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Refraction for identifying matter (property of matter):

$$\begin{aligned}
 \eta &\stackrel{opt.}{=} \frac{\sin(\alpha)}{\sin(\beta)} = \frac{\eta_\beta}{\eta_\alpha} \stackrel{prism}{=} \frac{\sin[\frac{1}{2}(\varpi + \varsigma_{min})]}{\sin[\frac{1}{2}\varpi]} \\
 &\stackrel{phys.}{=} \sqrt{\epsilon_r \mu_r} = \frac{\lambda_\alpha}{\lambda_\beta} = \frac{v_{ph,\alpha}}{v_{ph,\beta}} = \frac{1}{2} \frac{\lambda}{d_r} \frac{n}{\cos(\beta)} = \sqrt{\left(\frac{n}{2} \frac{\lambda}{d_r}\right)^2 + \sin(\alpha)^2} \\
 &\stackrel{dispersion}{=} \eta(\lambda) = \eta(\omega) \stackrel{anisotropy}{=} \eta(r)
 \end{aligned} \tag{1}$$

$$\text{Vacuum} \iff \eta = 1 f = \text{FocalLength} \quad D = \text{RefractivePower(Dioptri)}$$

$n \equiv$ order (“Quantum”):

$$n = \frac{\nu}{c} \Delta s = \frac{\Delta\varphi}{2\pi} = 2\eta \frac{d_r}{\lambda} \sqrt{\eta^2 - \sin(\alpha)^2} = 2\eta \frac{d_r}{\lambda} \cos(\beta) = \frac{q}{e_0} \in \mathbb{N} \tag{2}$$

$$v^2 = \left(\frac{\nu\lambda}{\eta}\right)^2 = \left(\frac{\omega}{k\eta}\right)^2$$

$$\left(\frac{\eta}{c}\right)^2 = \epsilon\mu \quad \epsilon = \epsilon_0\epsilon_r \quad \mu = \mu_0\mu_r$$

where:

$d_r = r_{x+1} - r_x$:= distance in space α := irradiation angle, incoming radiation direction, from source/sender (Einstrahlungswinkel zur Normalen auf Grenzfläche des Mediums)

β := refraction angle for bent transmitted radiation A_t orientation in matter (Durchstrahlungswinkel zur Normalen aus Grenzfläche ins Medium)

Orientation of Radiation:

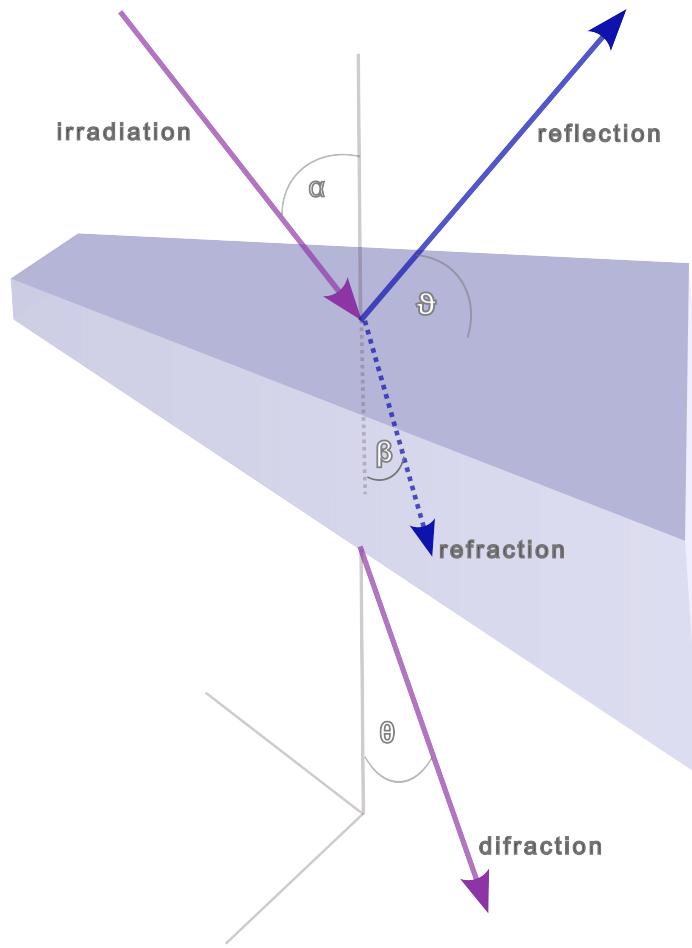


Figure 1: Radiation

ϑ = reflection angle for redirected radiation $A_{r\parallel}$ parallel to α from matter ¹

θ = diffraction angle for redirected radiation $A_{r\perp}$ orthogonal to α from matter ²

$\varpi = \beta_1 + \beta_2$ = angle of converging body surfaces (point tip of prismatic medium), spread angle of prism

ς = deviation angle of redirected ray beam after refraction (transmission) and diffraction

¹Abstrahlwinkel zur Grenzfläche des Mediums

²Beugungswinkel durch Objekt ins Vakuum

u_g = aperture angle (acceptance) from sender source (at distance g)

w_b = inclination angle at observer receiver (at distance b)

ε = visual angle from observer/receiver (of eye)