1

$$f = f_0 \frac{1}{1 \pm \frac{v}{c}}$$
$$\frac{v}{c} \ll 1$$
$$\Rightarrow f \approx f_0(1 \mp \frac{v}{c})$$

2

$$\sigma_c = \sigma_v = 0.1\% = 0.001$$

3

- zu zeigen: $c = \lambda_0 f_0$

$$p(x,t) = \hat{p}sin(2\pi(f_0 t - \frac{x}{\lambda_0 + \phi)}) \tag{1}$$

$$\frac{d^2 a}{dx^2} = \frac{1}{c^2}\frac{d^2}{dt^2} \tag{2}$$

$$\frac{d^2 p}{dx^2} = \frac{d}{dx} - \hat{p}cos(2\pi(f_0 t - \frac{x}{\lambda_0} + \phi)) \tag{3}$$