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Refraction for identifying matter (property of matter):

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

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

$n \equiv$ order (“quantum cycle”):

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

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

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

where:

$\{\alpha, \beta\} :=$ [radiation orientation](#) angles

$d_r = r_{x+1} - r_x :=$ distance in space

$\alpha :=$ irradiation angle, incoming radiation direction, from source/sender (Einstrahlungswinkel zur Normalen auf Grenzfläche des Mediums)

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

$\epsilon_0 :=$ Dielectric Constant (conductiv electric charge)

$\mu_0 :=$ Magnetic Constant (permeability in vacuum)