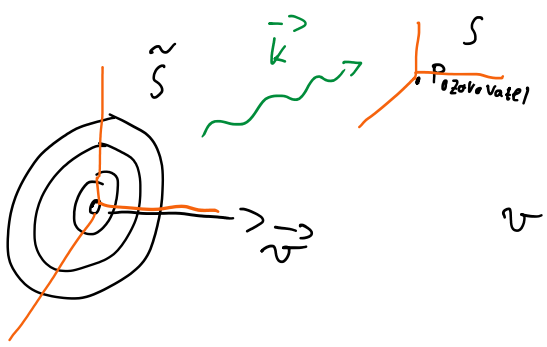
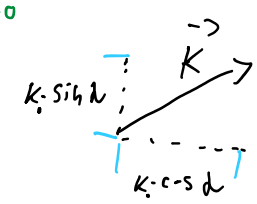
Relativistický dopplerův jev

Wednesday 15 January 2025 17:27



$\omega_0 = c \cdot k_0$

$k_0 = \frac{\omega_0}{c}$



v $\tilde{S}$: $\omega = \omega_0$

$k_x = k_0 \cdot \cos\alpha = \frac{\omega_0}{c} \cdot \cos\alpha$

$k_y = k_0 \cdot \sin\alpha = \frac{\omega_0}{c} \cdot \sin\alpha$

$k_z = 0$

$$\begin{pmatrix} \omega/c \\ k_x \\ k_y \\ k_z \end{pmatrix}_S = \begin{pmatrix} \gamma & \gamma\beta & 0 & 0 \\ \gamma\beta & \gamma & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} \omega_0/c \\ \omega_0/c \cos\alpha \\ \omega_0/c \sin\alpha \\ 0 \end{pmatrix}_{\tilde{S}}$$

Pozorovatel Λ^{-1} Zdroj

$S \to \tilde{S} : \Lambda$

$\tilde{S} \to S : \Lambda^{-1}$

$$\frac{\omega}{c} = \frac{\omega_0 \gamma}{c} + \frac{\gamma\beta\omega_0 \cos\alpha}{c}$$

$$\omega = \gamma\omega_0 \cdot (1 + \beta\cos\alpha)$$

$$\boxed{\omega = \gamma\omega_0 \cdot \left(1 + \frac{v}{c}\cos\alpha\right)}$$