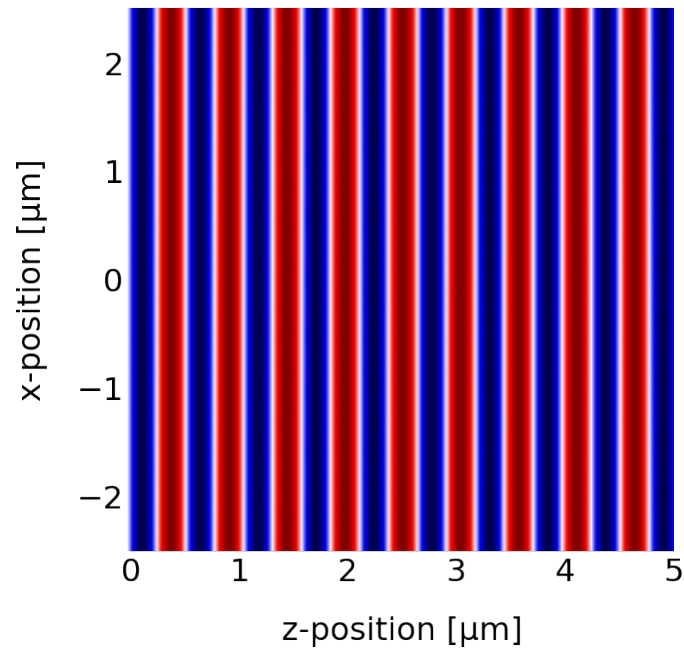


Experimental Physics 3 - Em-Waves, Optics, Quantum mechanics

Lecture 7

2. Wave Optics

Plane waves



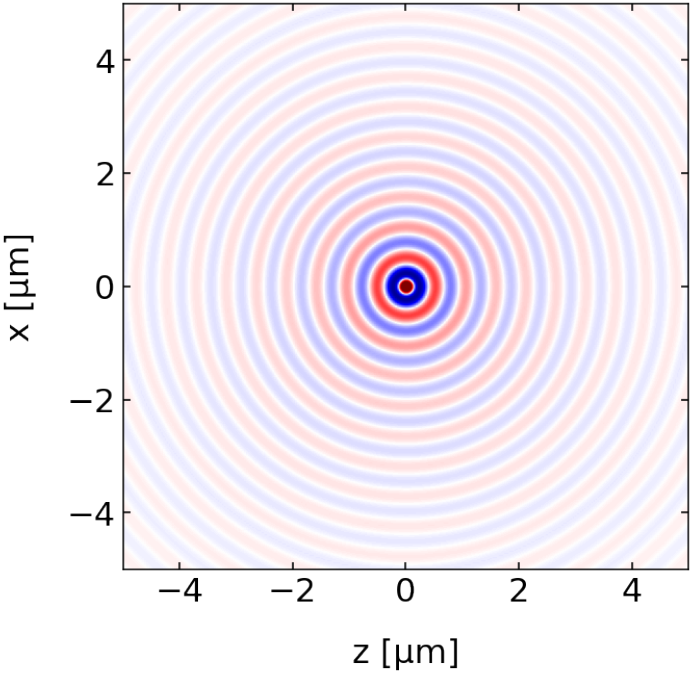
wave amplitude $U(\vec{r}) = Ae^{-i\vec{k}\cdot\vec{r}}$

intensity $I(\vec{r}) = |A|^2$

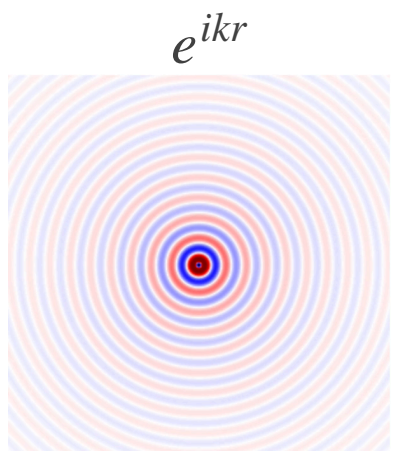
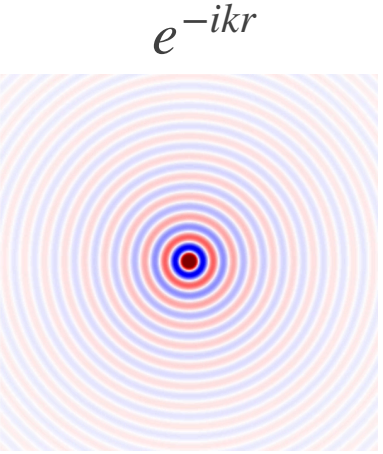
wavevector $\vec{k} = \{k_x, k_y, k_z\}$

wavenumber $k = |\vec{k}|$

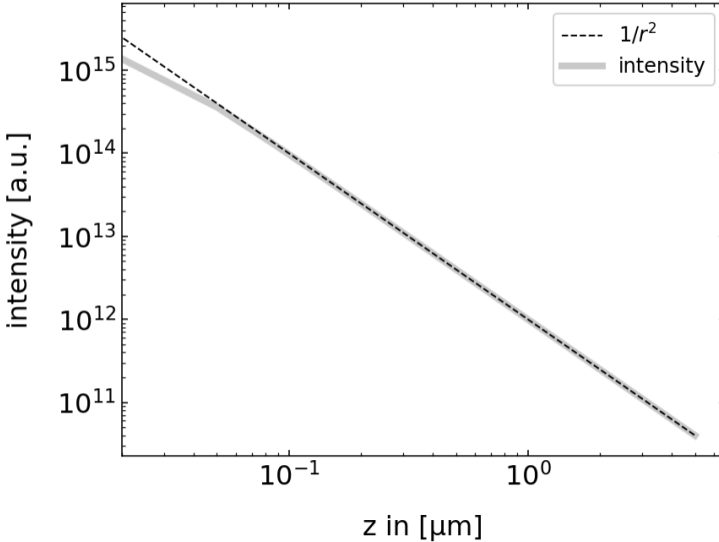
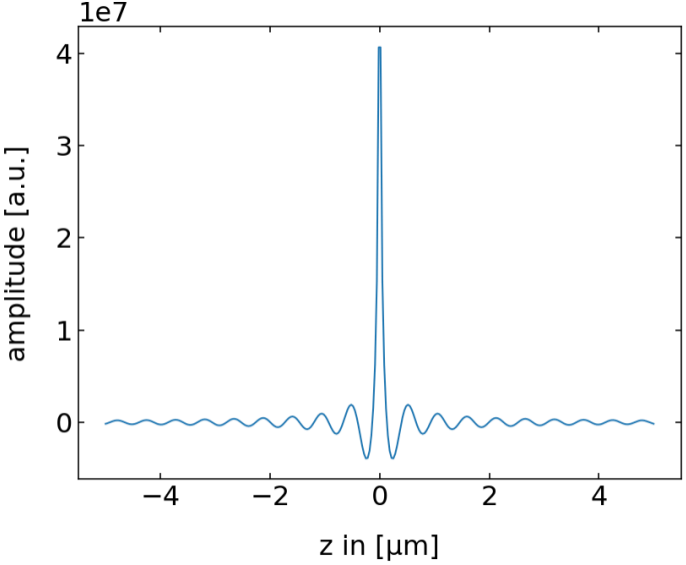
Spherical waves



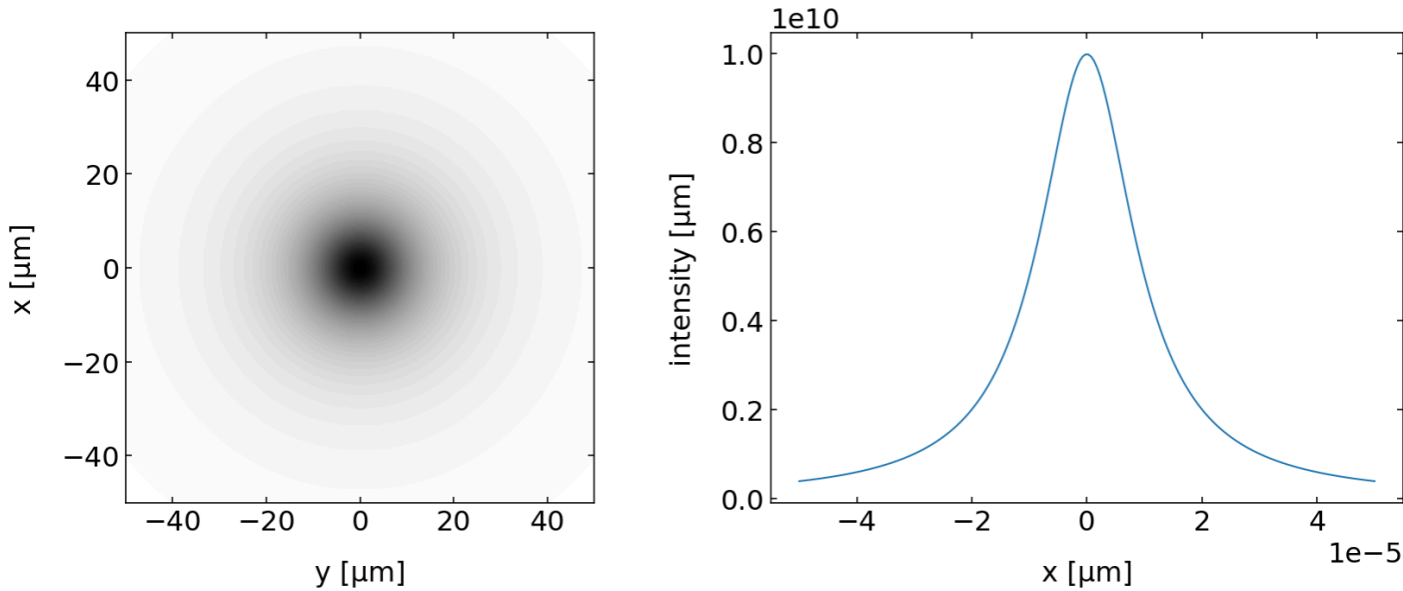
$$U(\vec{r}) = \frac{A}{r} e^{-ikr}$$
$$I(\vec{r}) = \frac{|A|^2}{r^2}$$



Intensity Spherical Wave



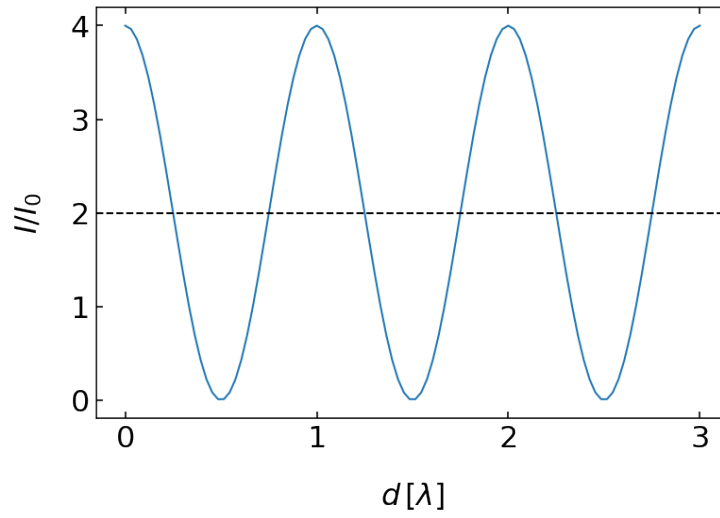
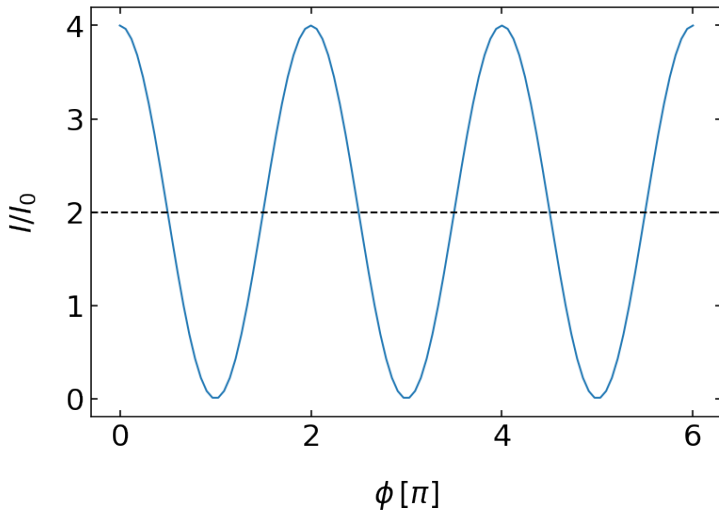
Intensity Spherical Wave



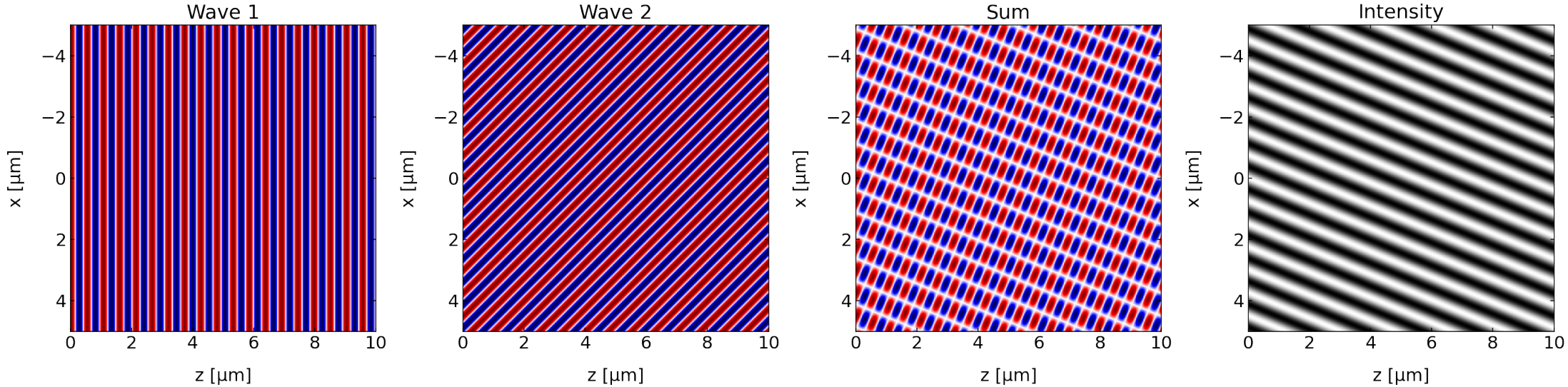
in a plane at a distance

Interference

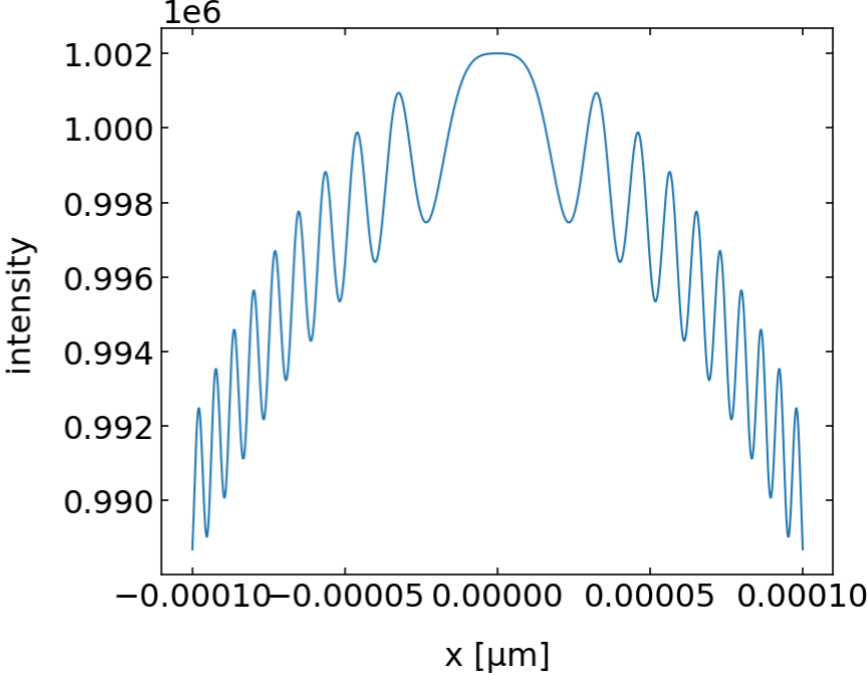
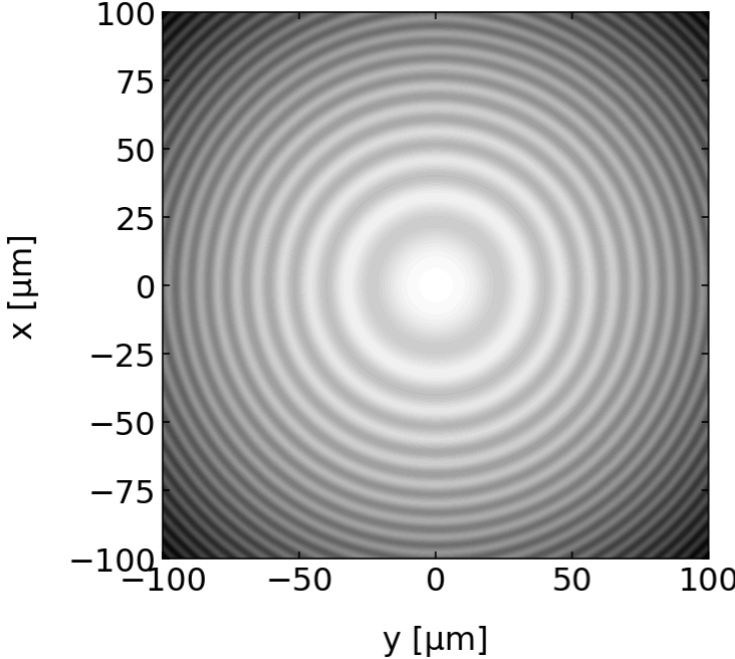
Interference



Interference in Space

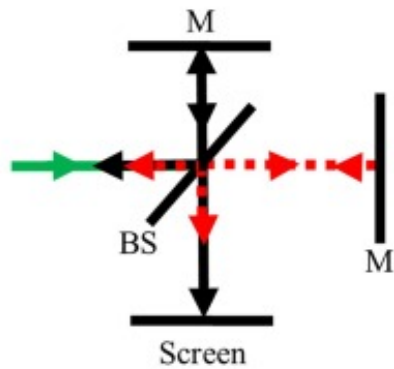


Interference Between Spherical and Plane Wave

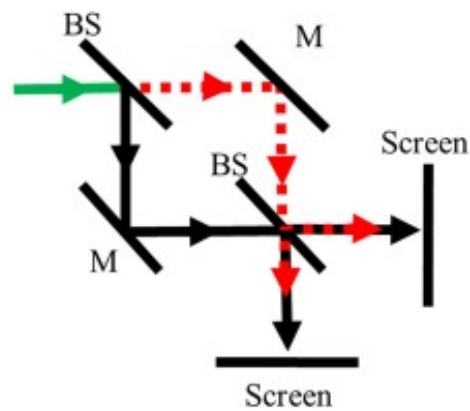


Interferometers

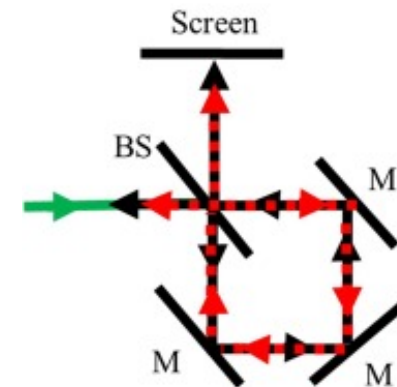
Michelson interferometer



Mach-Zehnder interferometer



Sagnac interferometer



BS=50/50 Beam splitter
M= Mirror

→ Incident laser beam
→ Reflected laser beam
→ Transmitted laser beam