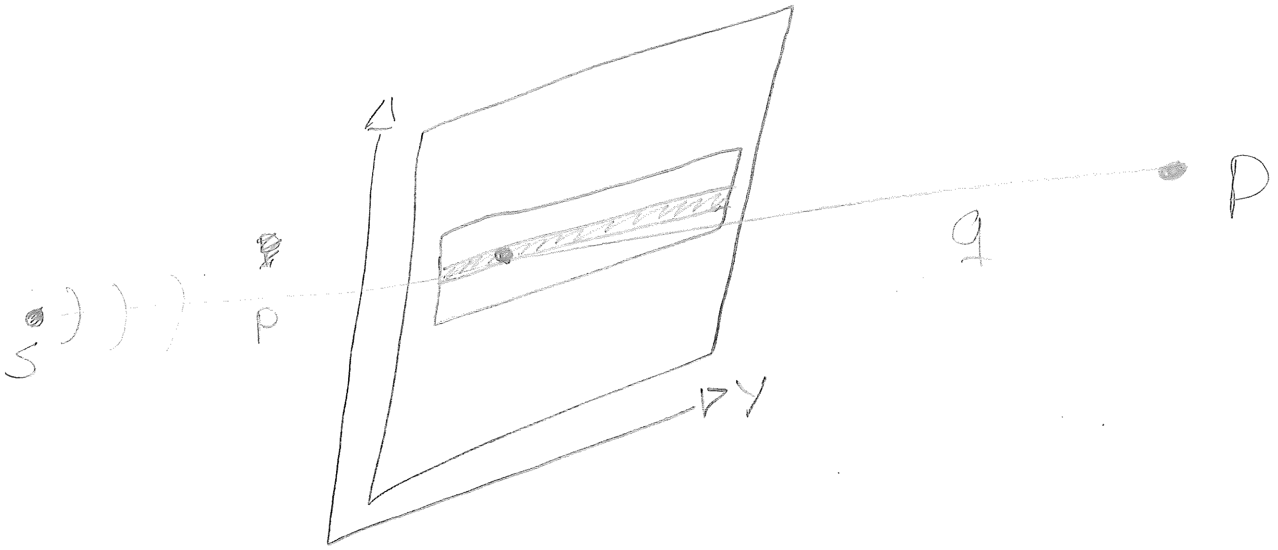
FÖRELÄSNING 13



$$E_p = Ce^{-i\omega t} \iint_{spalt} e^{ik\left(D + \frac{h^2}{2L}\right)} dA$$

$$\frac{1}{L} = \frac{1}{p} + \frac{1}{q} \quad , \quad D = p + q$$

. . . $$\boxed{E_p = A_p e^{i(kD - \omega t)} \left(\left[C(v_2) - C(v_1) \right] + i \left[S(v_2) - S(v_1) \right] \right)}$$

$$C(v) = \int_0^v \cos\left(\frac{\pi v^2}{2}\right) dv \quad , \quad v = z\sqrt{\frac{2}{\lambda L}}$$

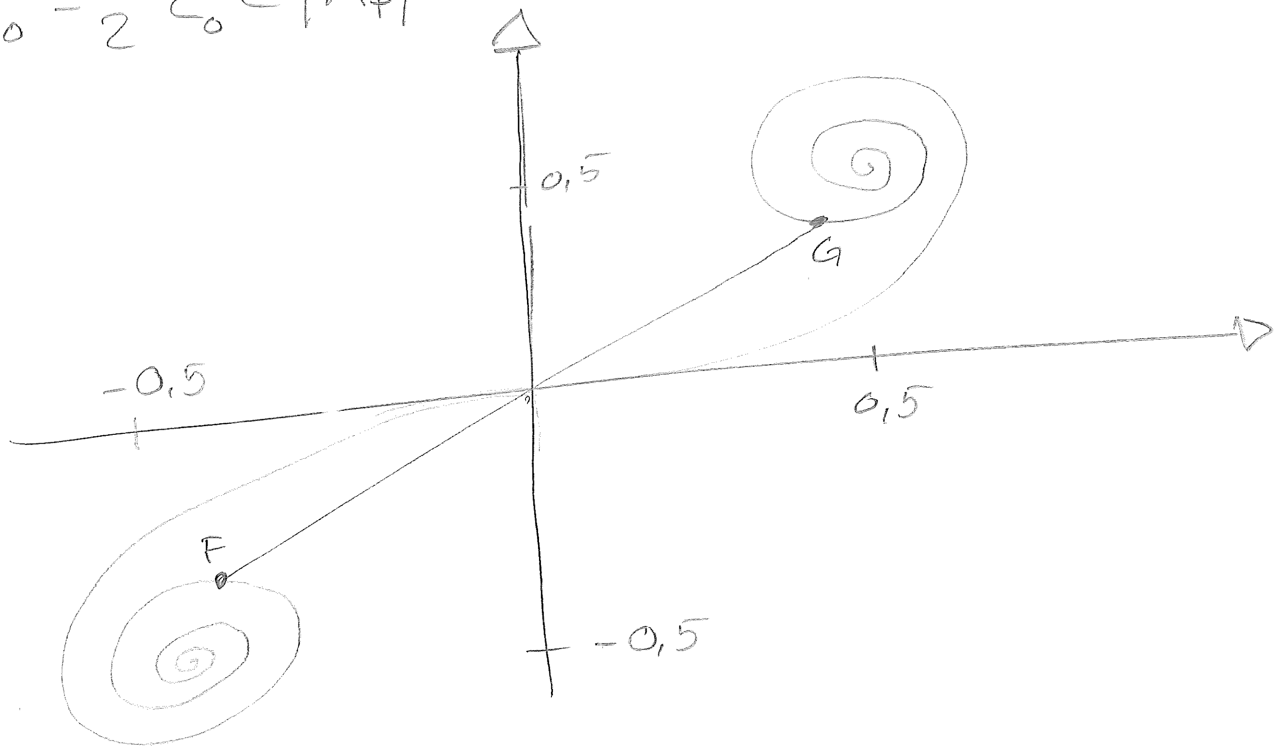
$$S(v) = \int_0^v \sin\left(\frac{\pi v^2}{2}\right) dv$$

Hur använder vi Cornu-spiralen?

$$I_p = \frac{1}{2}\varepsilon_0 c |E_p|^2$$

$$\Rightarrow I_p = I_0 \left(\overrightarrow{FG}\right)^2$$

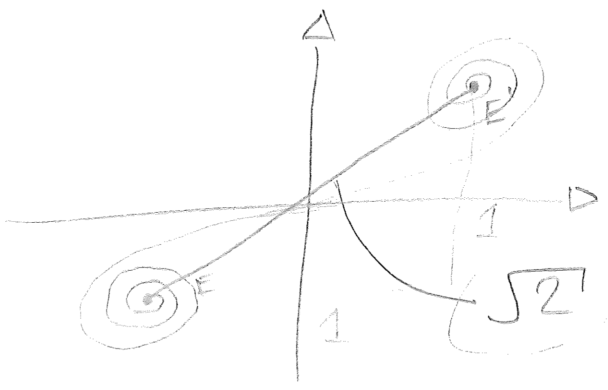
$$I_0 = \frac{1}{2}\varepsilon_0 c |A_p|^2$$



Alt 1: Inget hinder

$z: -\infty \to \infty \Rightarrow v: -\infty \to \infty$

$C(\infty) = 0,5 \ , \ S(\infty) = 0,5$

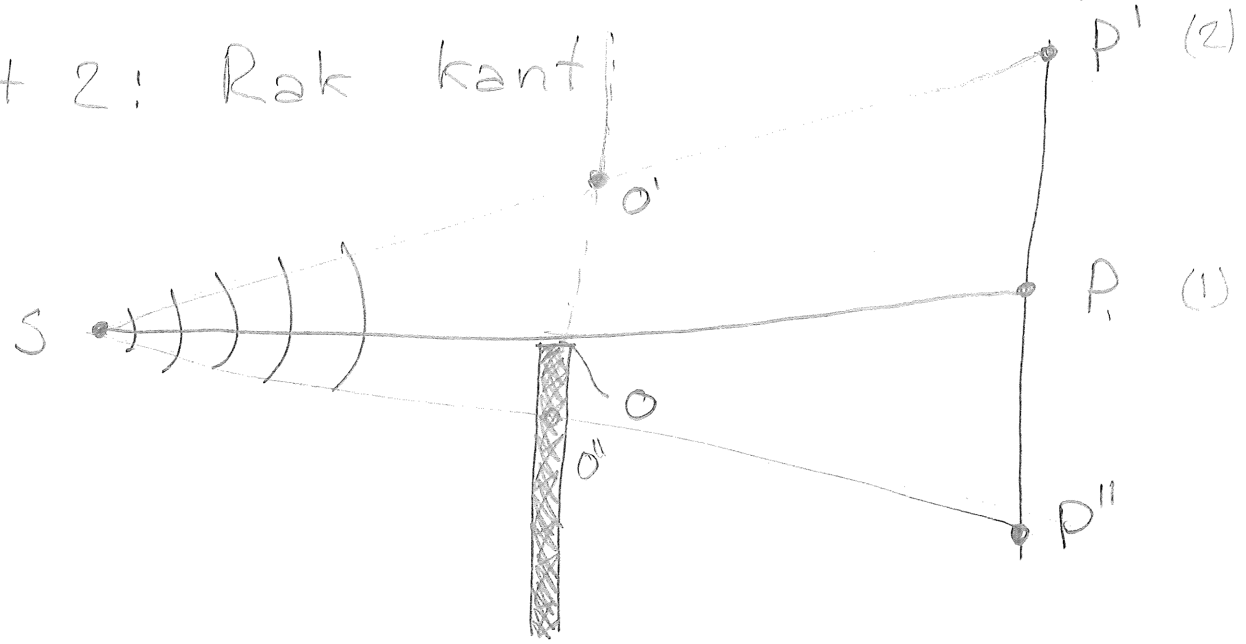


$$\cancel{I_u = I_0 \left(\overline{EE'}\right) = \boxed{2I_0}}$$

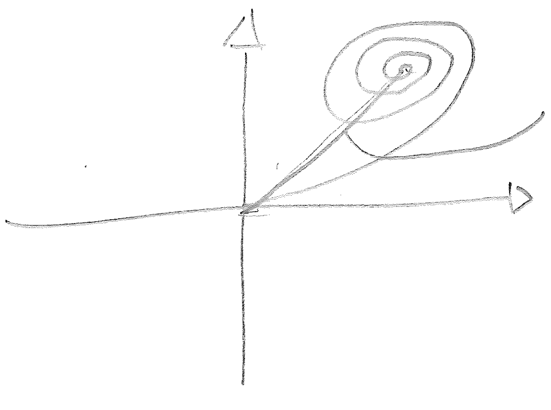
$$\underline{I} = \sqrt{2}^2 I_0 = 2I_0 = \underline{I_u}$$

(Några fall kan man lösa för hand)

Alt 2: Rak kant



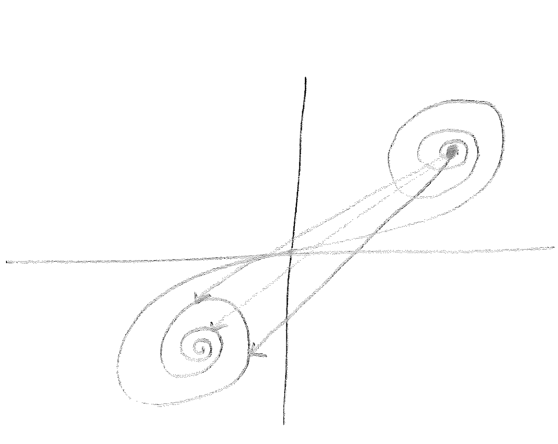
① SOP $z: 0 \to \infty$



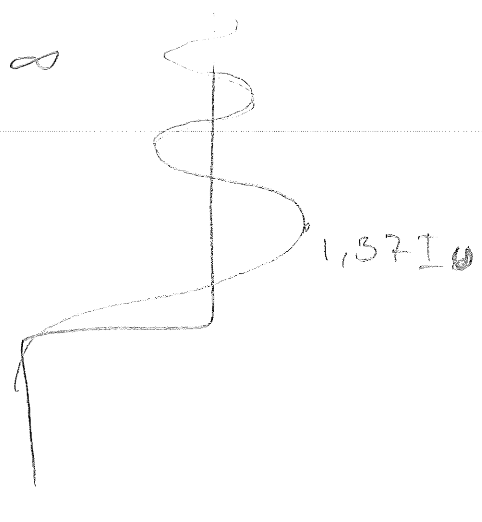
$\frac{1}{\sqrt{2}} \Rightarrow I_p = I_0 (\overline{OE})^2 = \frac{1}{2} I_0 = \boxed{\frac{1}{4} I_0}$

② P' över kanten => fler vågor

O' centrum. z: neg $\to \infty$

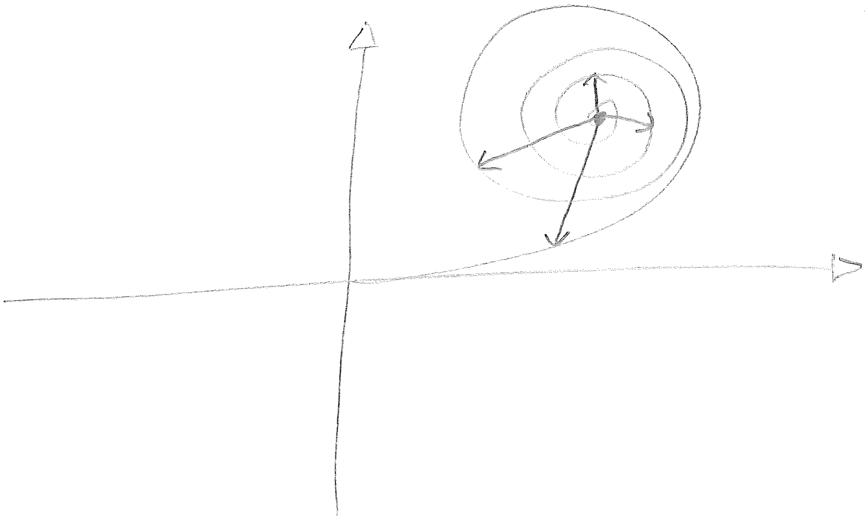


=>



③ 0'' centrum

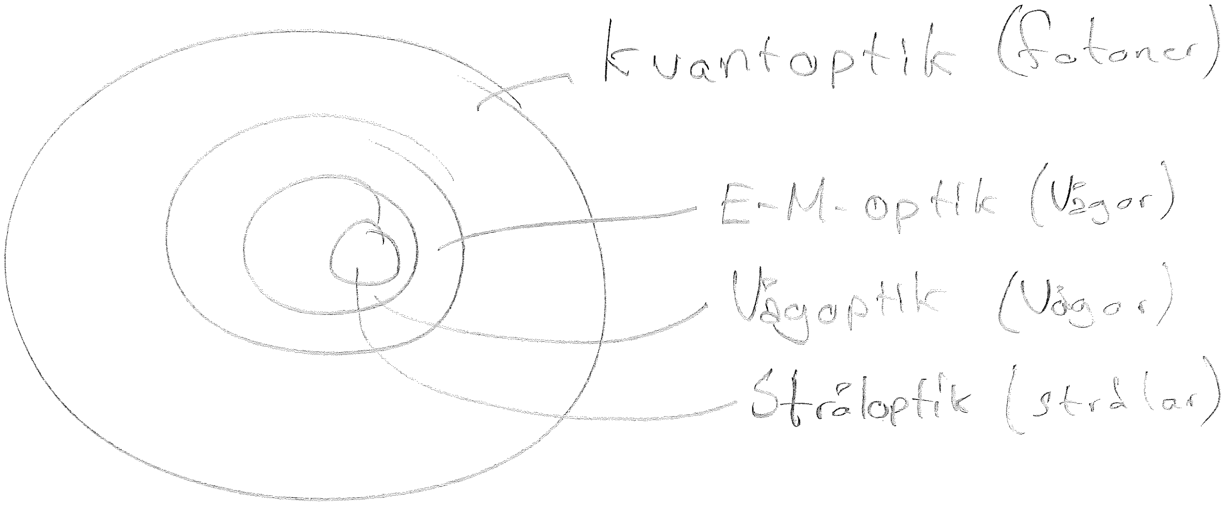
z: pös ⟶ ∞

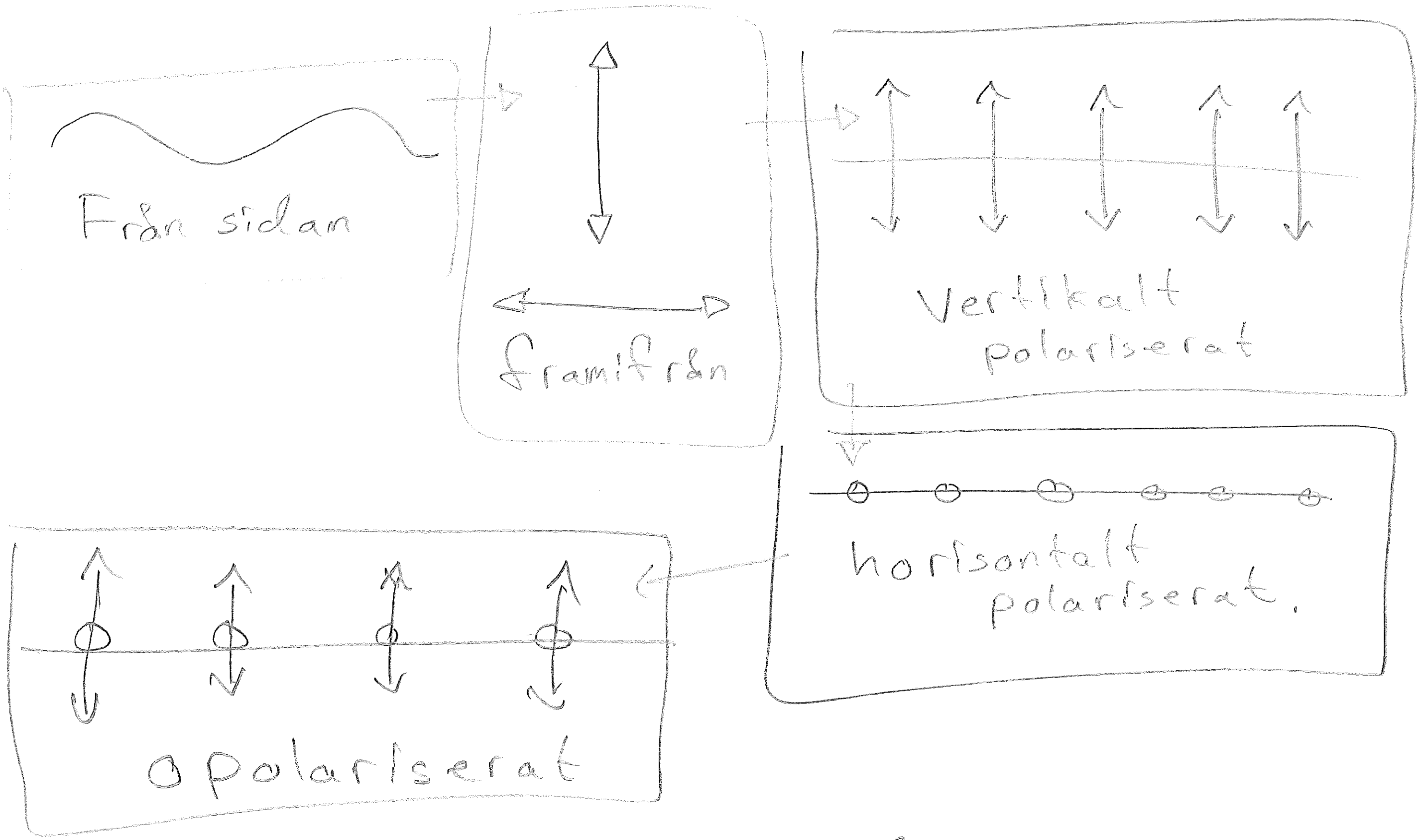


HUR FUNKAR 3D-bio? HUR FUNKAR SOLNEDGÅNGAR?
Vf ska man ha polariserade glasögon på havet?

~~Ans~~ Ljus är en transversell våg med flödestätheten vinkelrät mot utbredningsriktningen.

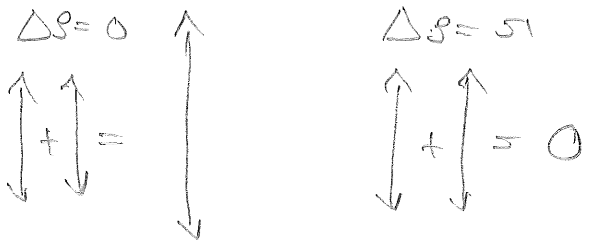
Vad är optik?



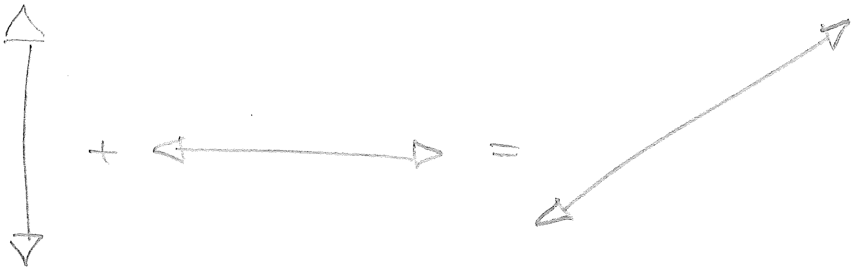


Samma polarisation ⟶ Interferens

beror Intensitet på relativa fasen

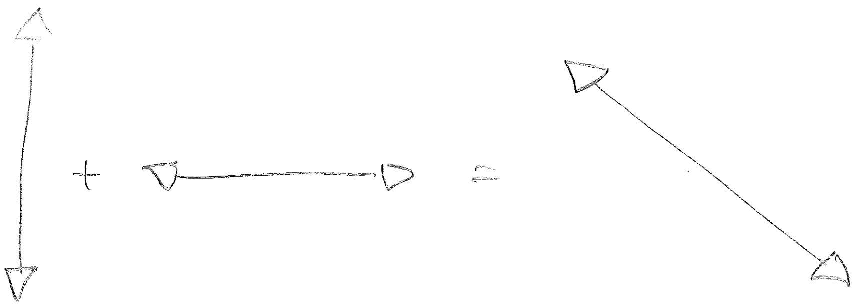


$\Delta \varphi = 0$

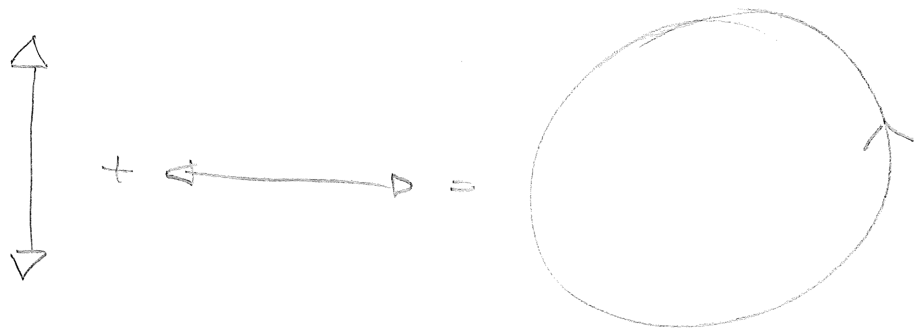


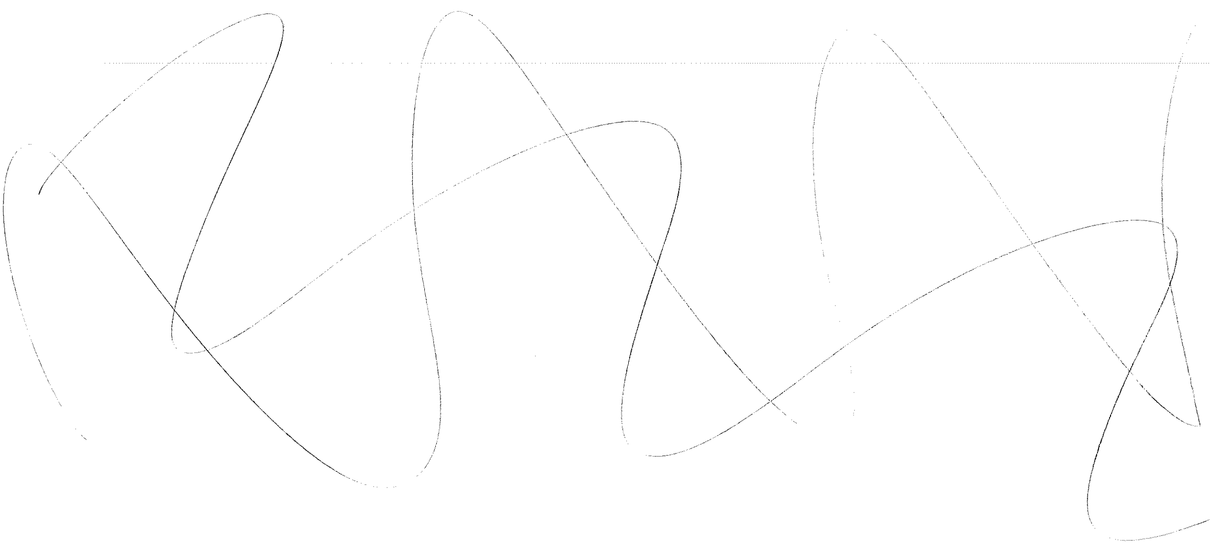
SKRIV
NER
OLIKA
FASSKILLNAD
I BOKEN!

$\Delta \varphi = \pi$

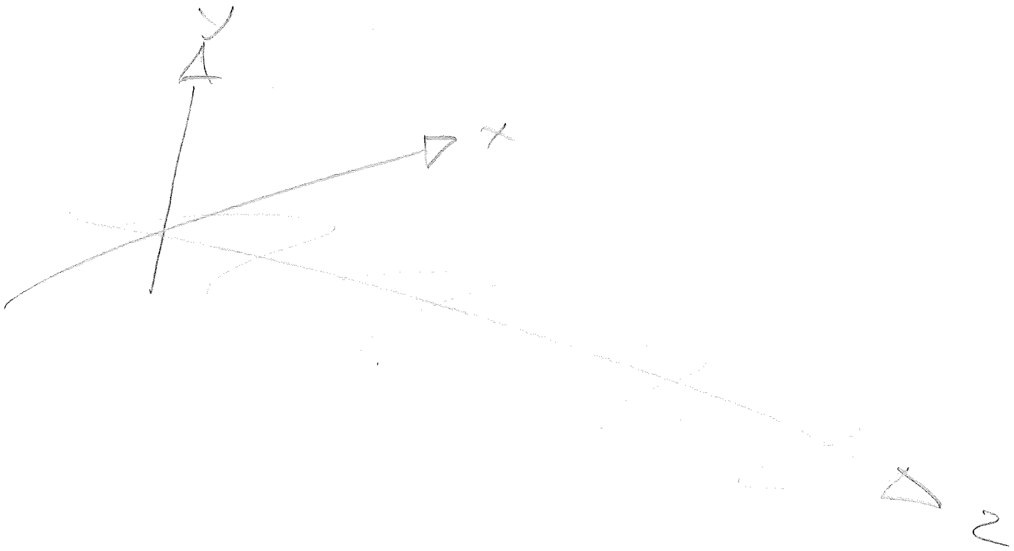


$\Delta \varphi = \pi/2$





JONES VEKTORER



$\boxed{E = E_x \hat{x} + E_y \hat{y}}$ kan skrivas om med

Komplex notation:

extra fas

$$\tilde{E}_x = E_{0x} e^{i(kz - \omega t + \delta_x)}$$

$$\tilde{E}_y = E_{0y} e^{i(kz - \omega t + \delta_y)}$$

$$E_x = Re(\tilde{E}_x) \quad , \quad E_y = Re(\tilde{E}_y)$$

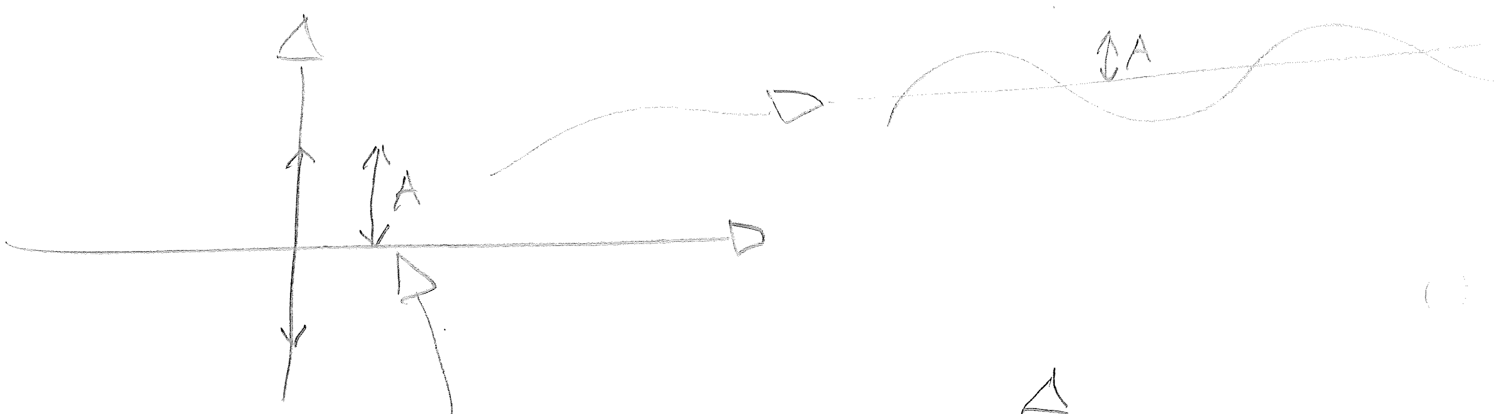
$$\Rightarrow \tilde{E} = E_{0x} e^{i(kz + \omega t + \delta_x)} \hat{x} + E_{0y} e^{i(kz + \omega t + \delta_y)} \hat{y} =$$

$$= \left[E_{0x} e^{i\delta_x} \hat{x} + E_{0y} e^{i\delta_y} \hat{y} \right] e^{i(kz - \omega t)}$$

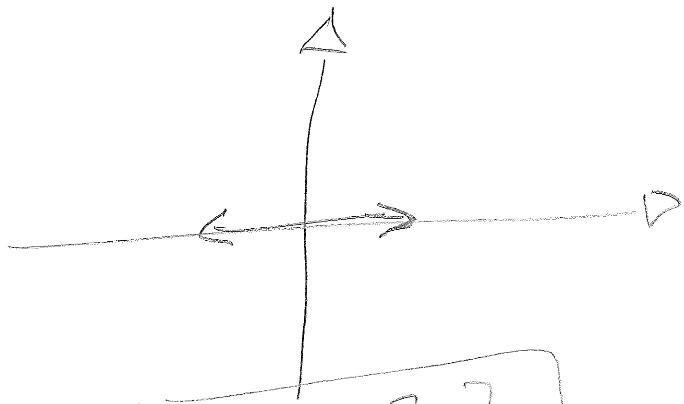
$$= \boxed{\tilde{E}_0 e^{i(kz - \omega t)}}$$

komplex amplitud, VEKTOR!

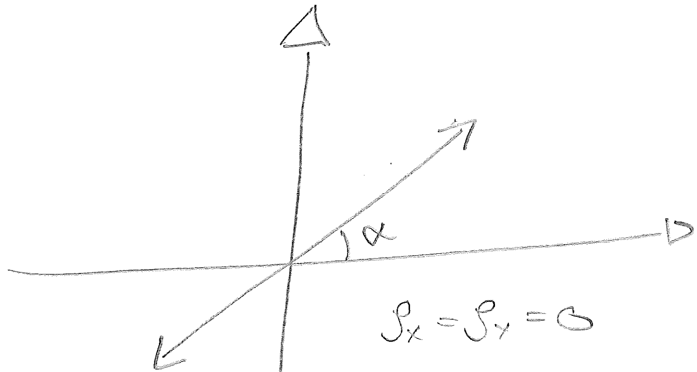
$$\tilde{E}_0 = \begin{bmatrix}\tilde{E}_{0x}\\ \tilde{E}_{0y}\end{bmatrix} = \begin{bmatrix}E_{0x}e^{i\delta_x}\\ E_{0y}e^{i\delta_y}\end{bmatrix}$$



$$\boxed{\tilde{E}_0 = A\begin{bmatrix}0\\ 1\end{bmatrix}}$$



$$\boxed{\tilde{E}_0 = A\begin{bmatrix}1\\ 0\end{bmatrix}}$$



$\delta_x = \delta_y = 0$

$E_{0x} = A\cos\alpha$

$E_{0y} = A\sin\alpha$

$$\boxed{\tilde{E}_0 = A\begin{bmatrix}\cos\alpha\\ \sin\alpha\end{bmatrix}}$$ — Allmänna fallet

Cirkulär polarisation:

$\tilde{E}_y$ fasförskjutet 90° i förhållande till $\tilde{E}_x$.

$$\boxed{\begin{aligned}\tilde{E}_x &= E_{0x} e^{-i\omega t} \\ \tilde{E}_y &= E_{0y} e^{-i(\omega t - \frac{\pi}{2})}\end{aligned}} \xrightarrow{\text{Jones}} \tilde{E}_0 = \begin{bmatrix} E_{0x} e^{i\delta_x} \\ E_{0y} e^{i\delta_y} \end{bmatrix} = \begin{bmatrix} A \\ A e^{i\pi/2} \end{bmatrix} =$$

$$= A \begin{bmatrix} 1 \\ i \end{bmatrix} \qquad \left(\sqrt{|1^2| + |i^2|} = \sqrt{2}\right)$$

Normalisering: $E_0 = \dfrac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ i \end{bmatrix}$

$$\boxed{\begin{aligned}\text{LCP: } & \frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ i \end{bmatrix} \\ \text{RCP: } & \frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ -i \end{bmatrix}\end{aligned}}$$

JONES MATRIS

$$M = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

Linjärpolarisator

Horisontal $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$ (Vi behåller bara komponenter med horisontell polarisation

Vertikal $\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$