

$$A_{L,\text{exit}}(\vec{k},t) = A_0(\vec{k})\left(1 - \frac{ik}{a(t)H_I}\right)e^{\frac{ik}{a(t)H_I}}$$

$$\mathcal{P}_{A_0}(k) = \left(\frac{kH_I}{2\pi m}\right)^2.$$