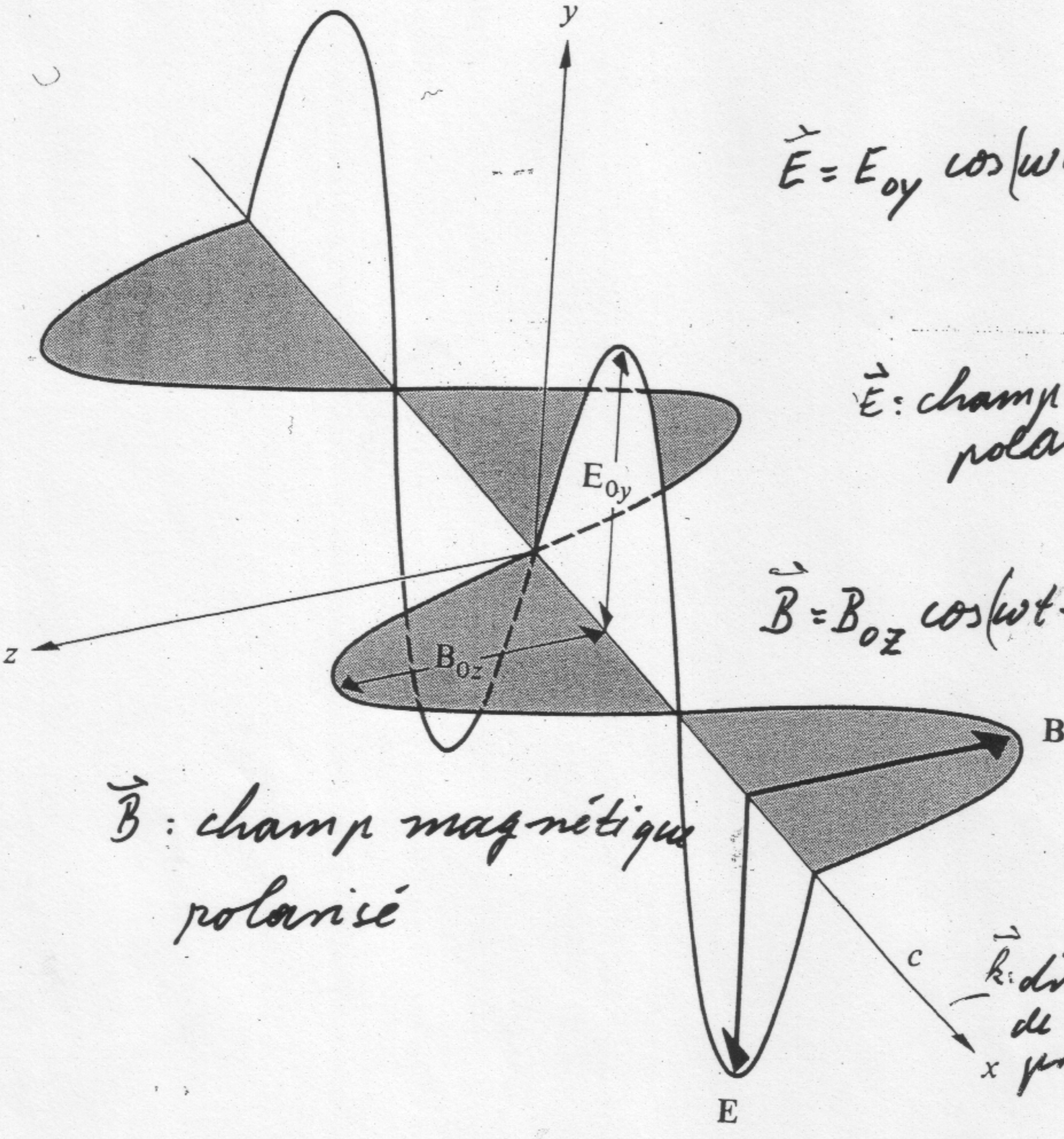
Onde électromagnétique



$\vec{E} = E_{0y} \cos(\omega t - kx)\, \hat{u}_y$

$\vec{E}$: champ el. polarisé

$\vec{B} = B_{0z} \cos(\omega t - kx)\, \hat{u}_z$

$\vec{B}$: champ magnétique polarisé

$\vec{k}$: direction de propagation

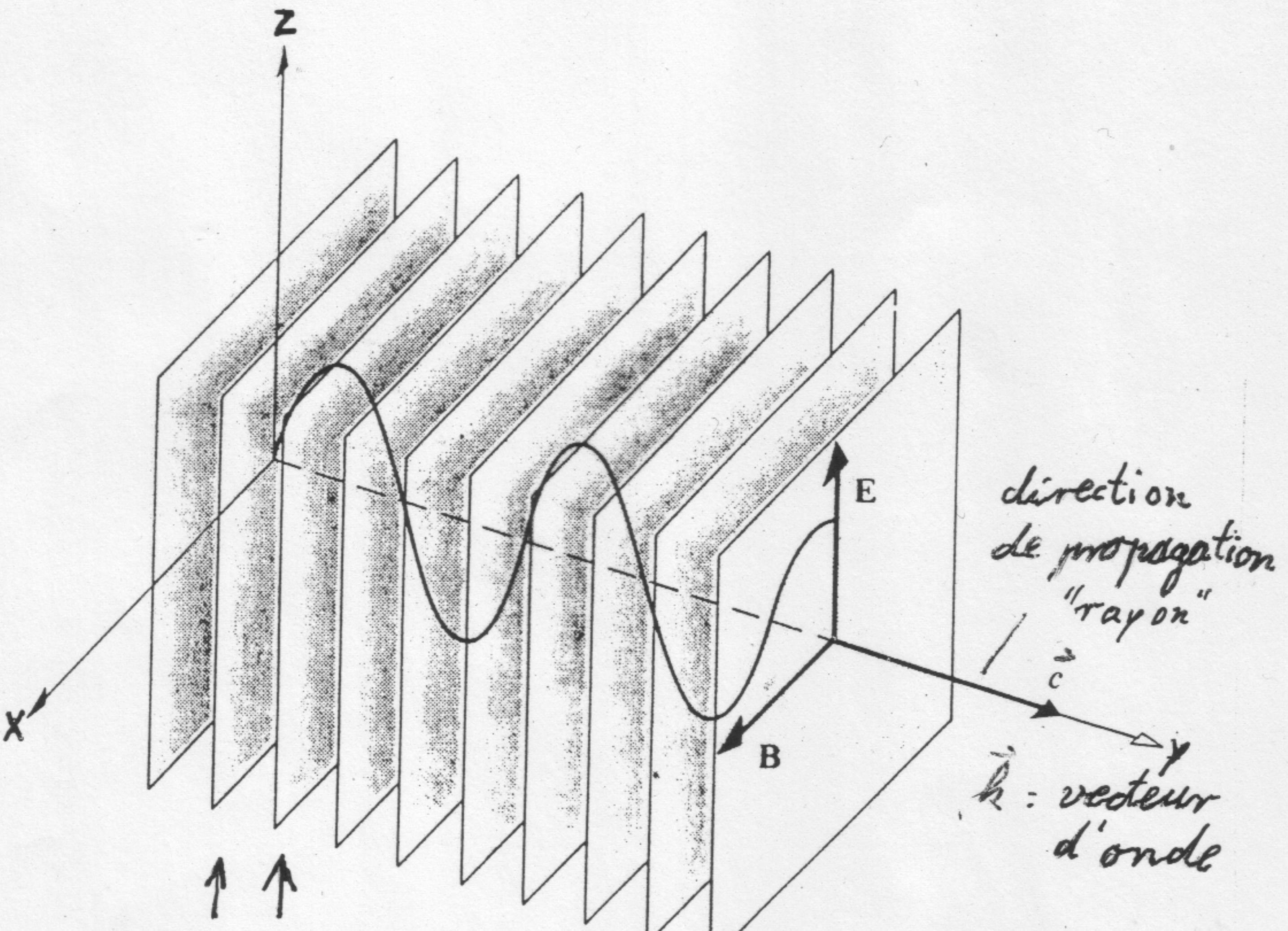
$\vec{k}$: vecteur d'onde ;

$\vec{E} \perp \vec{k} \parallel \hat{x}$, $\vec{B} \perp \vec{k}$, $\vec{E} \perp \vec{B}$

Fréquence $\nu = 1/T$; $\omega = 2\pi\nu$

longueur d'onde $\lambda = c/\nu$; $|\vec{k}| = 2\pi/\lambda$

Ondes planes & rayons de lumière



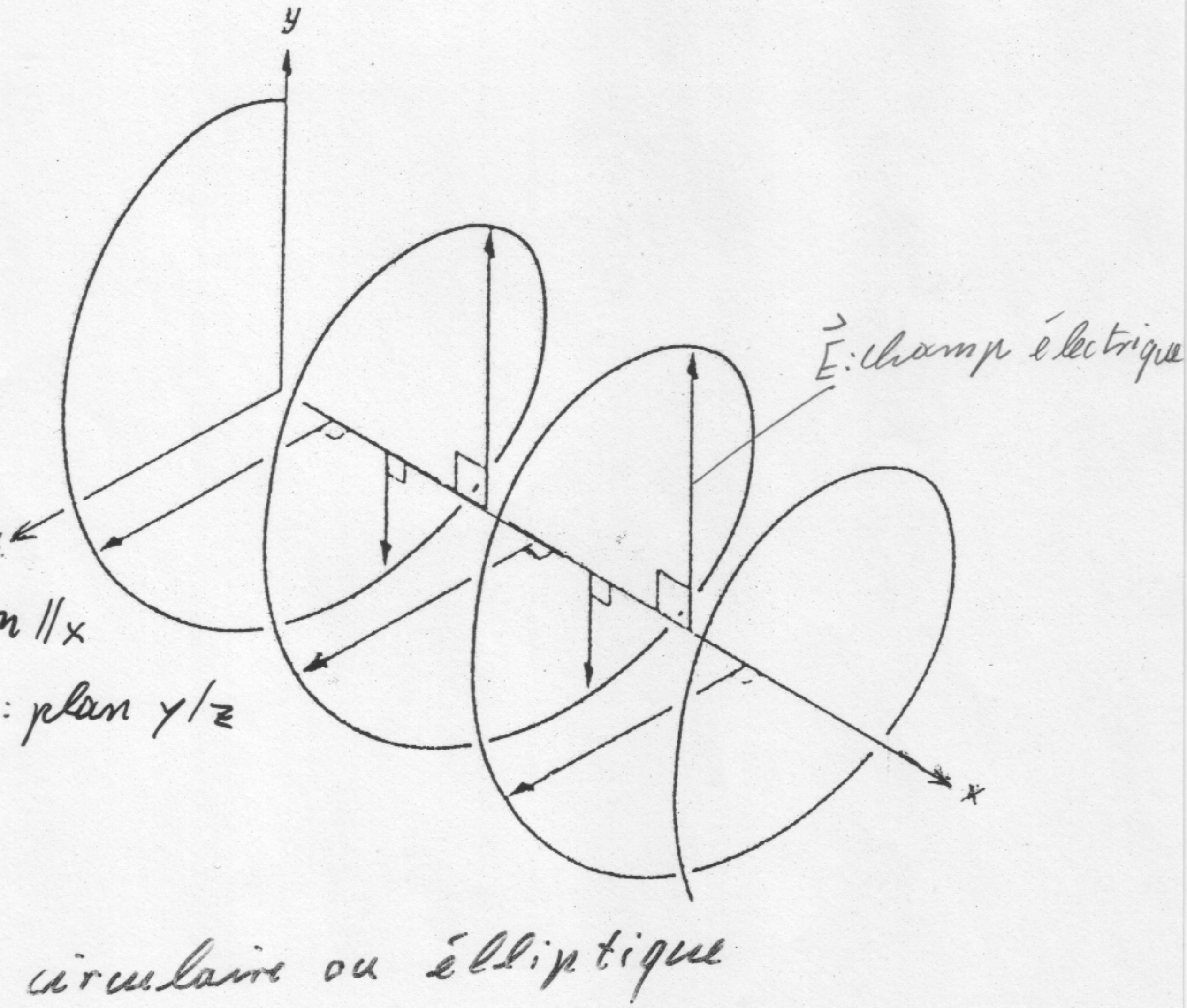
fronts d'onde (FO)
(surfaces de phase constants)

Polarization
linéaire :
ici $\vec{E} \parallel \vec{z}$

FO ⊥ "rayons"

si FO sont des plans ⇒ ondes planes
" " " " sphères ⇒ ondes sphériques

Polarisation

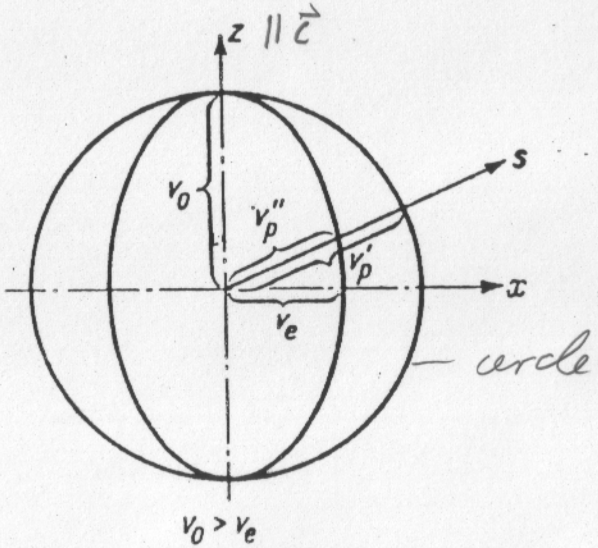


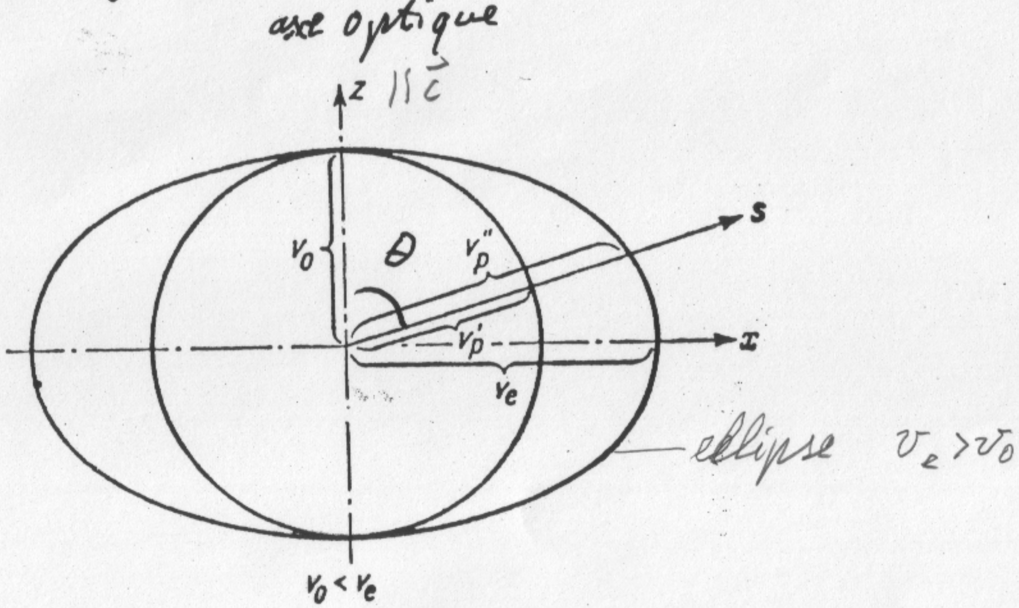
propagation $\parallel x$

vibration : plan y/z

circulaire ou élliptique

Birefringence





v_0 : vitesse ordinaire $(\vec{E} \perp \vec{c})$

v_e : vitesse extraordinaire $\vec{E} \parallel c$

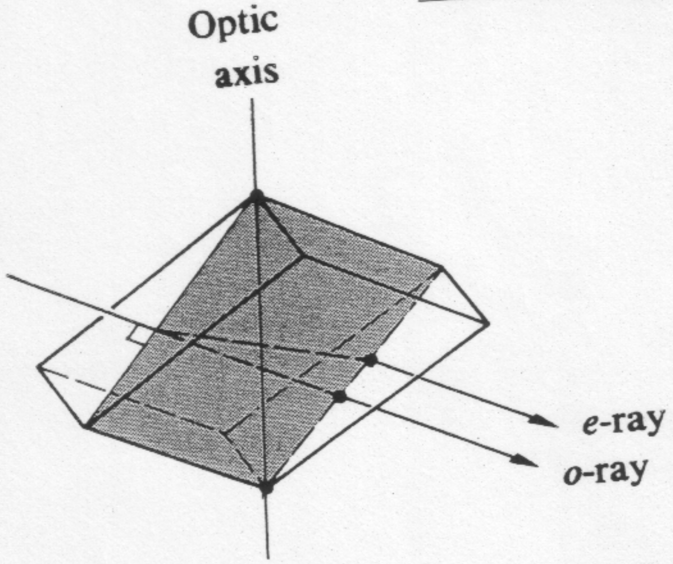
(Dispersion $n(\theta)$)

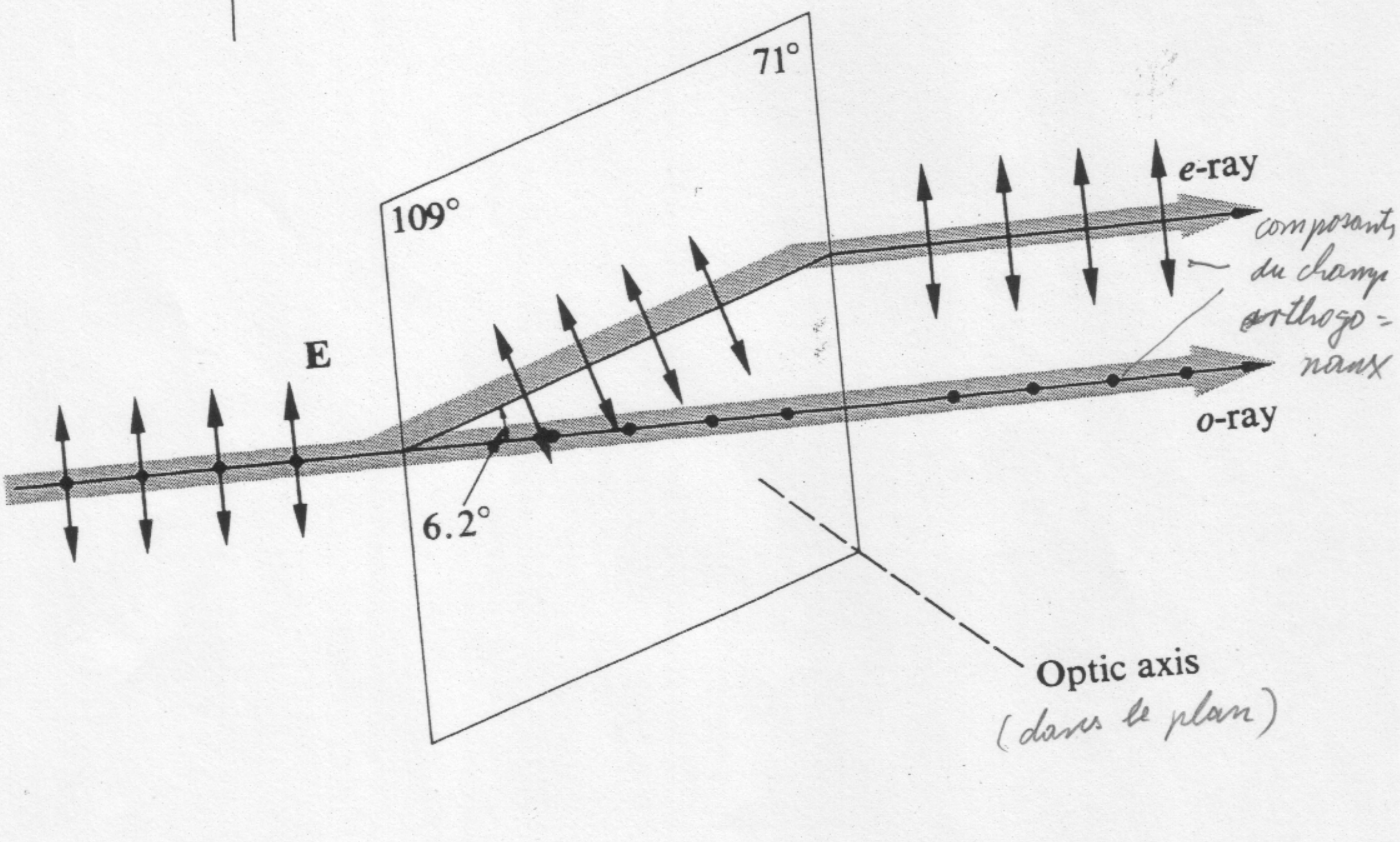
cristal uniaxil positif.

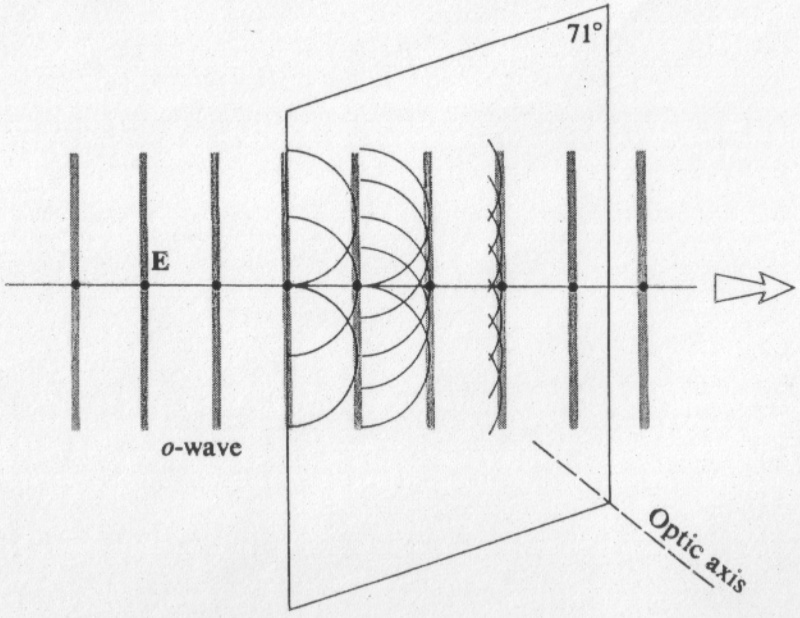
cristal uniaxial négative

Similaire : Dicroïsme (Absorption $\alpha(\theta)$)

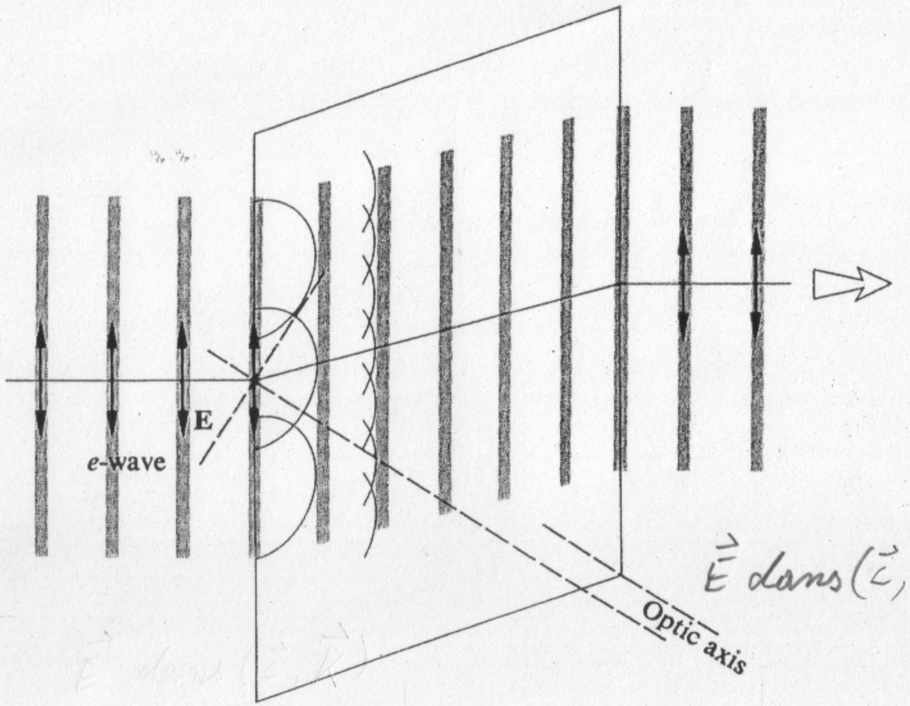
Birefringence







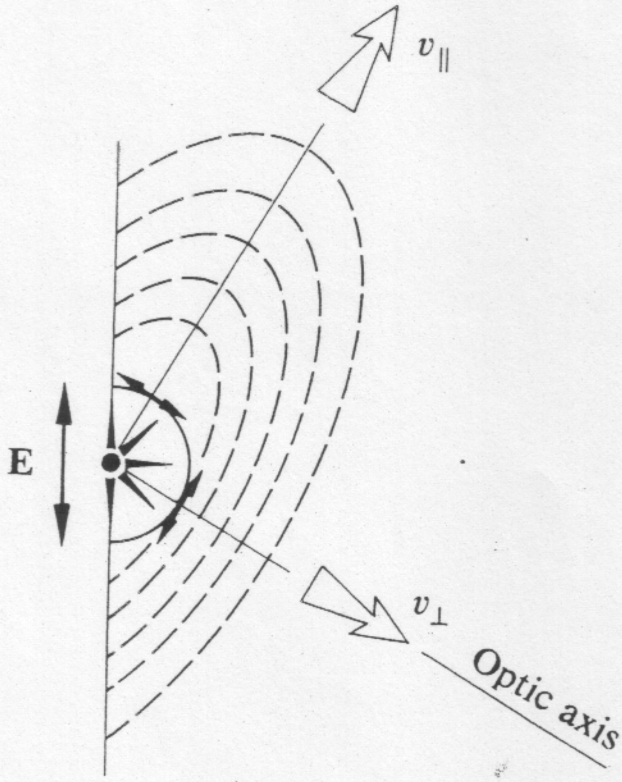
$\vec{E} \perp (\vec{c}, \vec{K})$



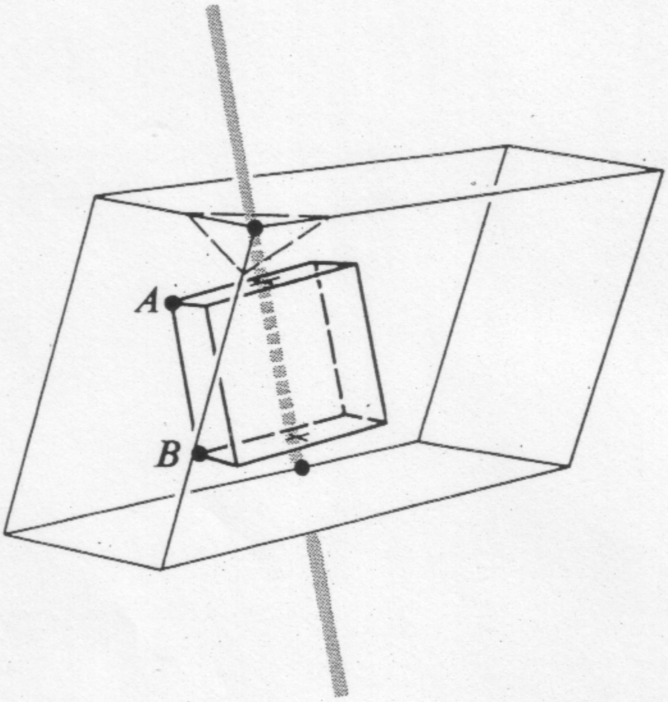
$\vec{E}$ dans $(\vec{c}, \vec{K})$

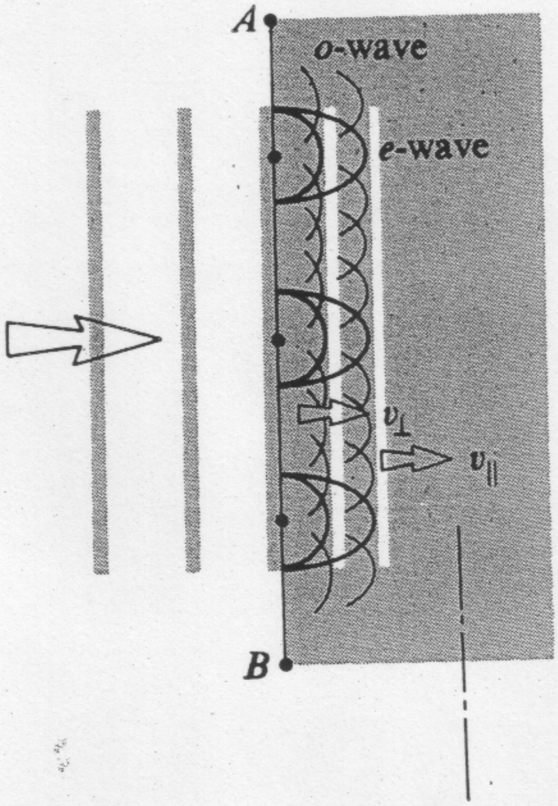
Section principale : plan $(\vec{c}, \vec{K})$ formé de l'axe optique et la direction de propagation $\vec{K}$

Ondelets dans le calcite



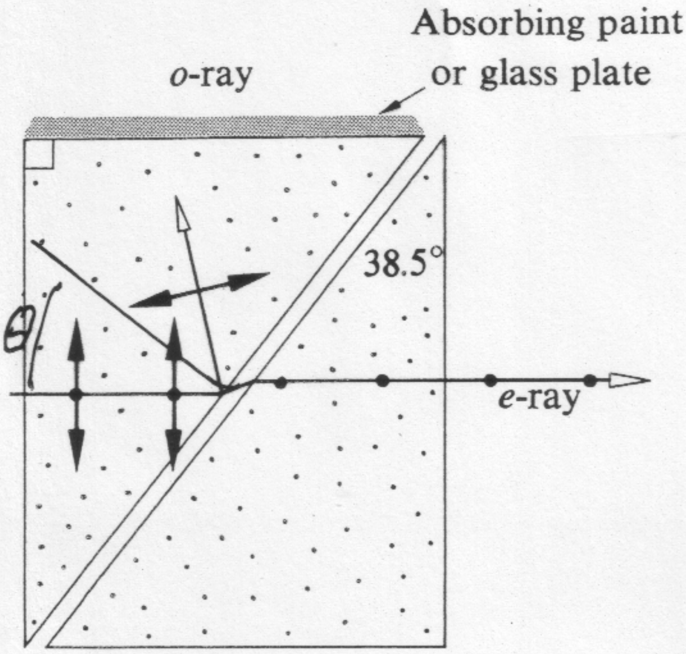
<u>calcite</u>

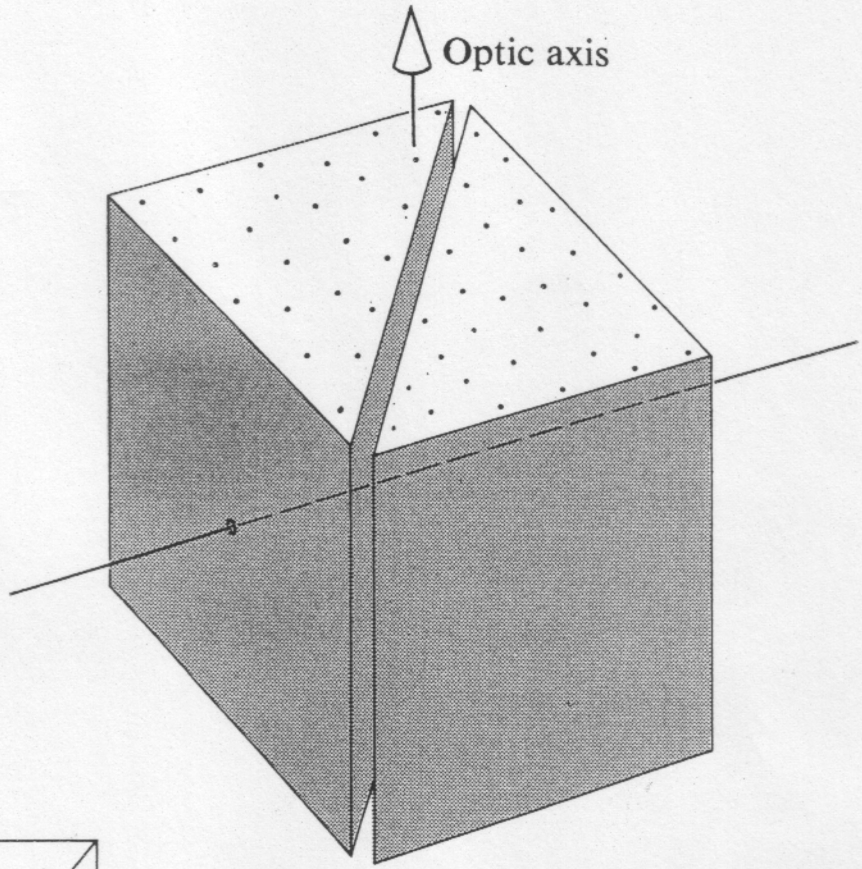


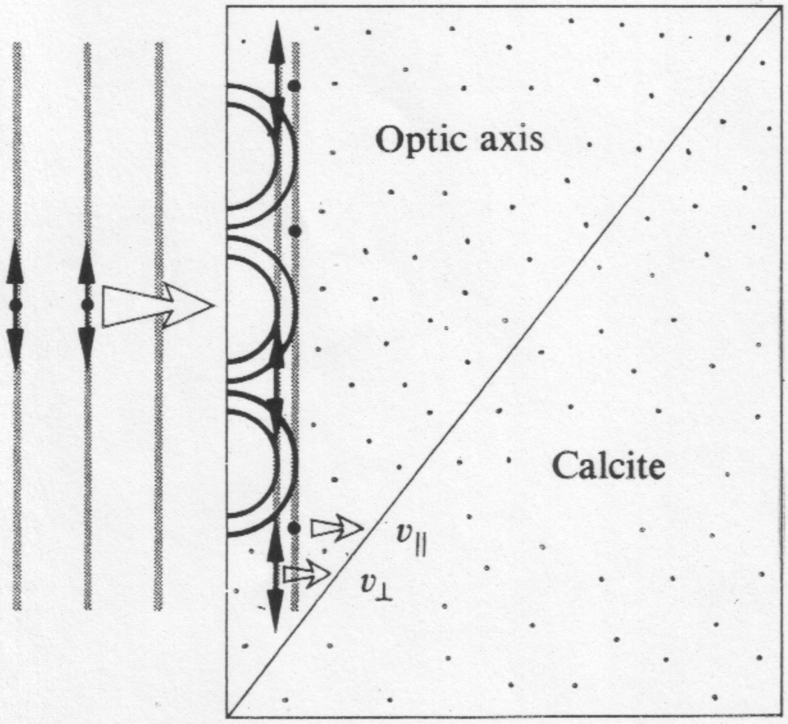


9

Glan – Foucault prism

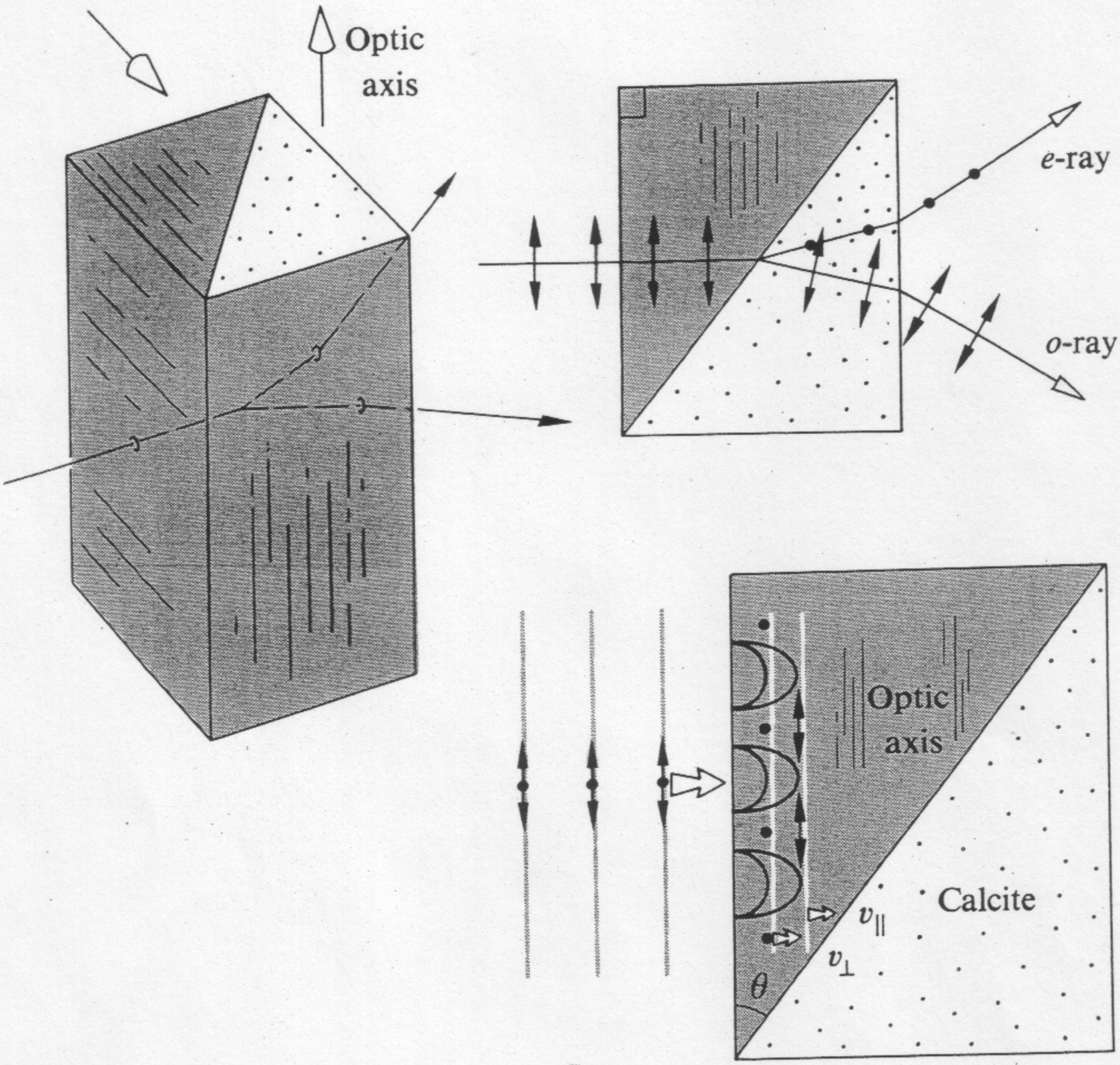






si $n_e < \frac{1}{\sin\theta} < n_o$ $\longrightarrow$ o : réflexion total
e : transmis

Prisme de Wollaston

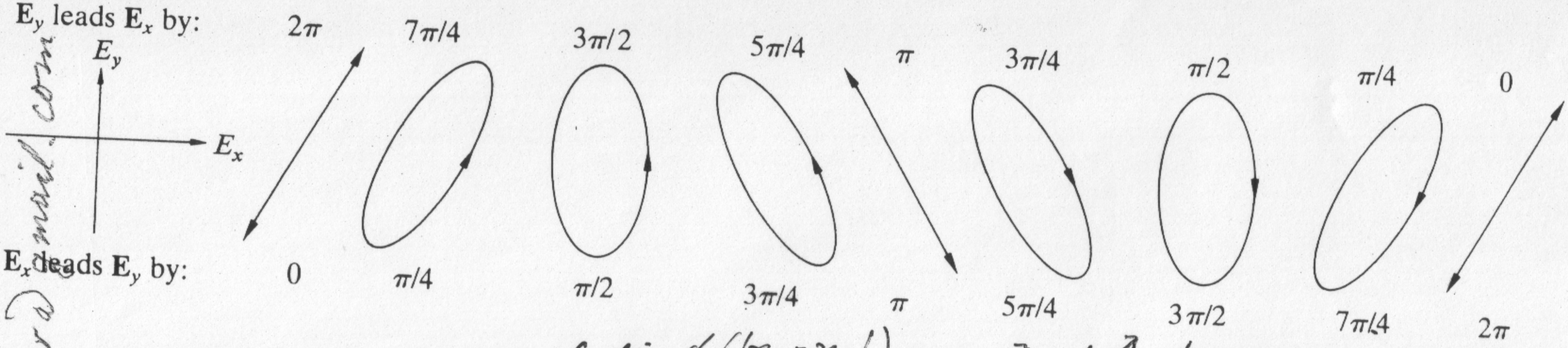


Après la séparatrice $e \Rightarrow o$

$o \Rightarrow e$

$\Rightarrow$ il y a 2 faisceaux à la sortie

Lame 1/4 onde, 1/2 onde



lame 1/4 onde : $\left\{ \begin{array}{l} \text{si } d(|n_0 - n_e|) = m\lambda_0 + \lambda_0/4 \\ \text{linéaire} \Rightarrow \text{circulaire} \; ; \; \text{circulaire} \Rightarrow \text{lin} \end{array} \right.$

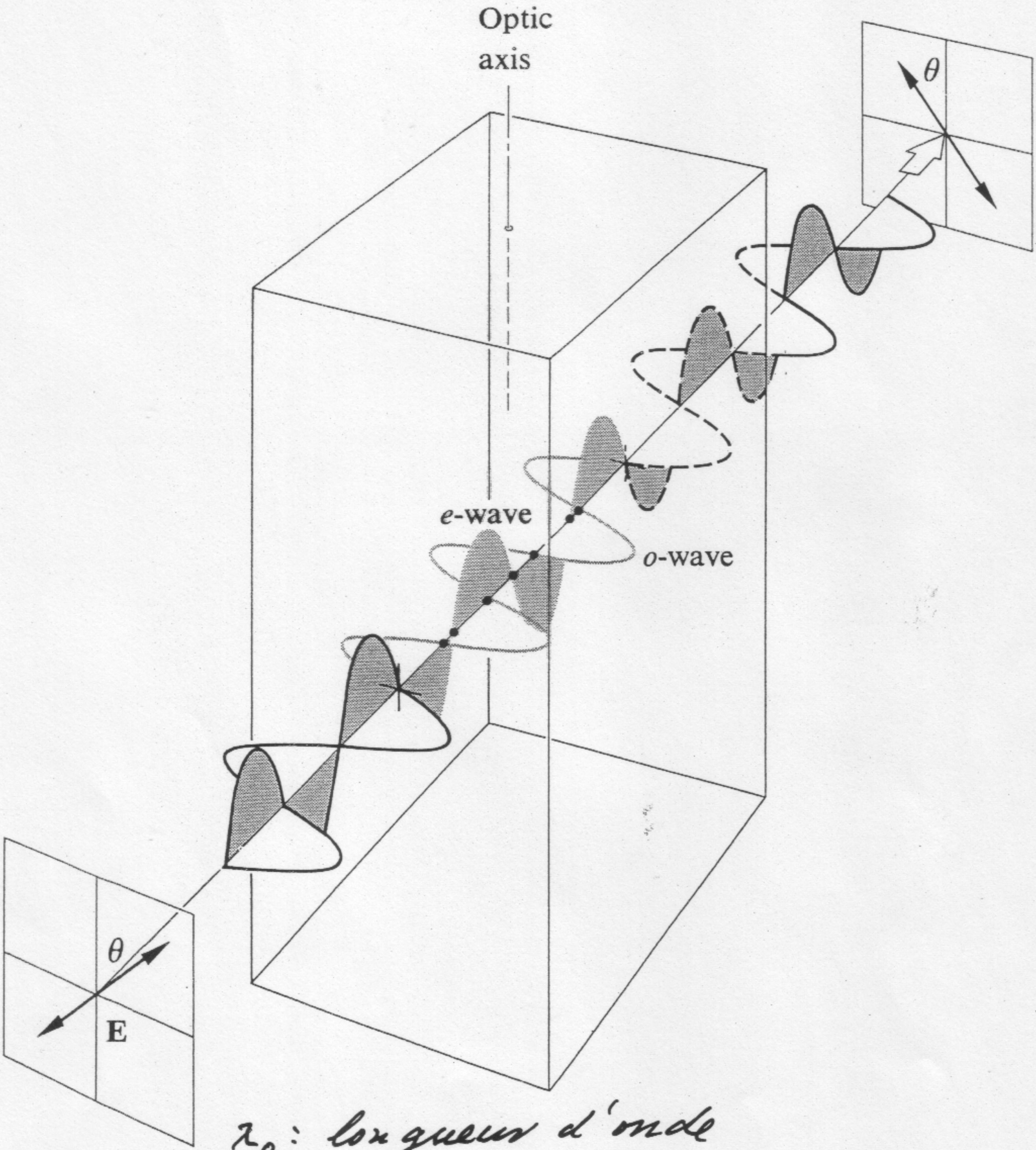
" 1/2 " : linéaire => linéaire

λ_0 : longeur d'onde $\quad A(x) = A \sin(2\pi x/\lambda_0)$

(dephasage : 2π

mardocheedor@mail.com

Lame 1/2 onde



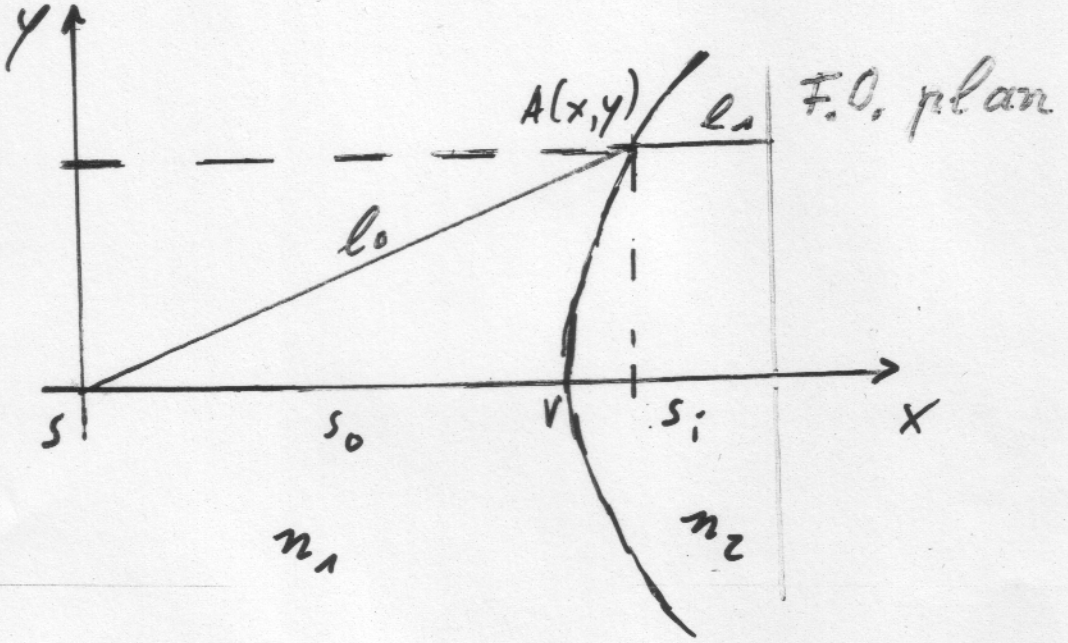
λ_0 : longueur d'onde

$\Longrightarrow$ linéaire $\Longrightarrow$ linéaire

si $d(|n_0 - n_e|) = (2m+1)\,\lambda_0/2$

Front d'onde plan :

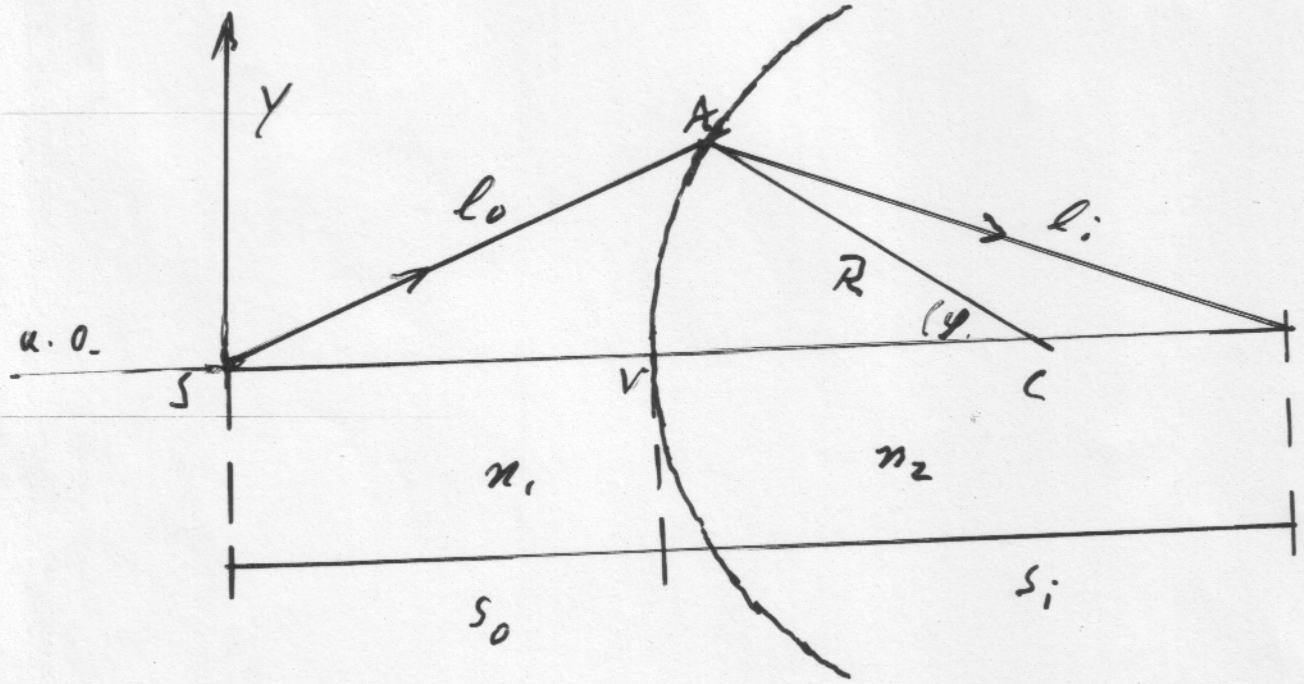
Surface hyperbolique : (A(x,y))



$n_2 > n_1$

Dioptre sphérique convergente

$n_2 > n_1$

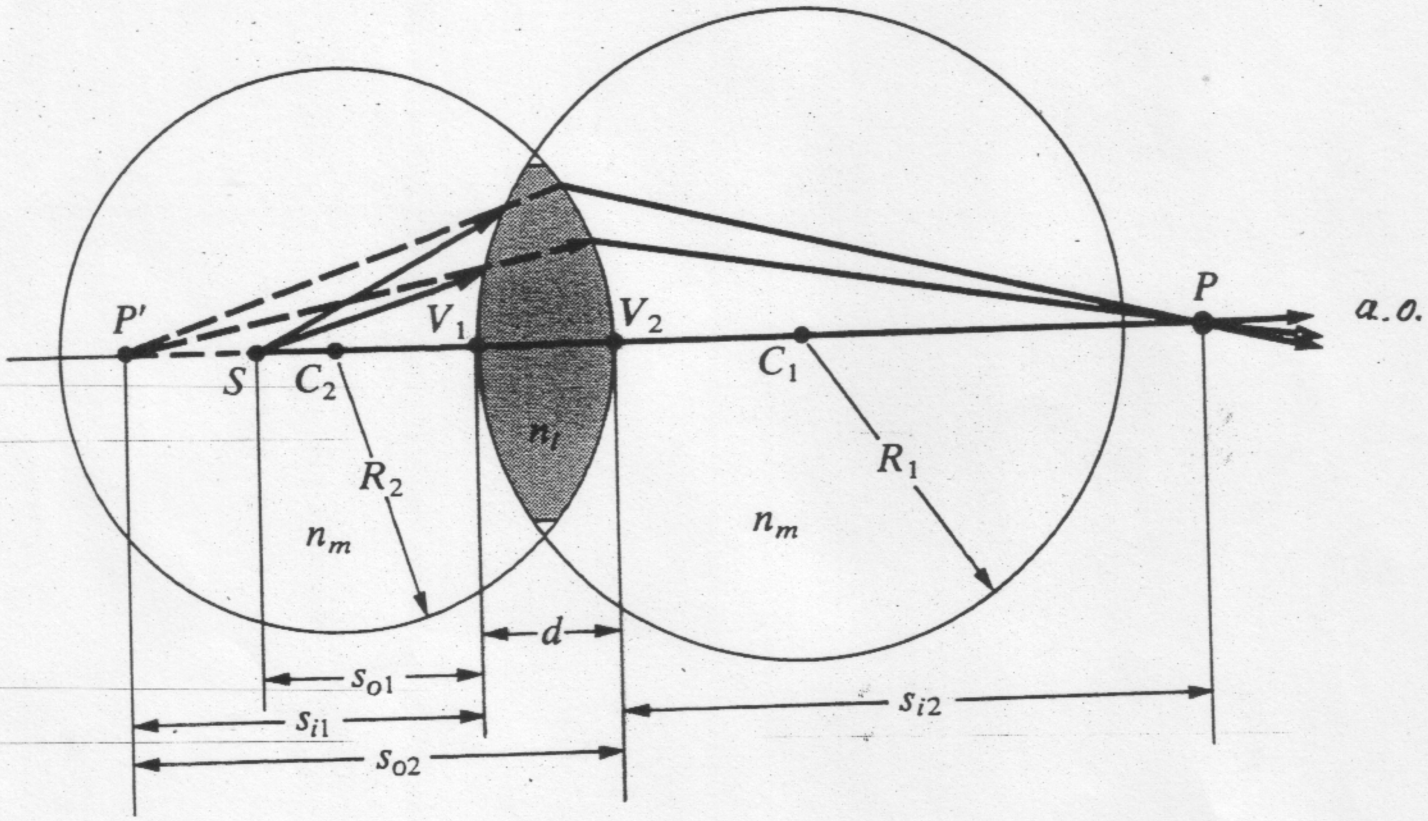


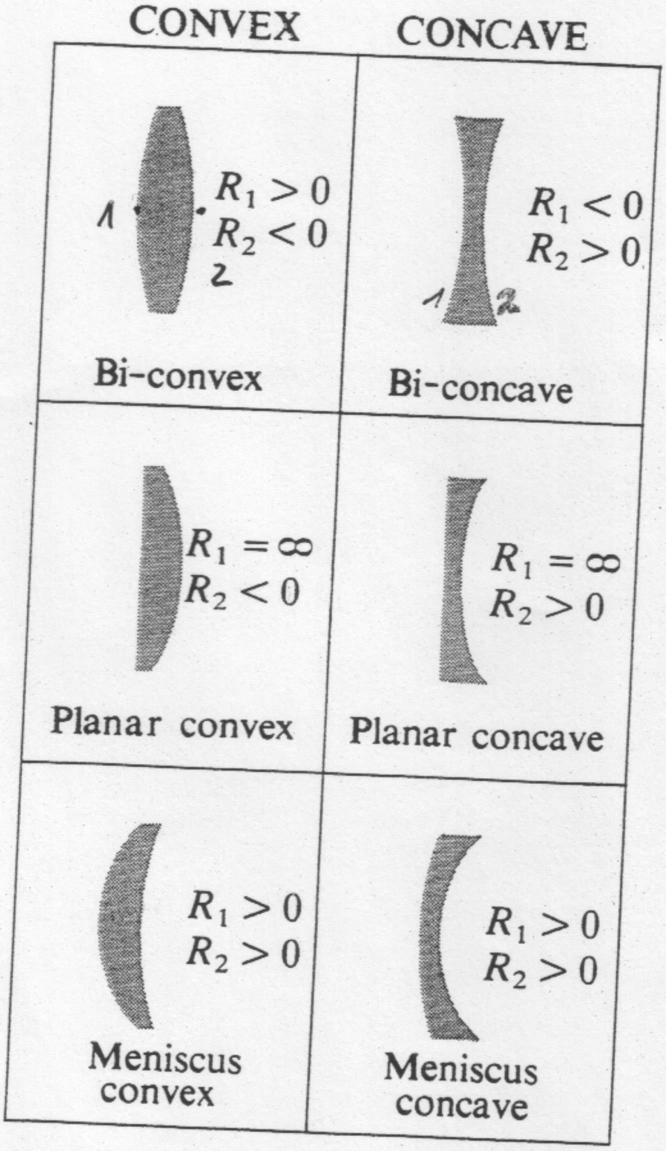
V : vortex   S : source   P : point focal

$s_0 = \overline{SV}$, $s_i = \overline{VP}$

(15)

<u>Lentille</u>




CONVEX
CONCAVE
$R_1 > 0$
$R_2 < 0$
Bi-convex
$R_1 < 0$
$R_2 > 0$
Bi-concave
$R_1 = \infty$
$R_2 < 0$
Planar convex
$R_1 = \infty$
$R_2 > 0$
Planar concave
$R_1 > 0$
$R_2 > 0$
Meniscus convex
$R_1 > 0$
$R_2 > 0$
Meniscus concave