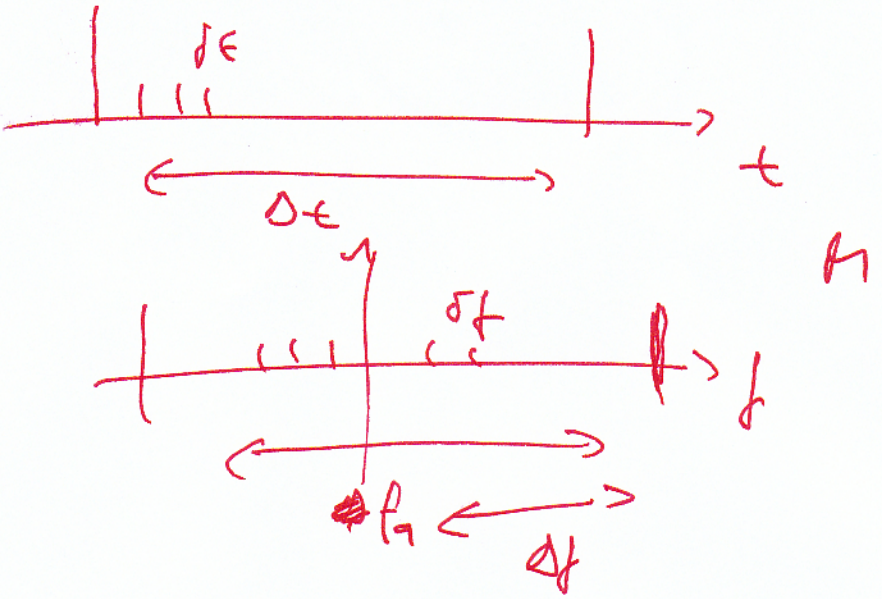

$$f_a = \frac{1}{\delta t} \qquad \Delta f = \frac{f_a}{2}$$

$$\delta f = 2 \cdot \frac{\Delta f}{M} = \frac{f_a}{M} = \frac{1}{M \cdot \delta t}$$

$$k = \frac{2\pi f}{c}$$

$$f = \frac{kc}{2\pi}$$

$$z = c \cdot \epsilon$$

$$t = \frac{z}{c}$$

$$\frac{c}{2\pi} \delta k = \frac{1}{M \delta z}$$

$$\delta k = \frac{2\pi}{M \delta z}$$

$$\delta \ell = \frac{2\pi}{M \delta k}$$

$$\delta \ell = \frac{2\pi \delta z}{2\pi}$$

$$\delta \ell = 2\pi \delta z$$