2 二维非线性晶体中的整流场

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$$E_\Theta(\omega,\boldsymbol{R})=\frac{U_0\eta_0}{2\pi c^2 n_{\mathrm{IR}}}\frac{e^{-\mathrm{i}kR}}{R}\sin\Theta_z\,\omega^2 e^{-\frac{\omega^2\tau_L^2}{4}}e^{-\frac{\pi^2}{2}\left(\frac{r_0\sin\Theta_x}{\lambda_{\mathrm{THz}}}\right)^2}\int_{-L/2}^{L/2}\boxed{d_{eff}(x)}\,e^{-\mathrm{i}\frac{\omega}{c}\Delta n(\Theta_x)x}\,\mathrm{d}x$$

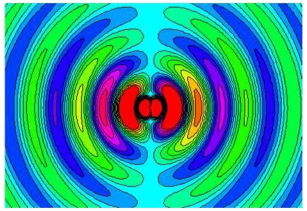
$$\begin{cases}\Delta n(\Theta_x):=n_g-n_{\mathrm{THz}}\cos\Theta_x\\ \tau_a:=\dfrac{n_{\mathrm{THz}}r_0}{\sqrt{2}c}\sin\Theta_x\end{cases}$$

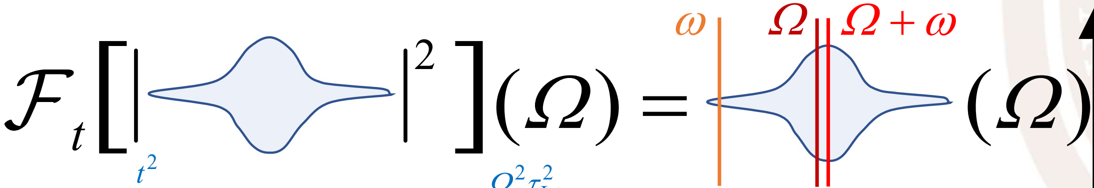
$$\begin{cases}\omega:=(\Omega+\omega)-\Omega\\ \Delta\boldsymbol{k}:=-(\boldsymbol{k}_{\Omega+\omega}-\boldsymbol{k}_{\Omega}-\boldsymbol{k}_{\omega})\begin{cases}\Delta k_{\mathrm{YZ}}=k_\omega\sin\Theta_x\\ \Delta k_x=k_{\Omega+\omega}-k_\Omega-k_\omega\cos\Theta_x\end{cases}\end{cases}$$

Uncertainty Principle: $\Delta k_{\mathrm{YZ}}\sim\dfrac{1}{r_0}$

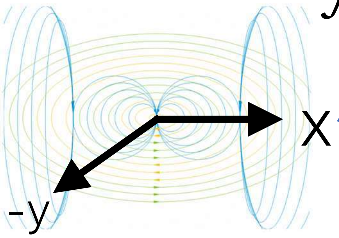
r_0 较小 = 干涉相长
r_0 较大 = 干涉相消

$$\begin{cases}d_{eff}=d_{eff}(x)\\ r_0=r_{y0}=r_{z0}\end{cases}$$

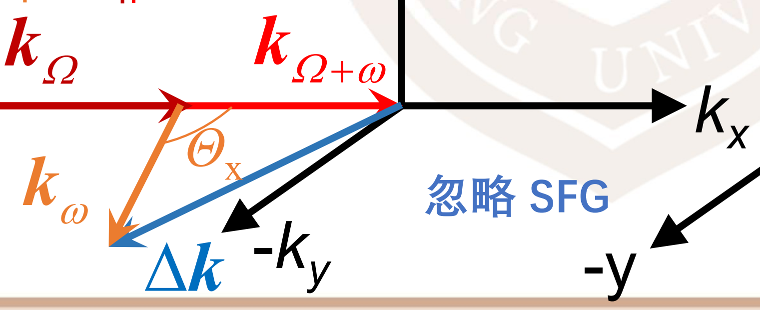


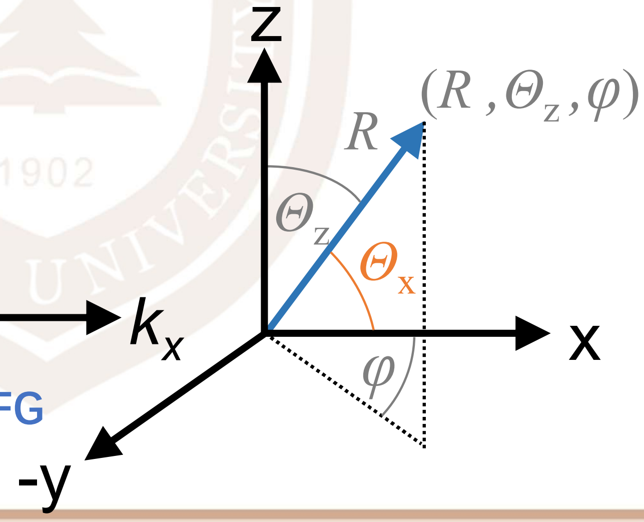


$$\mathcal{F}_t\left[e^{-\frac{t^2}{\tau_L^2}}\right](\Omega)=\sqrt{\pi}\tau_L e^{-\frac{\Omega^2\tau_L^2}{4}}$$



所有满足相同
相位匹配条件的
一系列 DFG 过程





① YZ 向波矢失配 只能由 坐标-动量不确定性原理 补偿，约束光斑大小 | ② 大光斑干涉相消