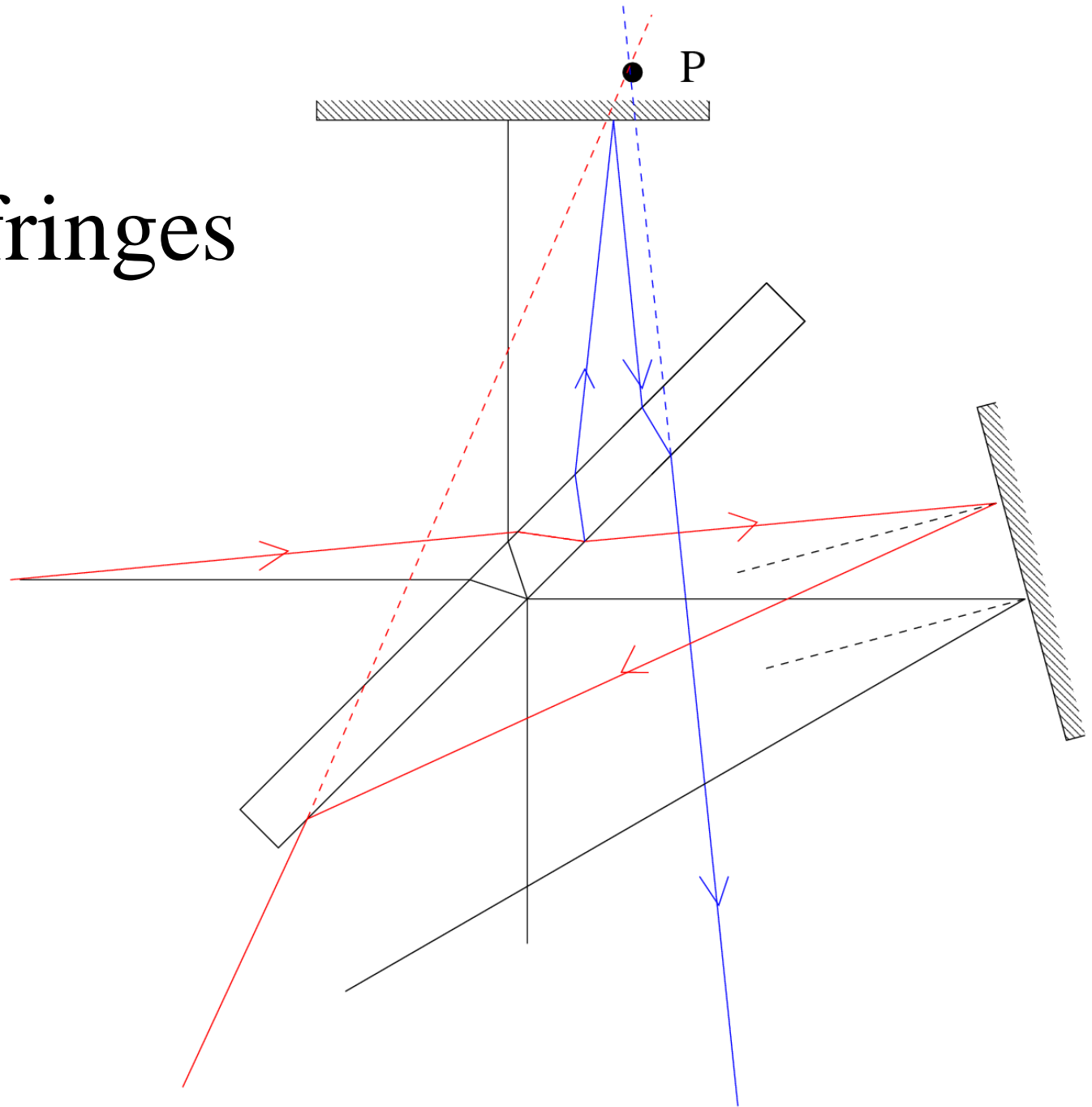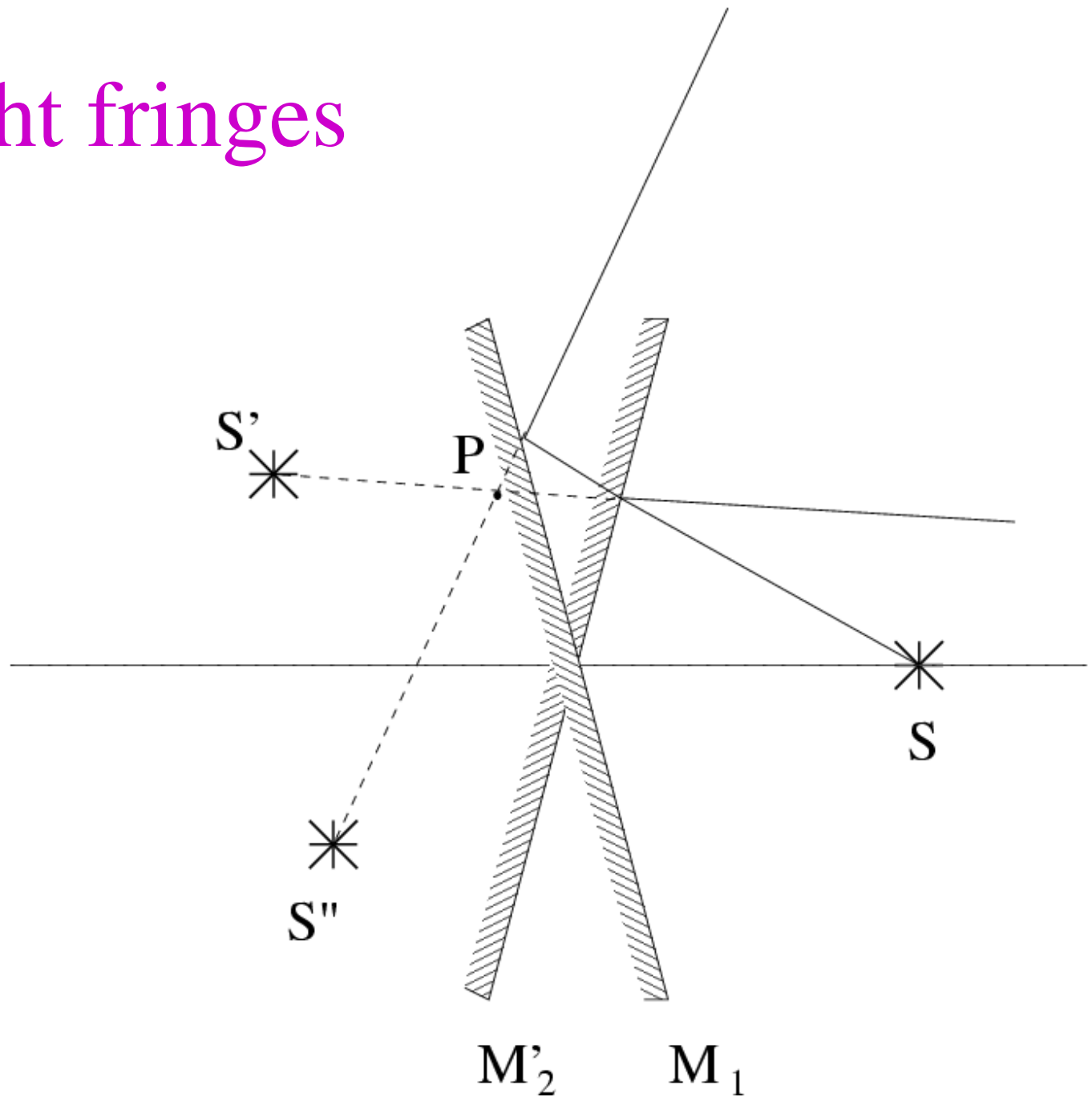3. Measurement of the coherence length of a spectral line

4. Formation of straight white light fringes (zero path difference)

5. Measurement of thickness of thin transparent sheets
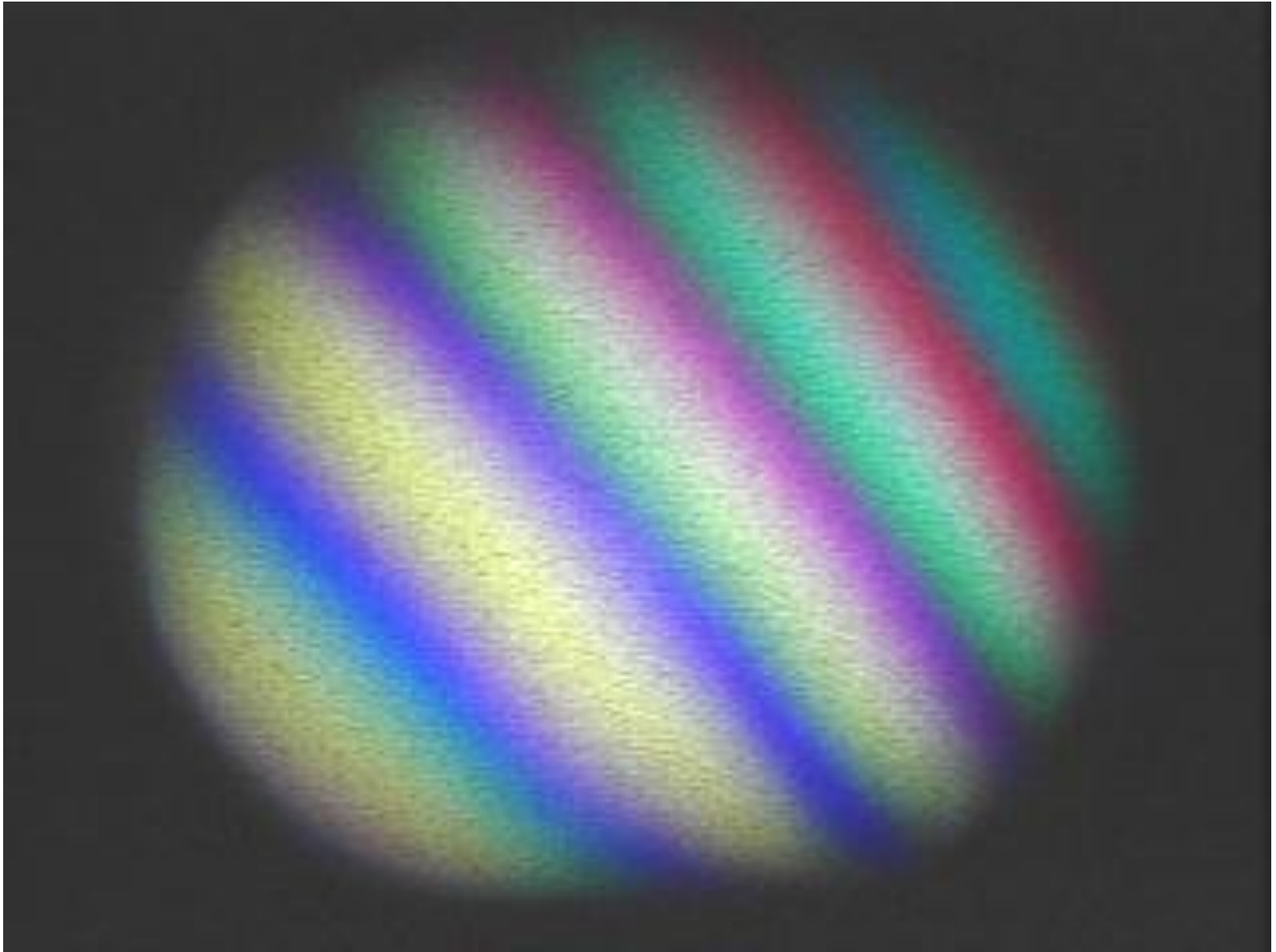
6. Measurement of the refractive index of gases
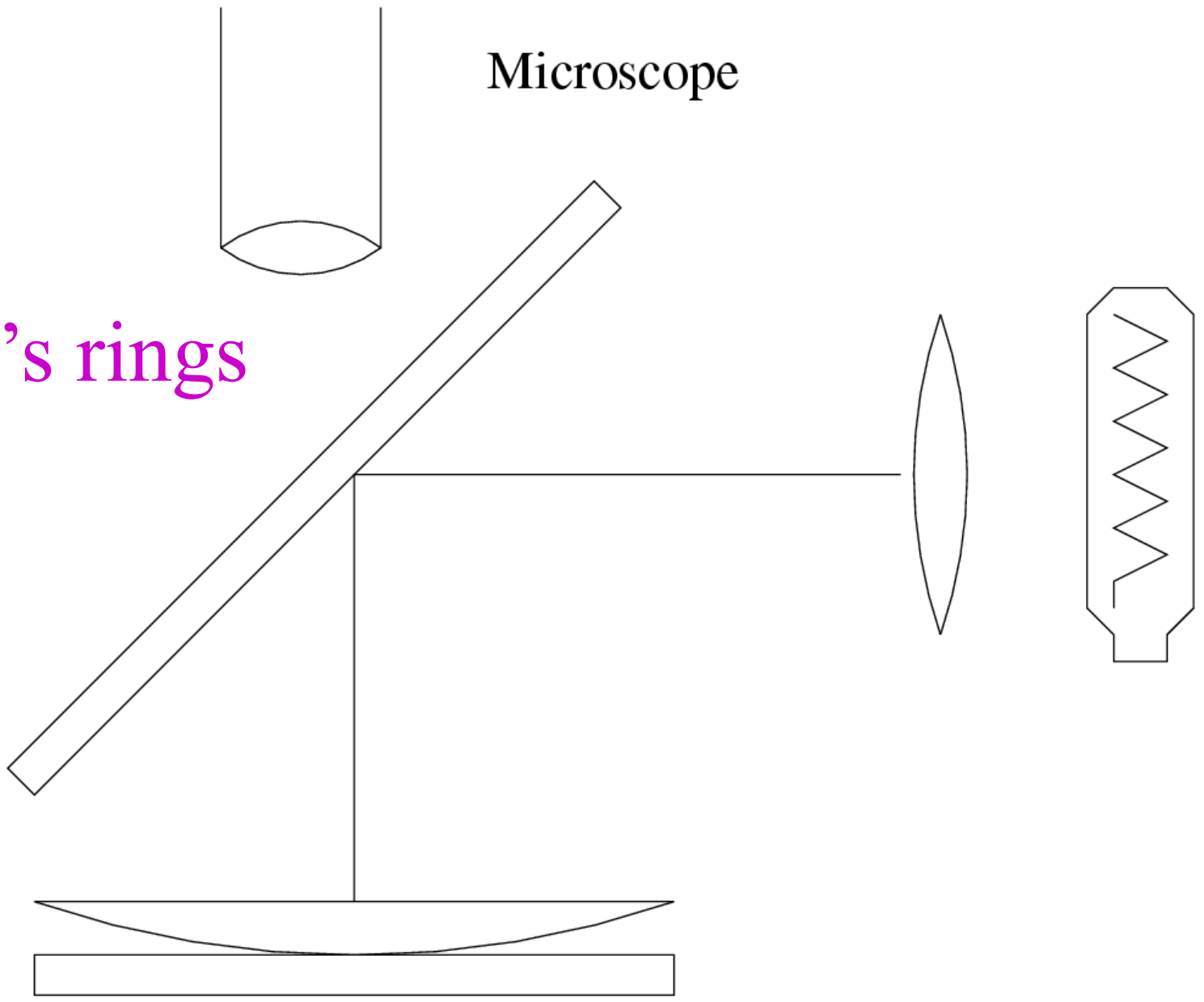
Straight fringes

P
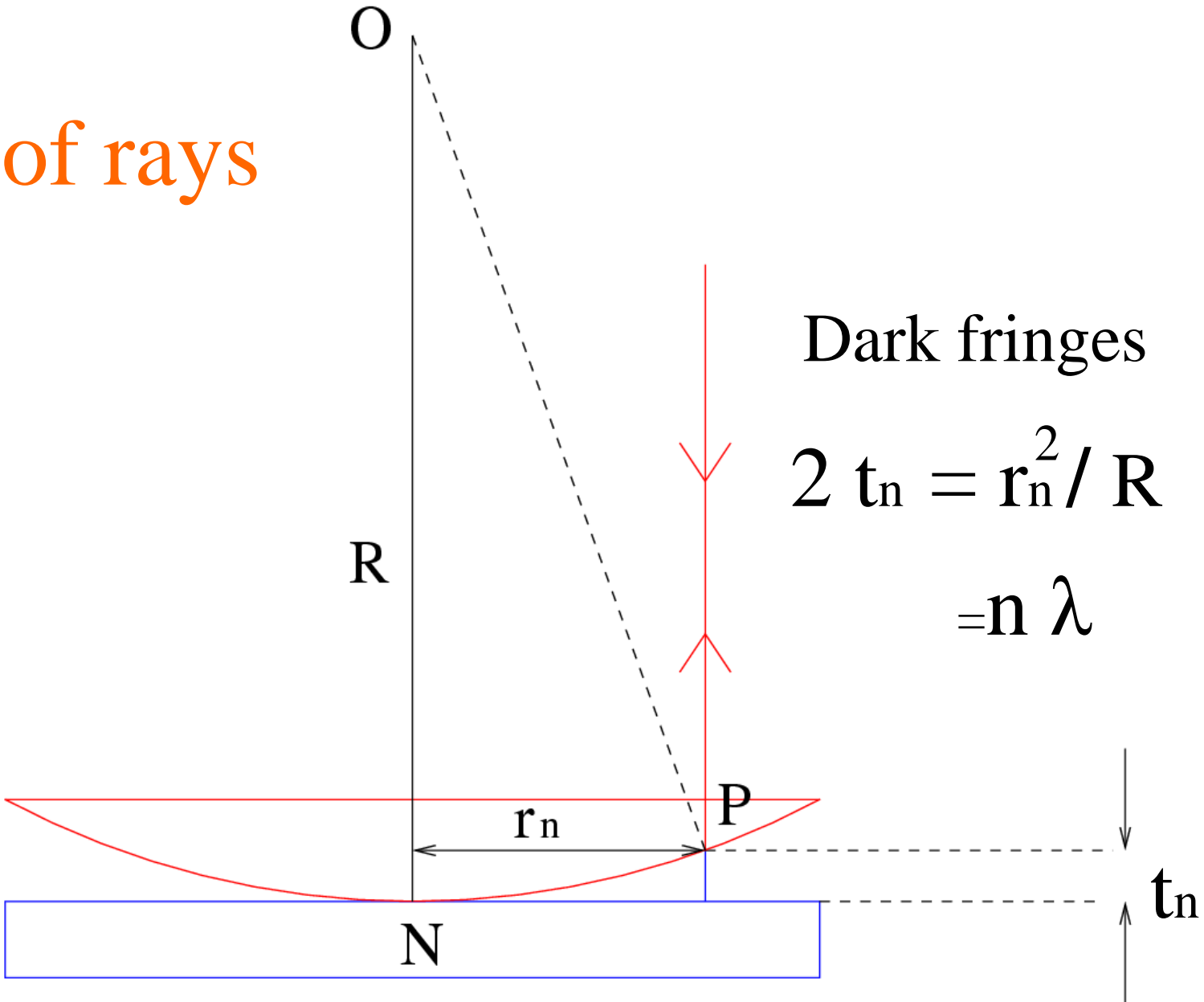
Straight fringes
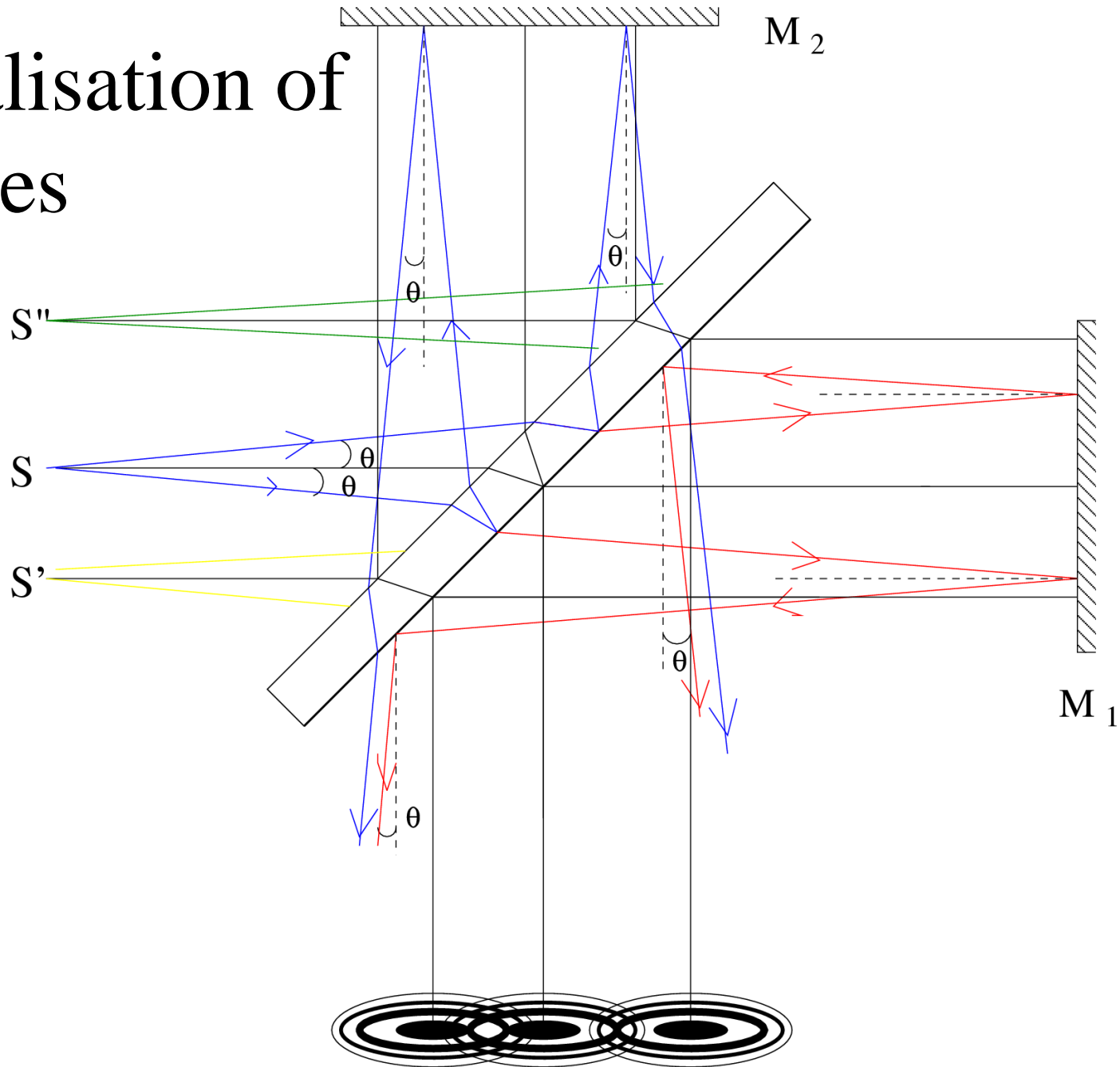
Straight white light fringes
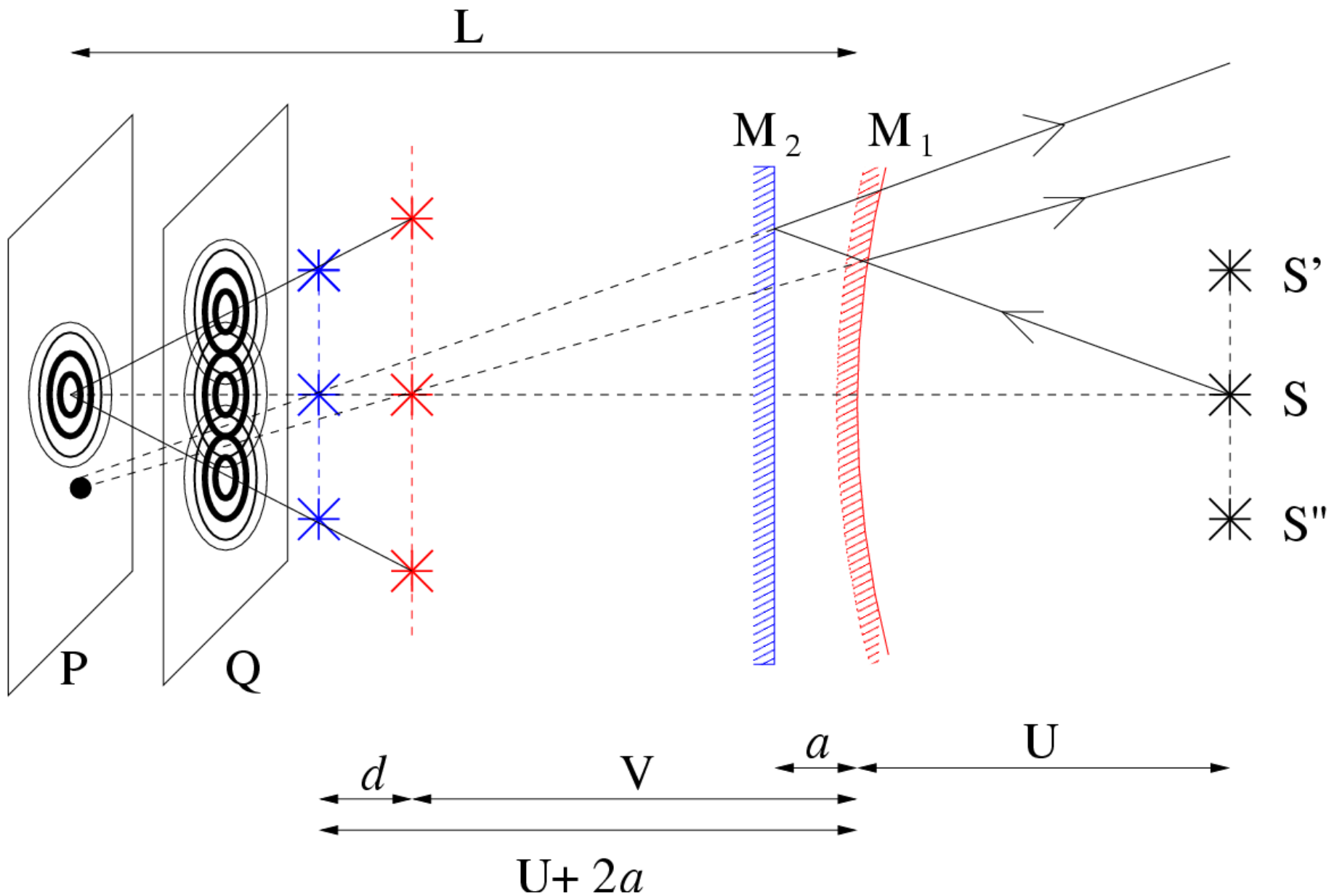
Microscope

Newton's rings

Pair of rays

Dark fringes

$$2\, t_n = r_n^2 / R$$

$$= n\, \lambda$$

O

R

r_n

P

N

t_n

Localisation of fringes

Localization of Newton-Michelson rings

$$V = \frac{UR}{R - 2U}$$

$$\frac{L - V - d}{L - V} = \frac{U}{V}$$

$$V + d = U + 2a$$

$$L = \frac{2aV}{V - U}$$

$$d = 2a + U - V$$

$$L = a\,R\,/\,U$$

$$d = 2a - 2U^2/(R - 2U)$$

Michelson interferometer: $R \rightarrow \infty$

$$L \rightarrow \infty, \qquad d = 2a$$

Newton's rings: $a \rightarrow 0$

$$L \rightarrow 0, \qquad d = -2U/(R - 2U)$$

Newton's rings: Pair of images

U<<R & U>>d

$V = RU / (R\text{-}2U)$

S''

S'

θ

S

d

U

V

U

$d = V - U \cong 2\,U^2/\,R$

$r_n^2 = 2\,U^2 n\,\lambda/d = n\,\lambda\,R$