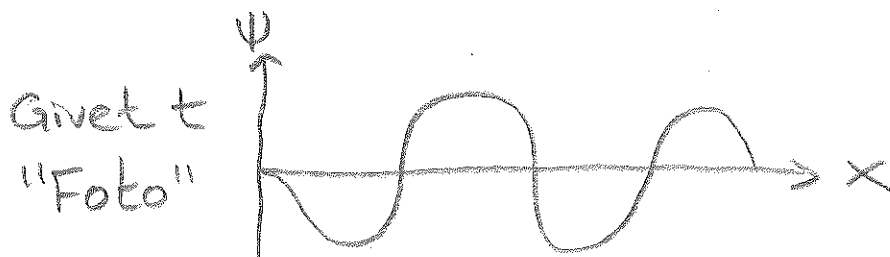
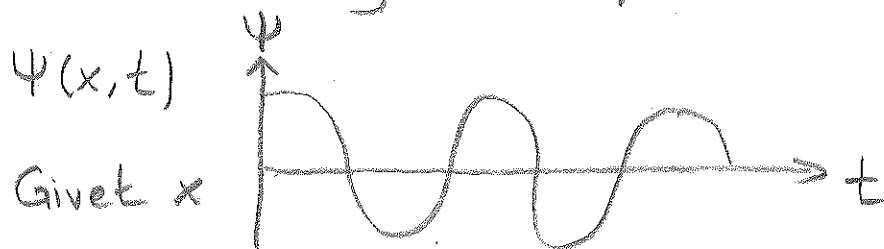


Föreläsning 5 01/04-15



Varje partikel

$$\Psi(t) = A \sin(\omega t + \alpha)$$

Det tar tiden $t_1 = \frac{x}{v}$ att röra sig från $x=0 \rightarrow x$

i x : $\Psi(t) = A \sin(\omega(t - t_1) + \alpha)$

$$\Rightarrow \Psi(x, t) = A \sin\left[\omega\left(t - \frac{x}{v}\right) + \alpha\right]$$

$$v = \frac{\lambda}{T}$$

$$\omega = 2\pi f = \frac{2\pi}{T}$$

$$k = \frac{2\pi}{\lambda}$$

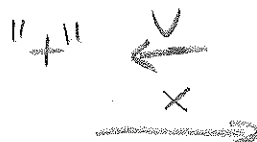
$$\left. \begin{array}{l} \omega = 2\pi f = \frac{2\pi}{T} \\ k = \frac{2\pi}{\lambda} \end{array} \right\} \Psi(x, t) = A \sin\left[\frac{2\pi}{T}\left(t - \frac{x}{v}\right) + \alpha\right]$$

$$= A \sin\left[2\pi\left(\frac{t}{T} - \frac{x}{\lambda}\right) + \alpha\right]$$

$$\Rightarrow A \sin(k(x \pm vt))$$

$$A \sin\left(2\pi\left(\frac{x}{\lambda} \pm \frac{t}{T}\right)\right) - \text{om } \alpha = 0$$

$$A \sin(kx \pm \omega t)$$



Motriktade vågor

$$S_1 = A_1 \sin \left[2\pi \left(\frac{t}{T} - \frac{x}{\lambda} \right) \right] \text{ åt höger}$$

$$S_2 = A_2 \sin \left[2\pi \left(\frac{t}{T} - \frac{x}{\lambda} \right) + \varphi \right] \text{ åt vänster}$$

$$S = S_1 + S_2 = A_1 \sin(\omega t + \alpha_1) + A_2 \sin(\omega t + \alpha_2)$$

$$\alpha_1 = -\frac{2\pi x}{\lambda}, \quad \alpha_2 = \frac{2\pi x}{\lambda} + \varphi$$

$$A^2 = A_1^2 + A_2^2 + 2A_1 A_2 \cos(\alpha_2 - \alpha_1)$$

$$A_{\min} \text{ då } \alpha_2 - \alpha_1 = \pi + 2\pi m$$

$$\Rightarrow \frac{2\pi x}{\lambda} + \varphi - \left(-\frac{2\pi x}{\lambda} \right) = \frac{4\pi x}{\lambda} + \varphi = \pi + 2\pi m$$

$$\Rightarrow x = \frac{\lambda}{4} - \varphi \frac{\lambda}{4\pi} - \left(\frac{m\lambda}{2} \right) \text{ - Avstånd mellan två min} = \frac{\lambda}{2}$$