$$\vec{A}(x,y,z) = \vec{A}(x+L,y,z) \rightarrow \vec{k} = \frac{2\pi}{L}(n_x,n_y,n_z)^T = \frac{2\pi}{L}\vec{n}$$

$$\boxed{\vec{A}(\vec{r},t) = \sum_{m=1,2}\sum_{\vec{k}}\sqrt{\frac{2\pi\hbar c^2}{\omega_{\vec{k}}V}}\hat{\epsilon}_m\left[\vec{\mathcal{A}}_m(\vec{k})e^{i(\vec{k}\vec{r}-\omega t)} + \vec{\mathcal{A}}^*_m(k)e^{-i(\vec{k}\vec{r}-\omega t)}\right]}$$

$$E_{\text{klassisch}} = \frac{1}{8\pi}\int d^3r\left(\vec{E}^2+\vec{B}^2\right) = \frac{1}{8\pi}\int d^3r\left(\left(\frac{1}{c}\frac{\partial\vec{A}}{\partial t}\right)^2 + \left(\vec{\nabla}\times\vec{A}\right)^2\right)$$

$$E_{\text{klassisch}} = \frac{1}{2}\sum_{m=1,2}\sum_{\vec{k}}\hbar\omega_{\vec{k}}\left[\vec{\mathcal{A}}_m(\vec{k})\vec{\mathcal{A}}^*_m(\vec{k}) + \vec{\mathcal{A}}^*_m(k)\vec{\mathcal{A}}_m(\vec{k})\right]$$

$$H = \frac{1}{2}\sum_{m=1,2}\sum_{\vec{k}}\hbar\omega_{\vec{k}}\left[a^\dagger_m(\vec{k})a_m(\vec{k}) + a_m(\vec{k})a^\dagger_m(\vec{k})\right]$$

Mit den Relationen

$$a^\dagger_m\left|0\right\rangle = \left|1_{\vec{k},m}\right\rangle \quad a^\dagger_m a^\dagger_{m'}\left|0\right\rangle = \left|1_{\vec{k},m}, 1_{\vec{k}',m'}\right\rangle \quad a^\dagger_m a^\dagger_m\left|0\right\rangle = \sqrt{2}\left|2_{\vec{k},m}\right\rangle$$

quantisiertes Strahlungsfeld: $\boxed{H = \sum_{m=1,2\,\vec{k}}\hbar\omega_{\vec{k}}a^\dagger_m(\vec{k})a_m(\vec{k})}$