focal length =f(λ)

To circumvent the problem:

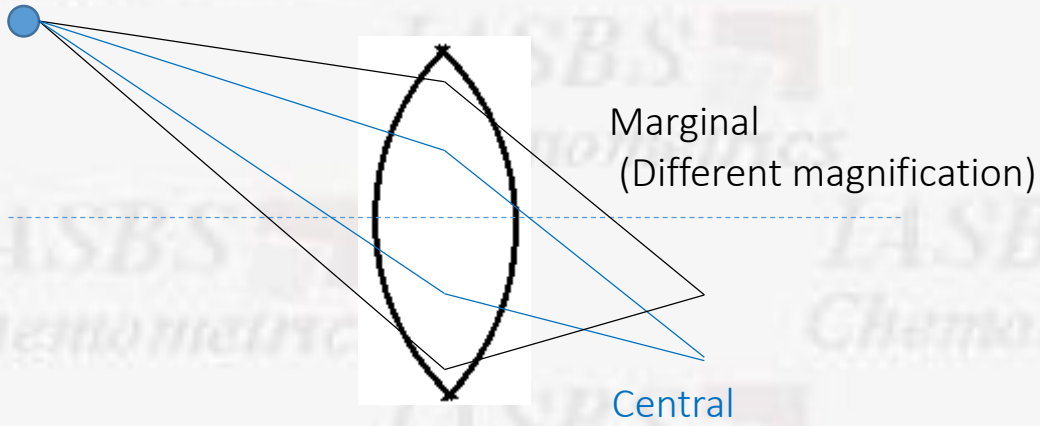
- Convex planar,
- Apperture
- Combined lenses
- Aspherical lenses

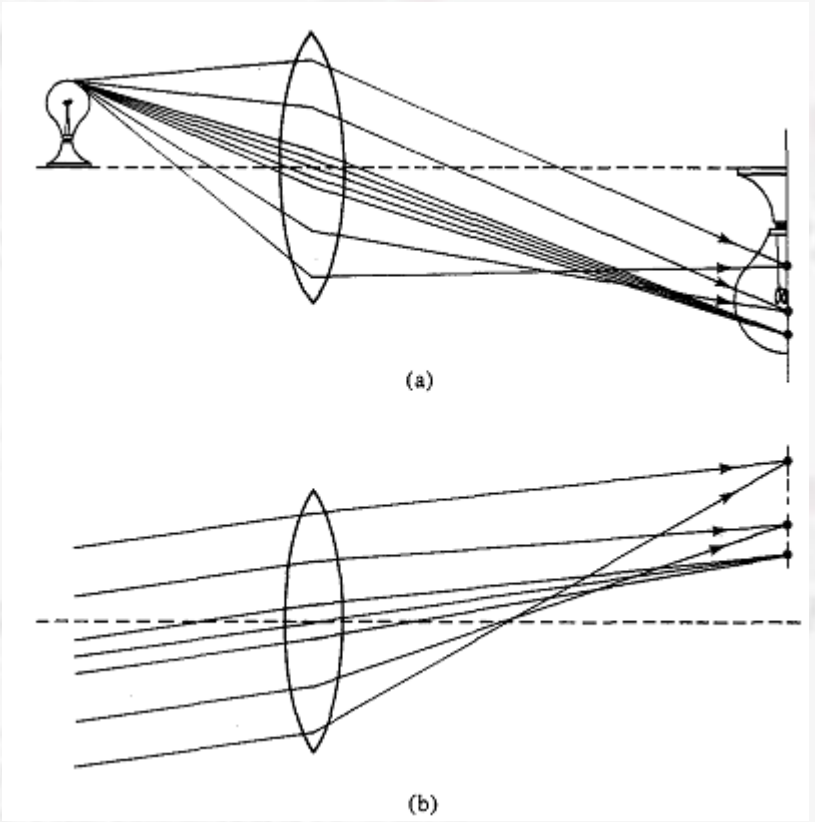


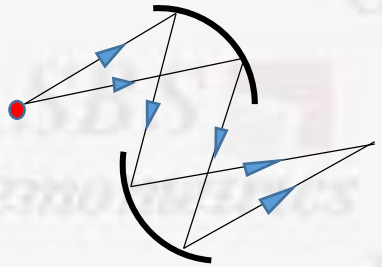
♣ Coma:

Tilt lense → comet like tail

(Off-axial-object)



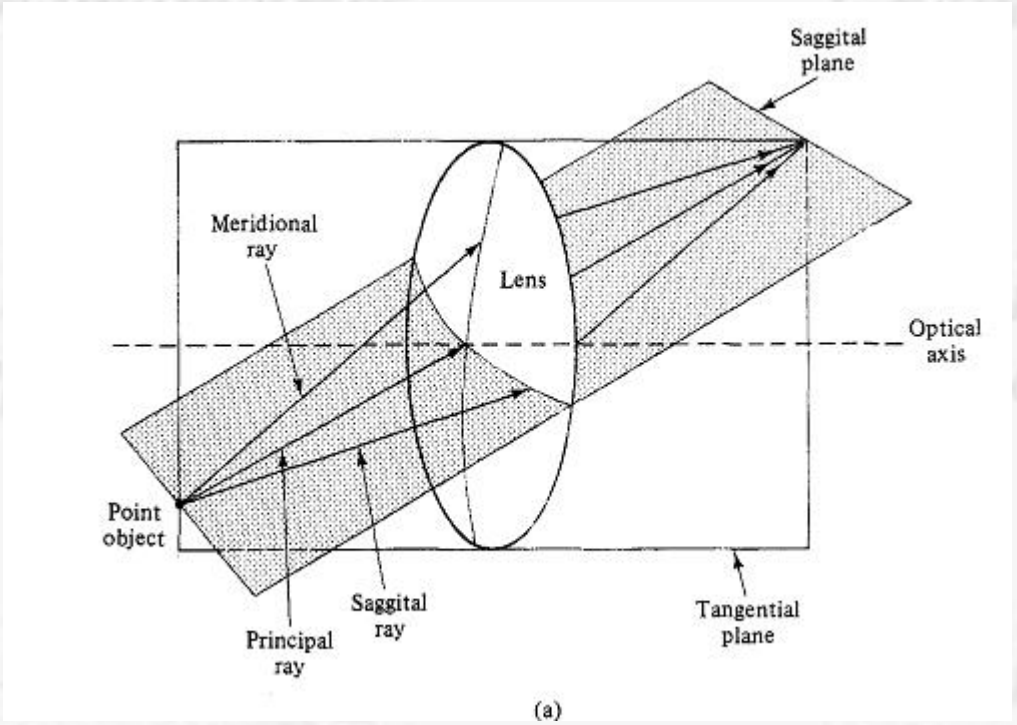




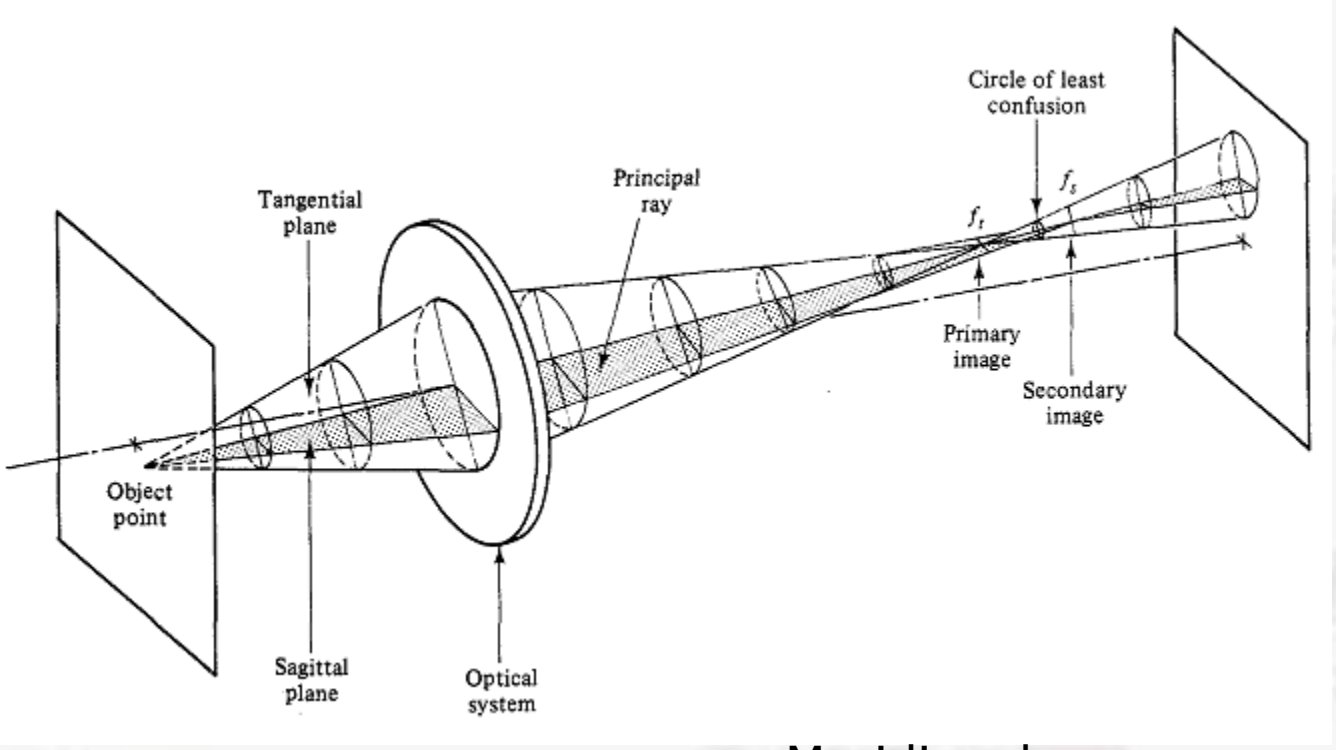
Circumvent the problem:

- Convex plannar,
- Blocking marginals, (aperture)
- Symmetric mirror pair

♣ Astigmation

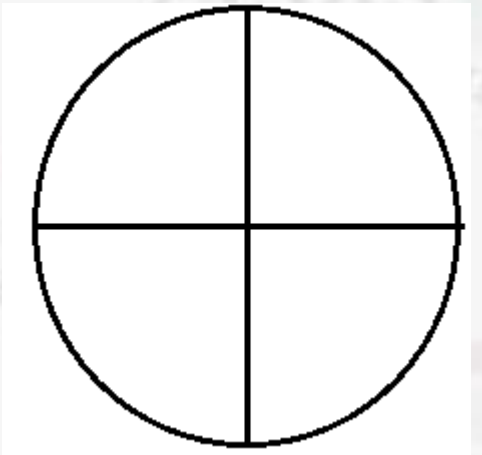


Off-axis object



Different
Focal lengths
→ Astigmation

Meridianal

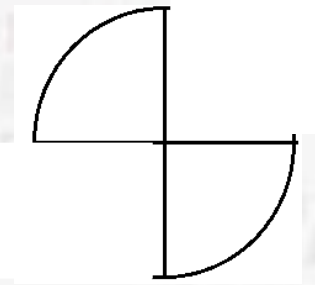


Sagital

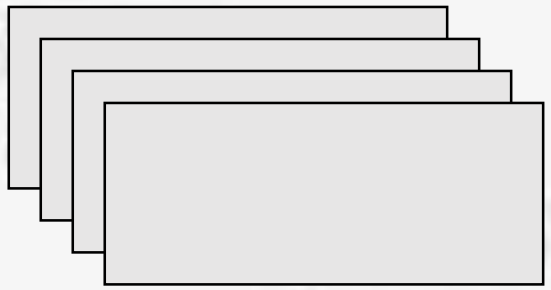
Greenwich Meridian

Beam Splitters

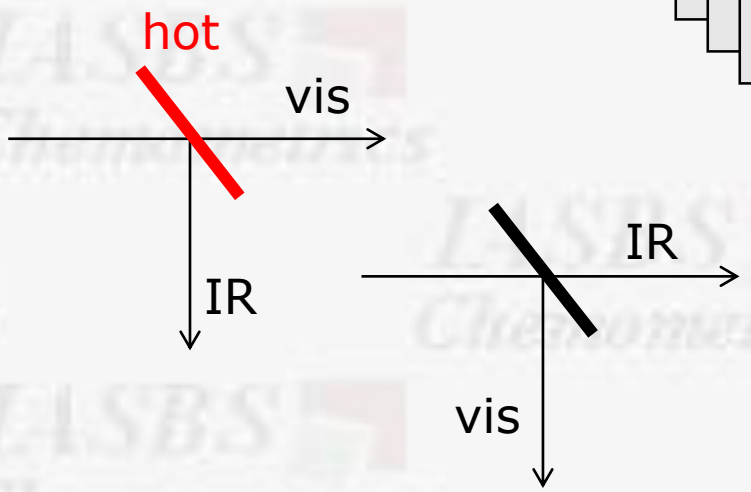
- Partially Silvered Mirror (Thin Metal Coating)
- Pellicle beam splitter(membrane, nitro cellulose)
- Chopper (Mirror and vacant)



- Pile of plates



- Dichroic mirror



- Fibre optic bandles.