Doppler-Effekt

$$\lambda \cdot f_Q = c$$

a) bewegter Beobachter

$$T_B = \frac{\lambda}{c + v_B}$$

$$f_B = \frac{1}{T_B} = \frac{c + v_B}{\lambda} = \frac{c + v_B}{c} f_Q$$

$$= \left(1 + \frac{v_B}{c}\right) f_Q$$

Bsp: $v_B = 100 \frac{km}{h} = 27{,}78 \frac{m}{s}$, $c = 340 \frac{m}{s}$

$$\left(1 + \frac{v_B}{c}\right) = 1.082$$

b) bewegte Quelle

$$\lambda_B = \lambda_Q - v_Q T_Q$$

$$T_B = \frac{\lambda_B}{c} = \underbrace{\frac{\lambda_Q}{c}}_{T_Q} - \frac{v_Q}{c} T_Q = \left(1 - \frac{v_Q}{c}\right) T_Q$$

$$f_B = \frac{1}{1 - v_Q/c} f_Q$$

Bsp.: s. links

$$\frac{1}{1 - v_Q/c} = 1.089$$

$$\frac{1}{1-x} \overset{|x|<1}{=} 1 + x + x^2 + x^3 + \ldots \overset{|x| \ll 1}{\approx} 1 + x$$

Doppler Doppler