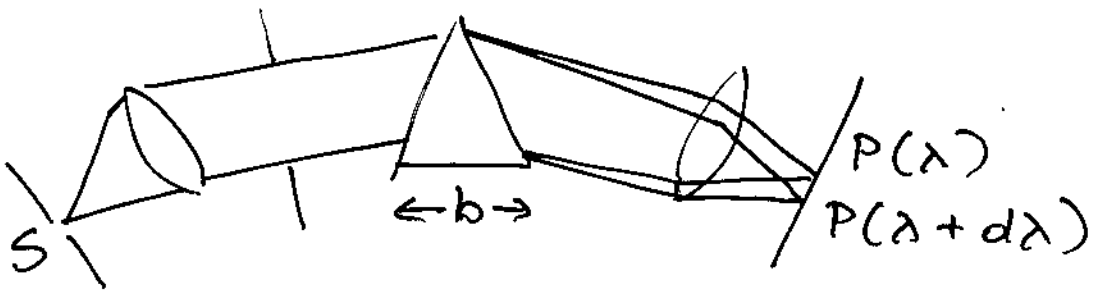
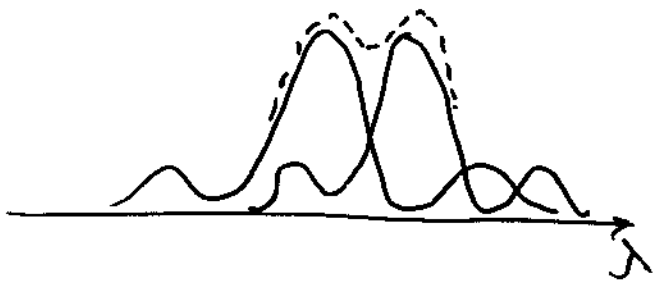
3. Podstawy metod pomiarowych

3.1 Pryzmat i siatka dyfrakcyjna



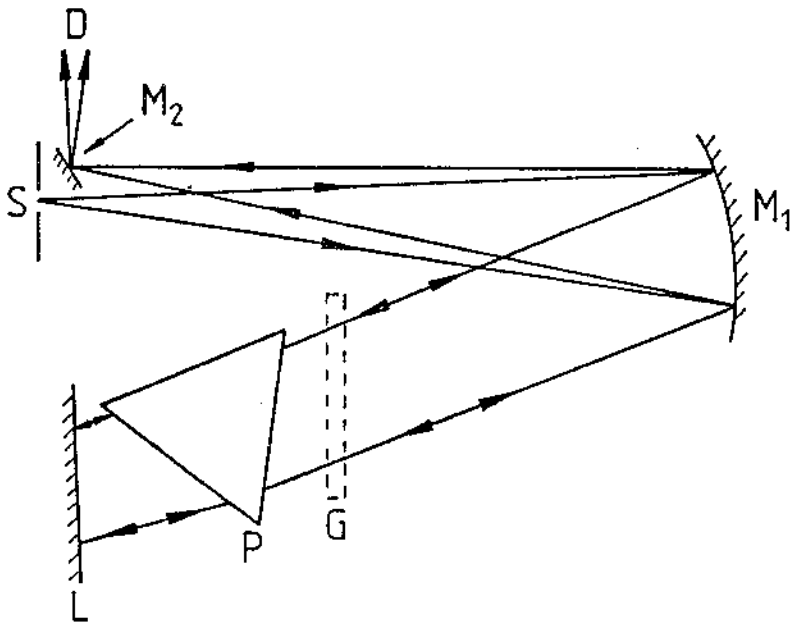
$$R = \frac{\lambda}{d\lambda} = \frac{\nu}{d\nu} = \frac{\bar{\nu}}{d\bar{\nu}}$$



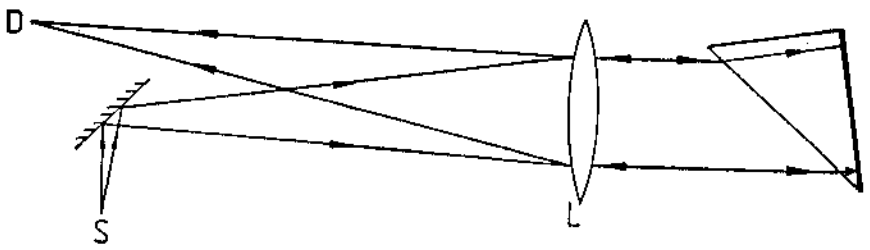
- układ Littrowa

	λ_{max} (μm)
kwarc	3.5
LiF	5.5
NaCl	15
CsI	50

$$R = b\frac{dn}{d\lambda}$$

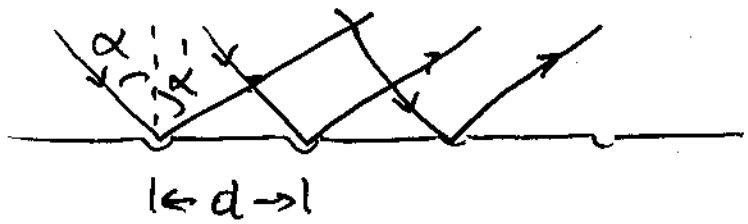


Littrow mount of prism or grating in an infrared spectrometer



Littrow mount of a prism in a visible or near ultraviolet spectrometer

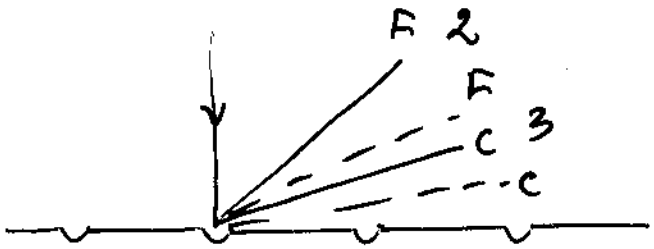
– siatka dyfrakcyjna odbiciowa



$$d[\sin\alpha' - \sin\alpha] = m\lambda \qquad m = 0, 1, 2 \ldots$$

$$\frac{d\Theta}{d\lambda} = \frac{m}{d\cos\alpha'}$$

$$R = mN$$



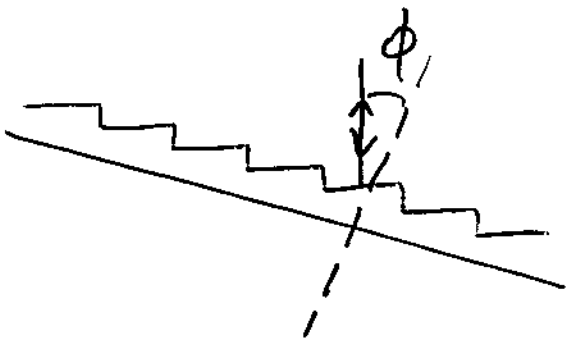
$$m(\lambda + \Delta\lambda) \leq (m+1)\lambda$$

$$\Delta\lambda \leq \frac{\lambda}{m}$$

$m = 1$ $\qquad \Delta\lambda \leq \lambda$

$\lambda \div 2\lambda$ sw. widzialne

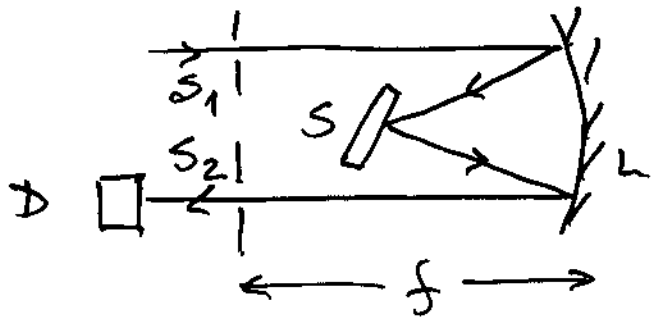
$m = 2$ $\qquad \Delta\lambda \leq \frac{\lambda}{2}$



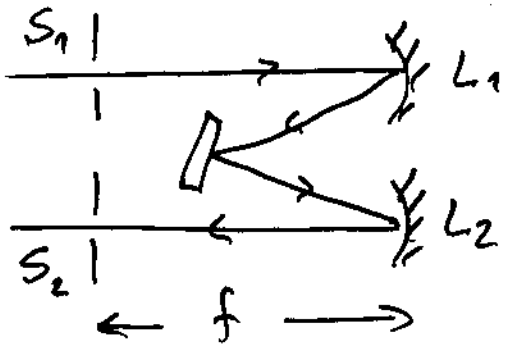
blazed grating

$$m\lambda = 2d \sin\alpha \qquad \alpha = \alpha'$$

– układ Eberta

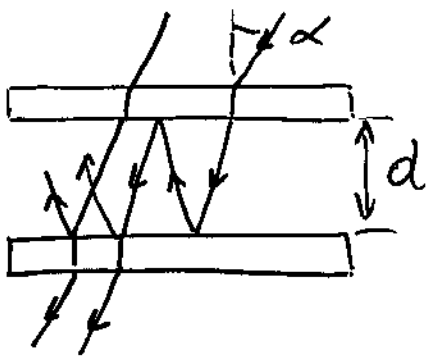


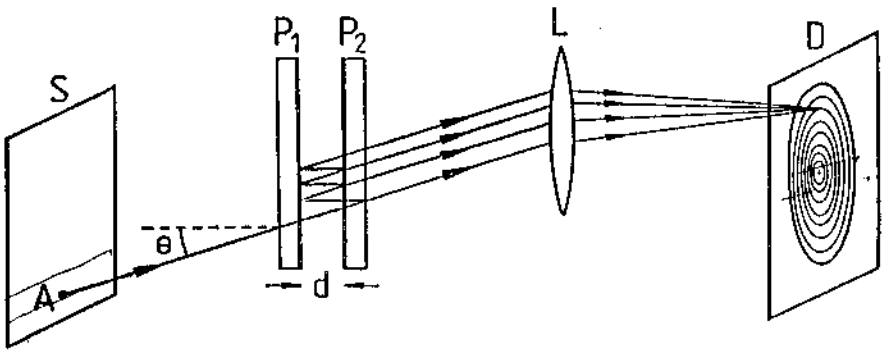
– układ Czerneqo - Turnera



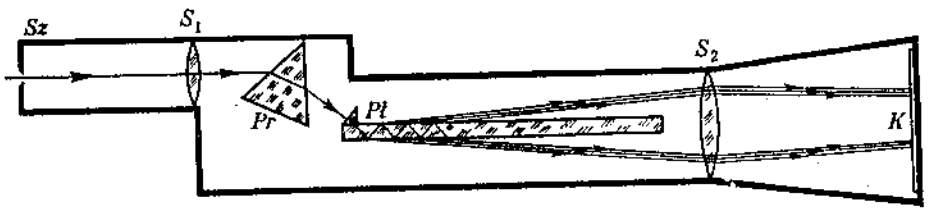
3.2. Interferometry

– Fabry'ego - Perota

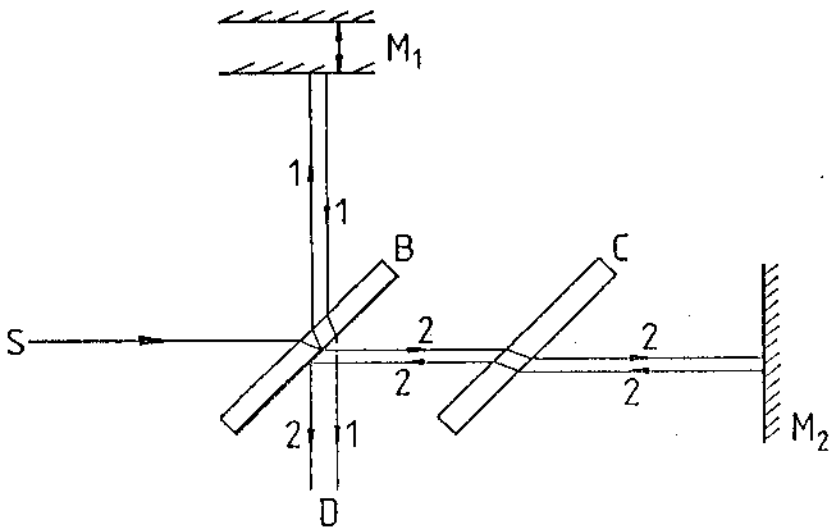




A Fabry-Perot interferometer



Schemat spektrografu Lummera i Gehrckego



A Michelson interferometer

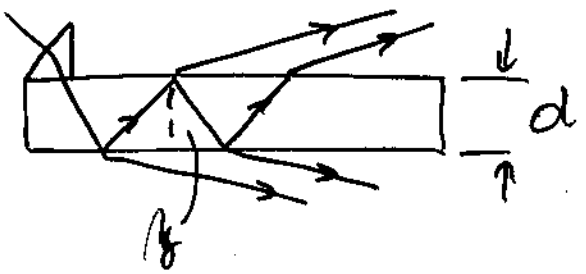
$$\Delta = 2dn\cos\alpha = m\lambda$$

$$\Delta = 20000\lambda$$

$$(m+1)\lambda' = m\lambda \qquad \lambda' = \lambda + \Delta\lambda$$

$$\Delta\lambda = \frac{\lambda^2}{\Delta}$$

– Lummera - Gehrckego



$$\Delta = 2dn\cos\beta$$

$$R = \frac{\lambda}{d\lambda} = Nm$$

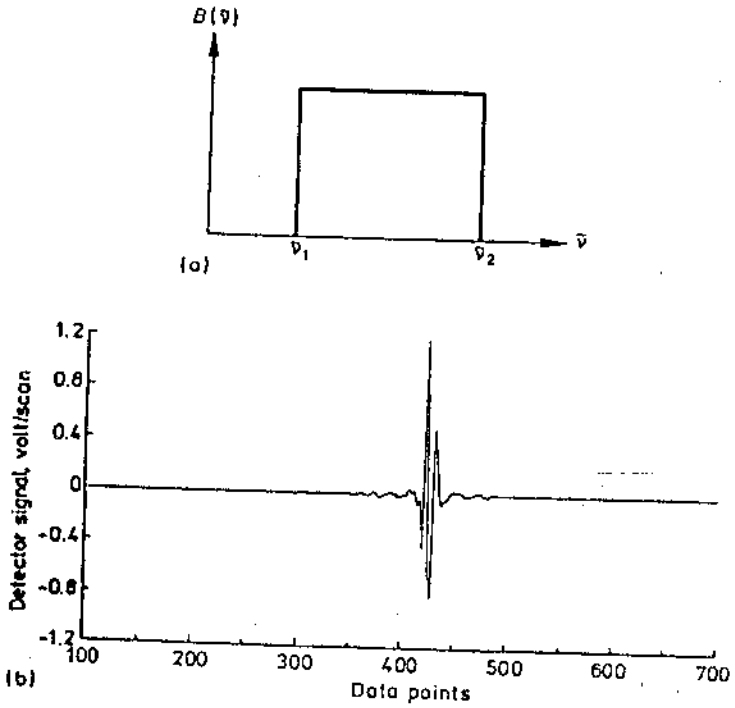
– Michelsona

$$J = J_0 \cos 2\pi\bar{\nu}\Delta$$

$$J(\Delta) = \int_0^\infty B(\bar{\nu})\cos 2\pi\bar{\nu}\Delta\, d\bar{\nu}$$

$$B(\bar{\nu}) = 2\int_0^\infty J(\Delta)\cos 2\pi\bar{\nu}\Delta\, d\Delta$$

$$\Delta\bar{\nu} = \frac{1}{\Delta_{max}}$$



(a) Wavenumber domain spectrum of a broad band source and (b) the corresponding interferogram