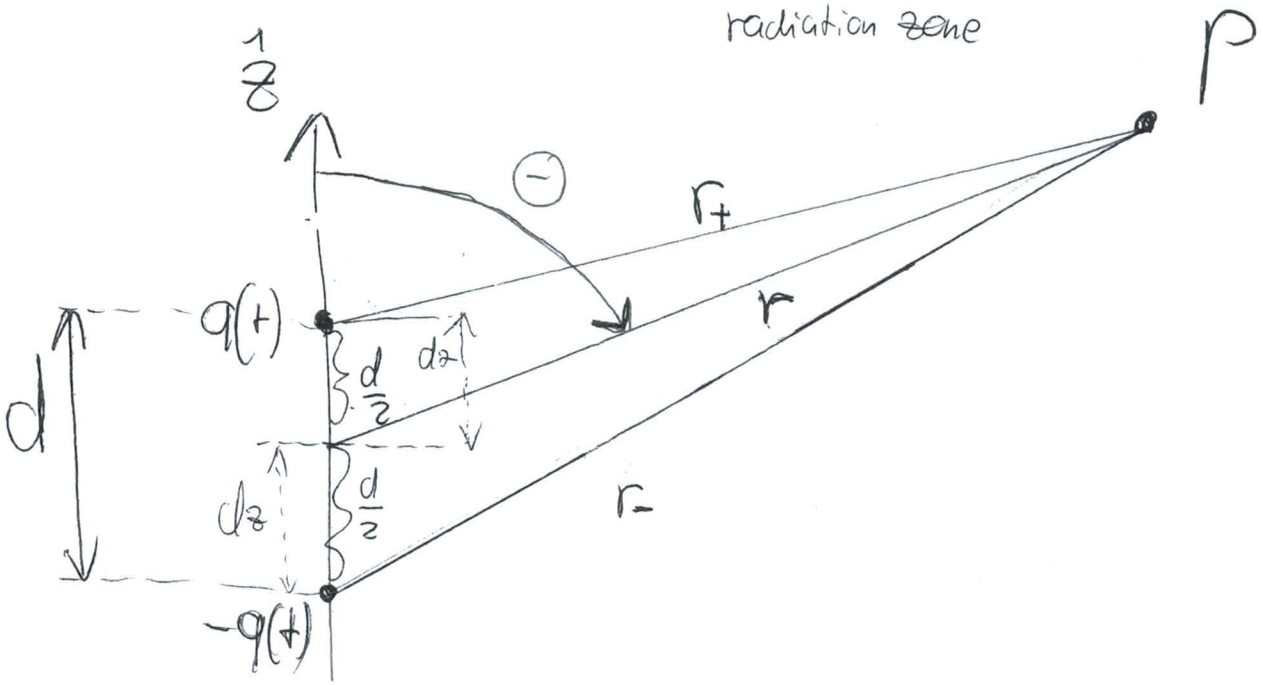
Vector Potential $\vec{A}$ in $d \ll \frac{w}{c} = \frac{\lambda}{2\pi} \ll r$

radiation zone



$$d \ll \frac{c}{w} = \frac{\lambda}{2\pi} \ll r$$

$$\vec{J}(t) = \frac{dq(t)\vec{z}}{dt} = \frac{d}{dt} q_0 \cos(wt)\vec{z}$$

$$= -q_0 w \sin(wt)\vec{z}$$

differential current along $\vec{z}$