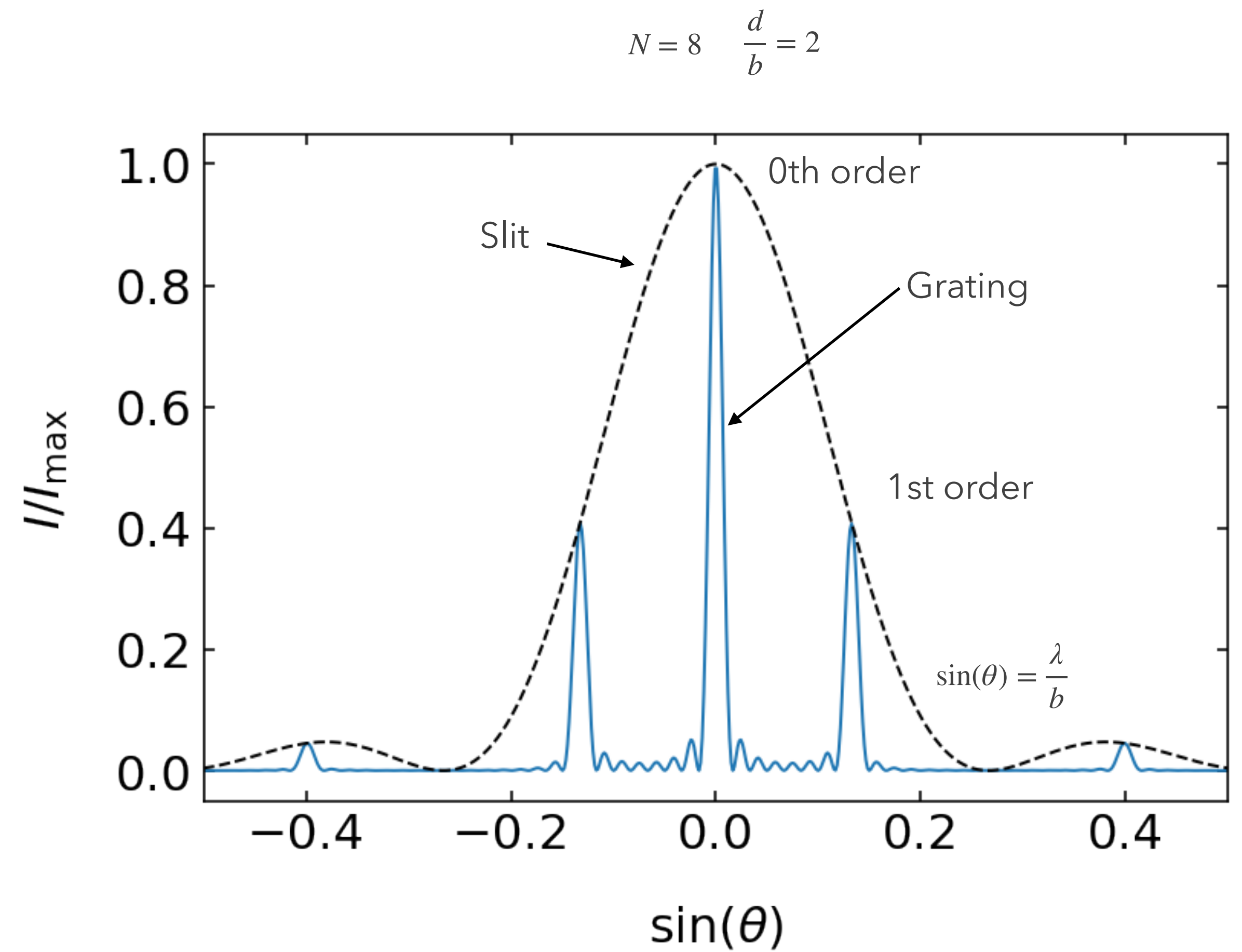
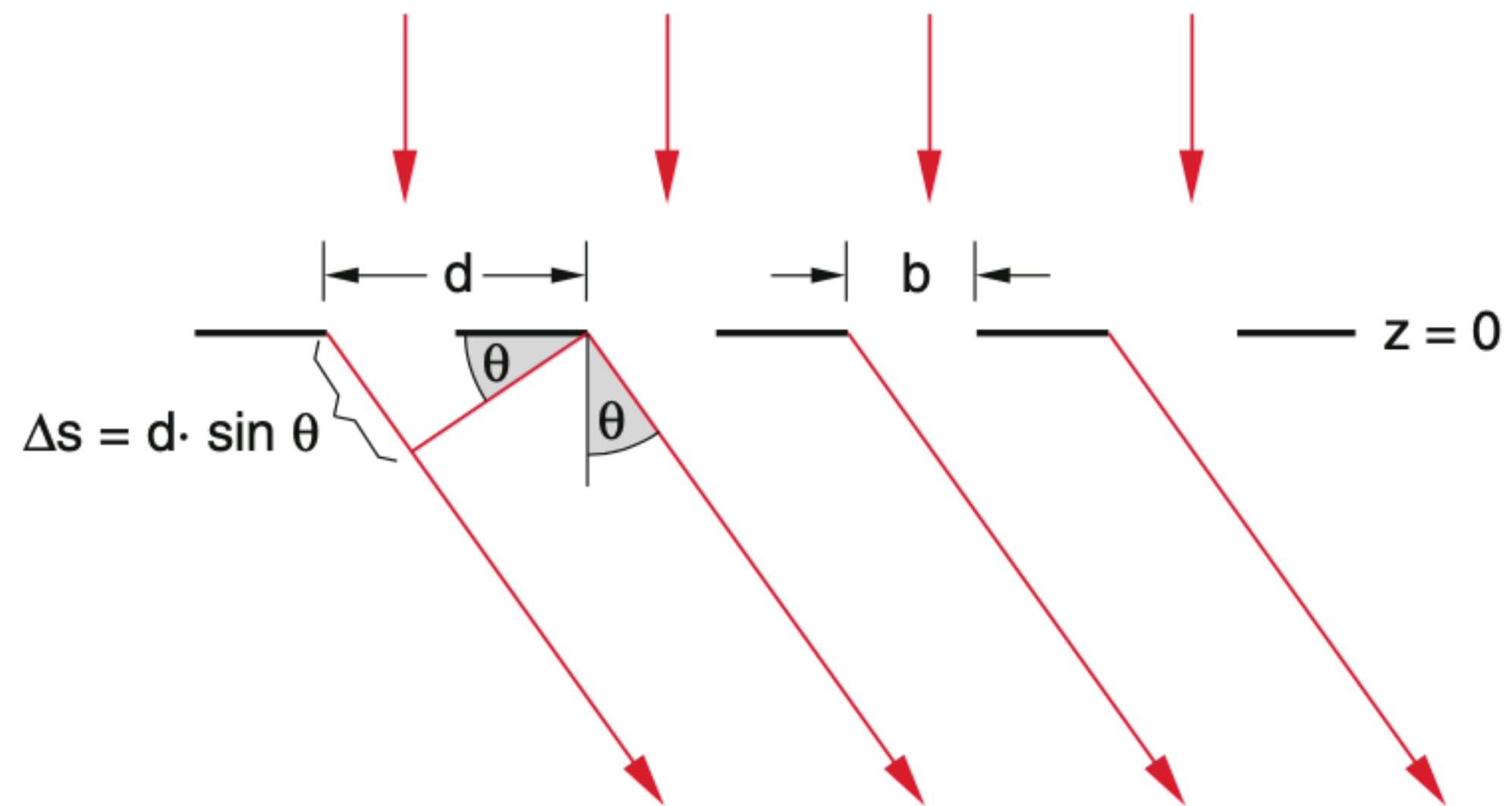


Experimental Physics 3 - Em-Waves, Optics, Quantum mechanics

Lecture 14

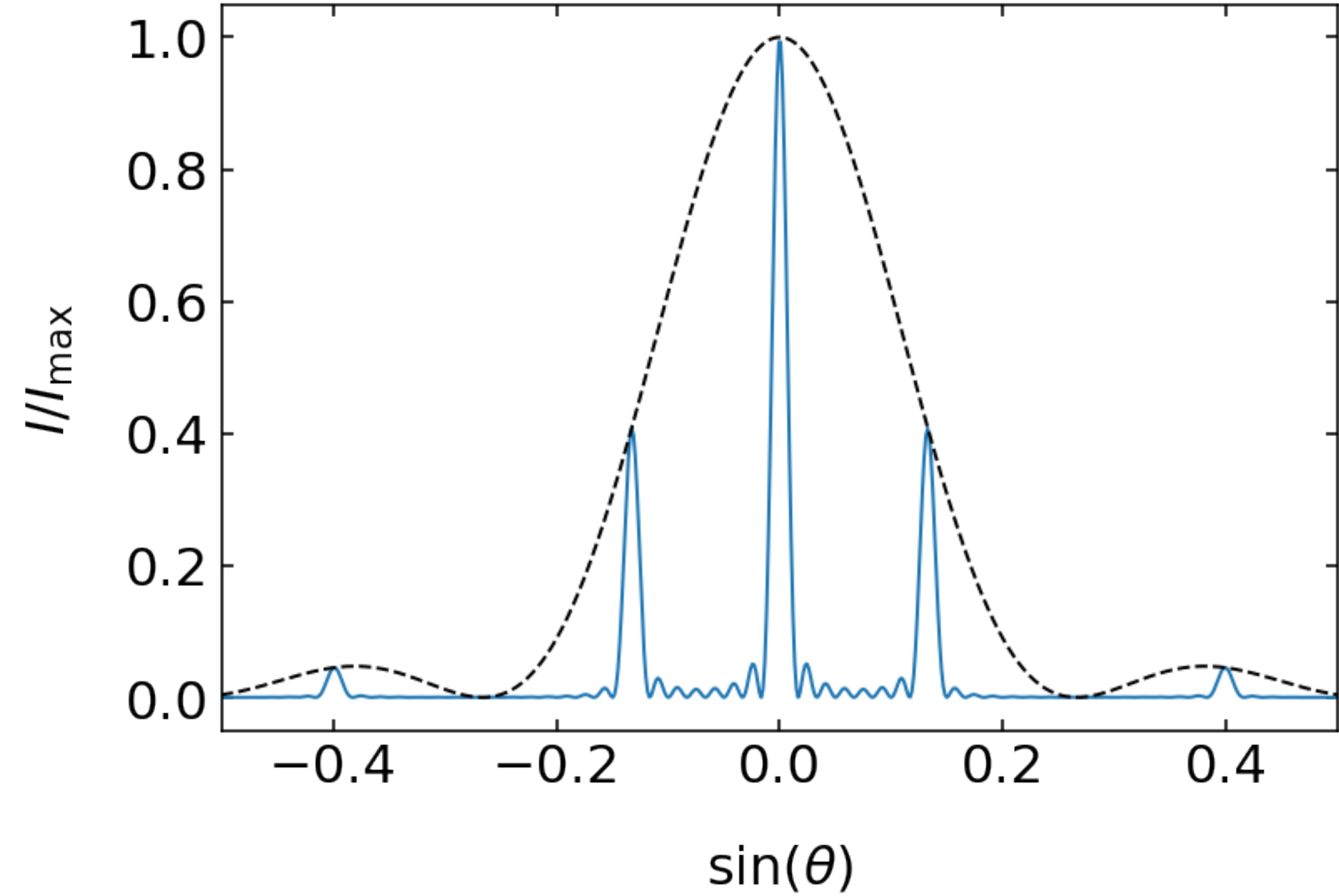
2.3 Diffraction

Diffraction Grating

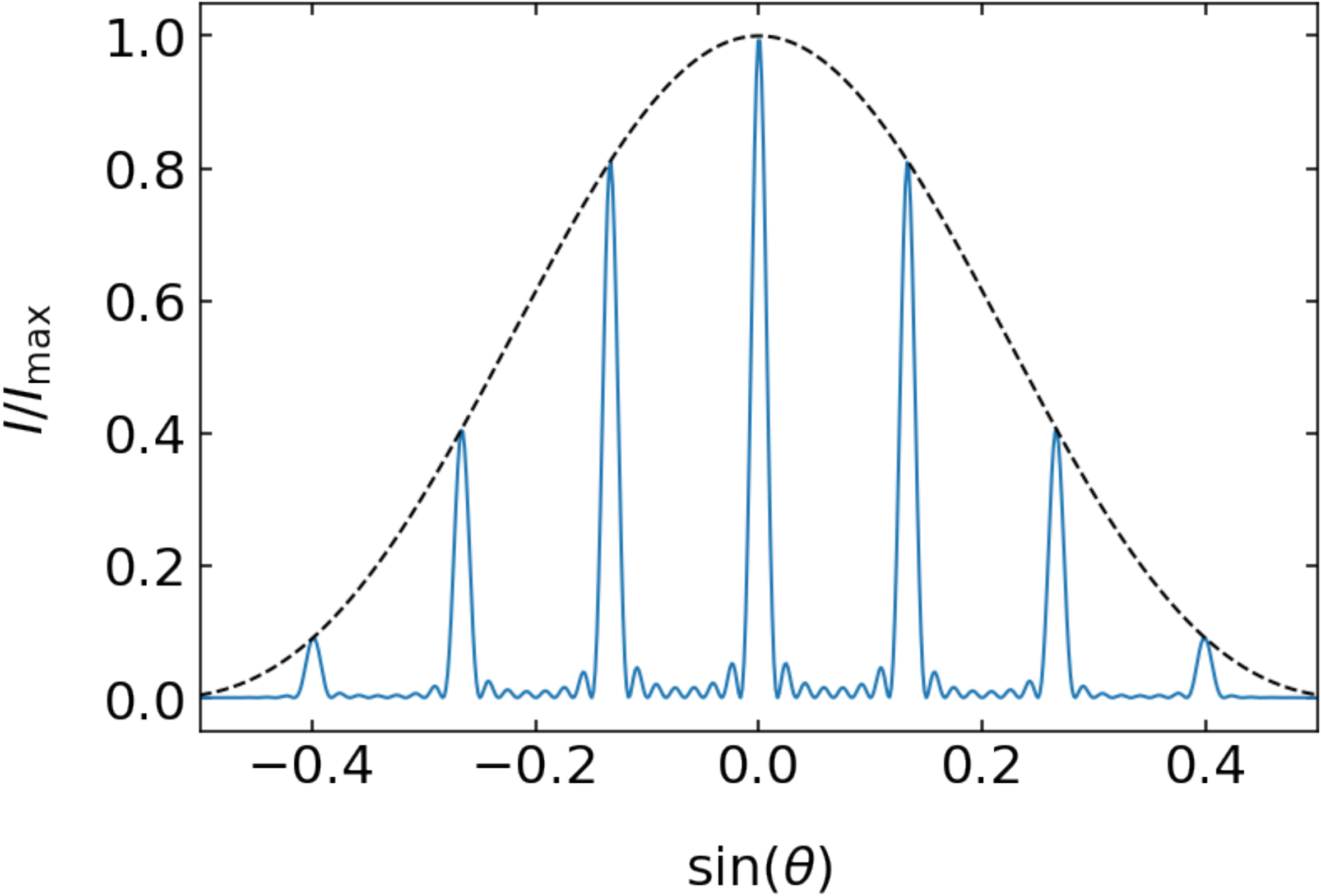


Diffraction Grating

$N = 8 \quad \frac{d}{b} = 2$

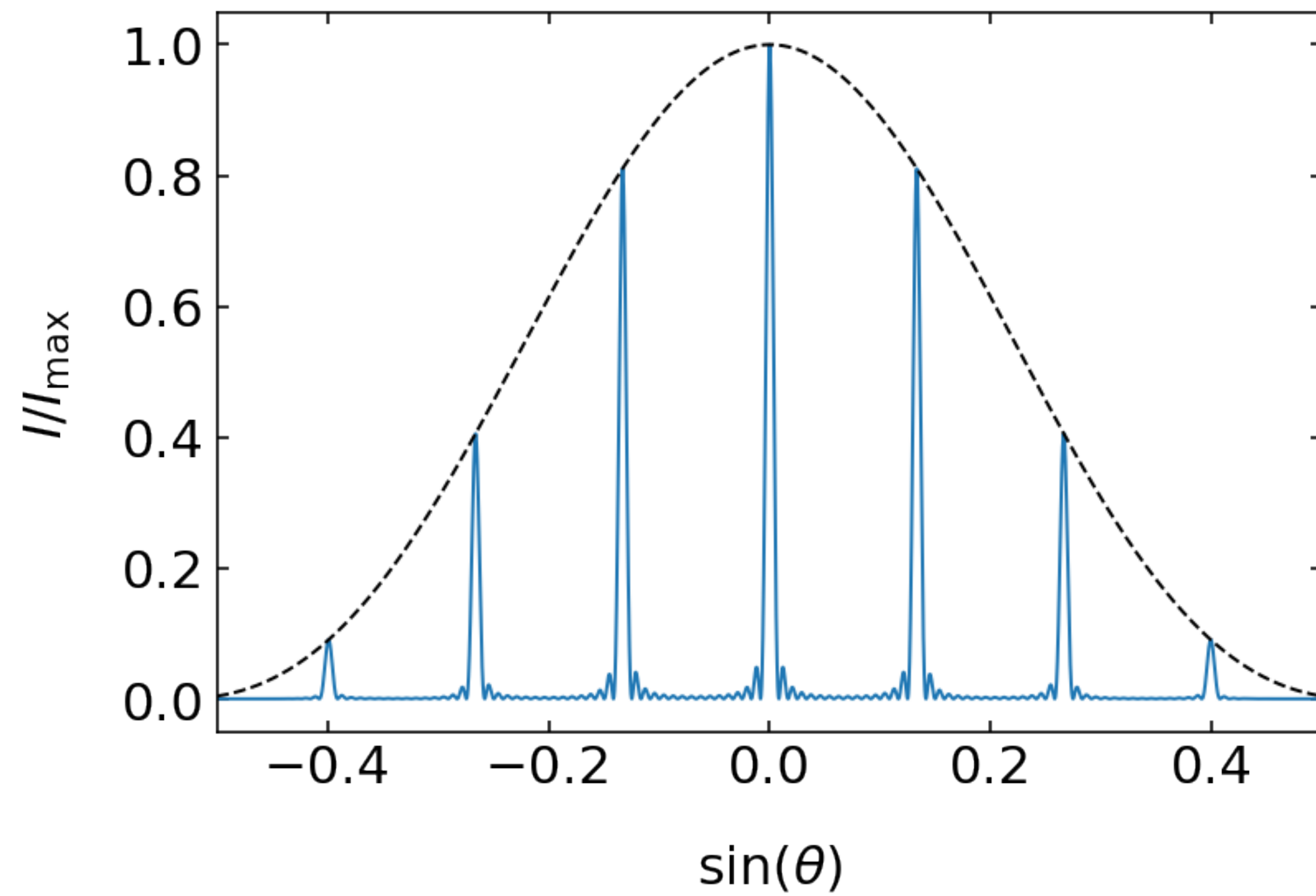


$N = 8 \quad \frac{d}{b} = 4$

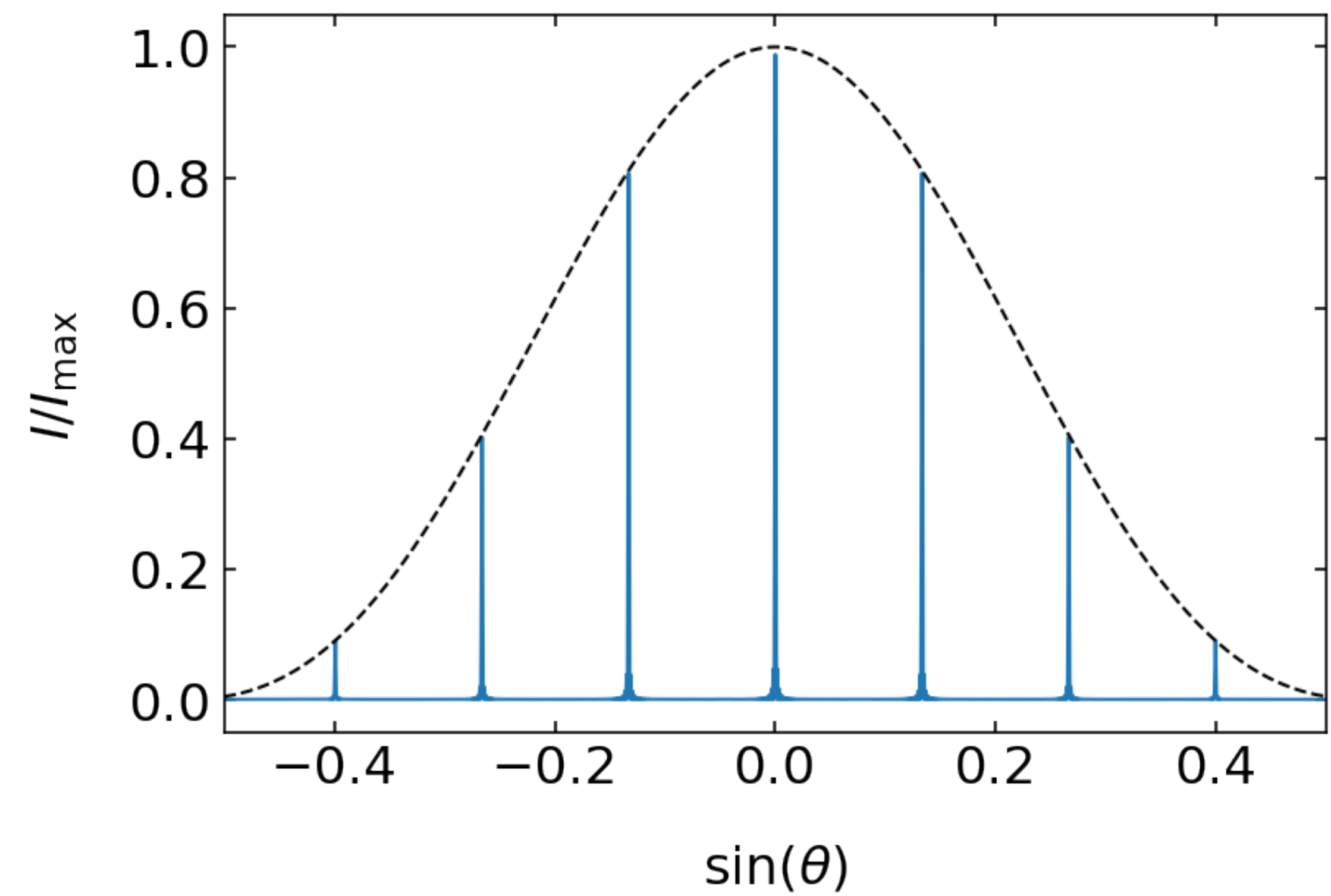


Diffraction Grating

$N = 16$

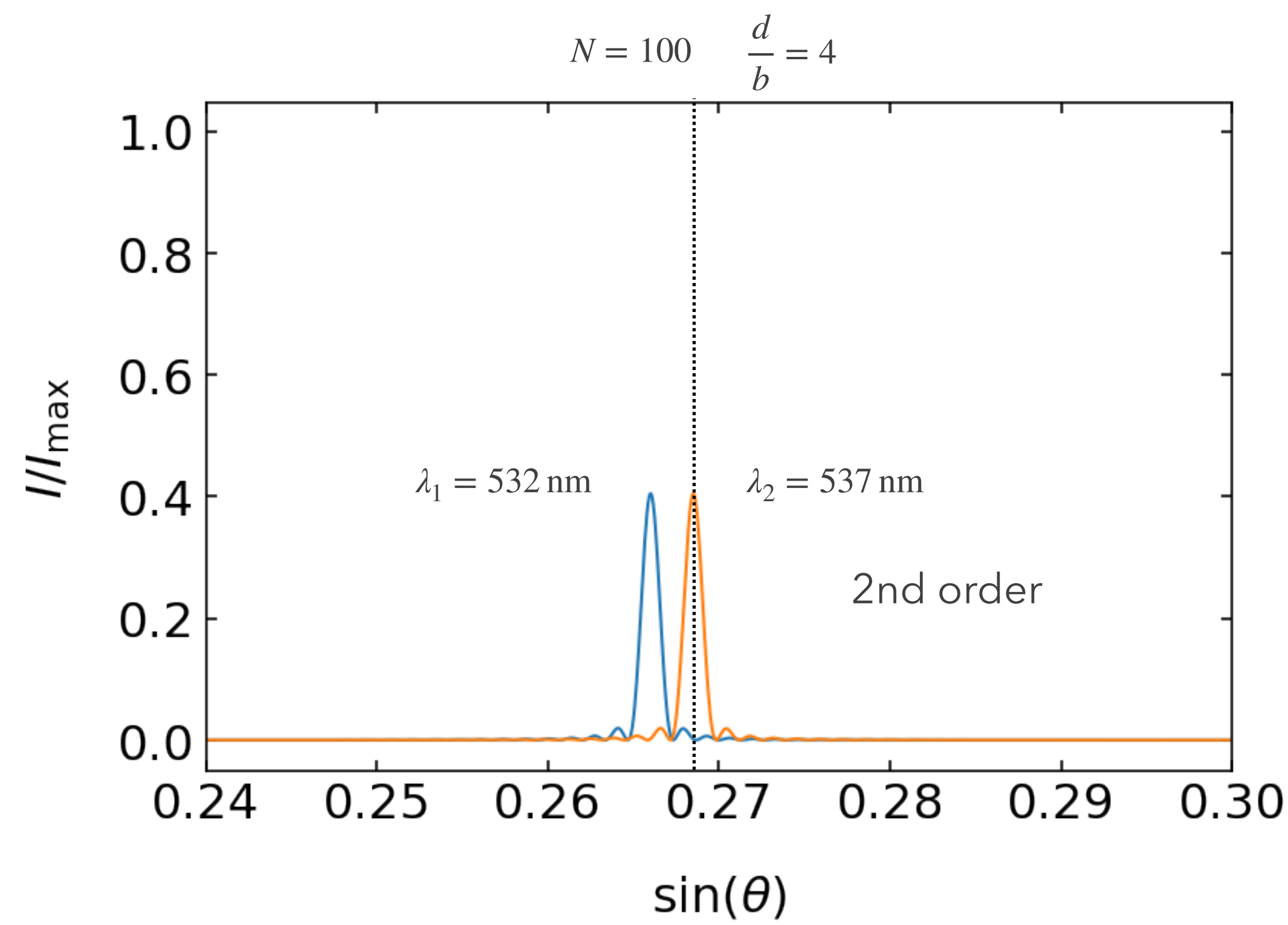
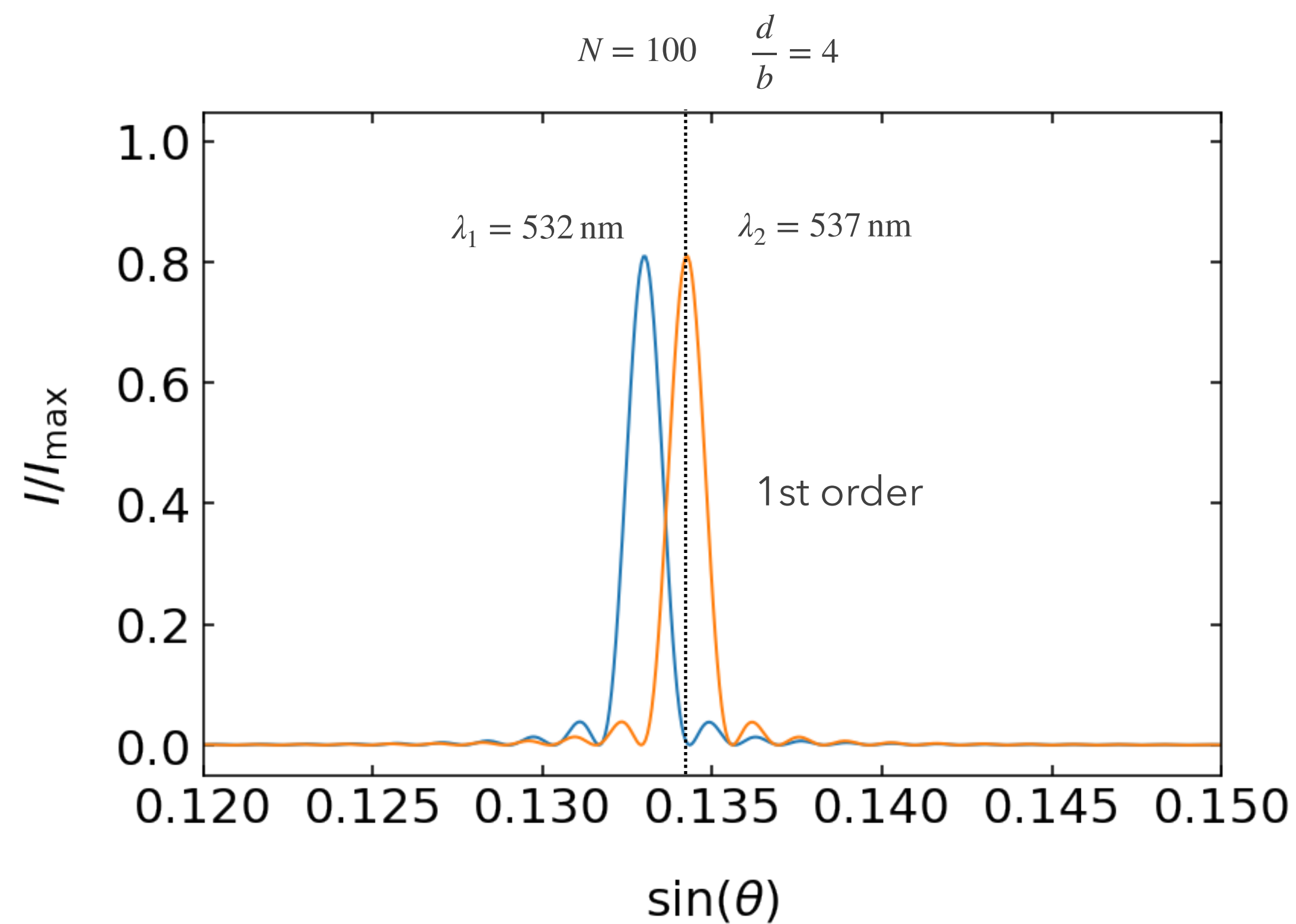


$N = 100$

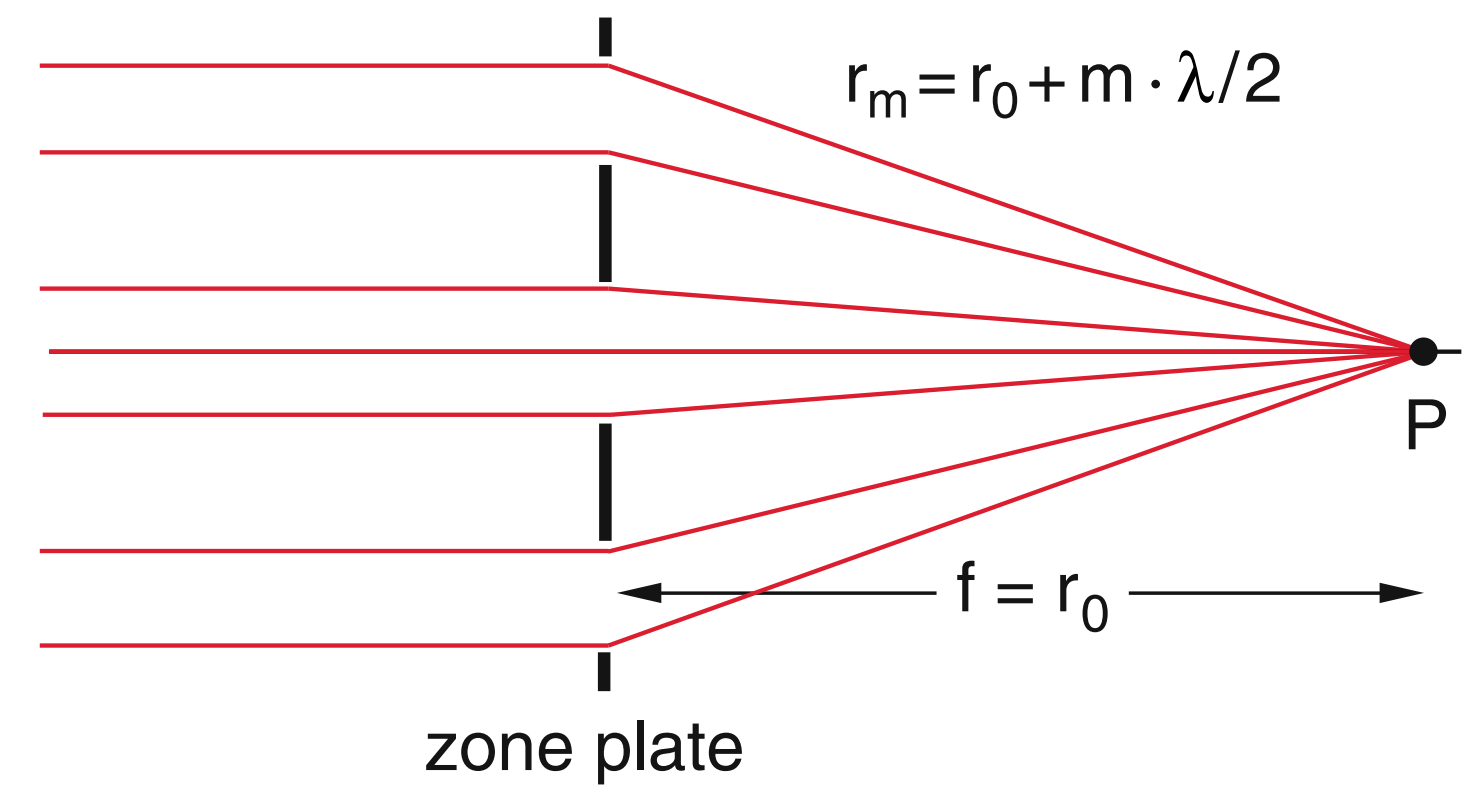
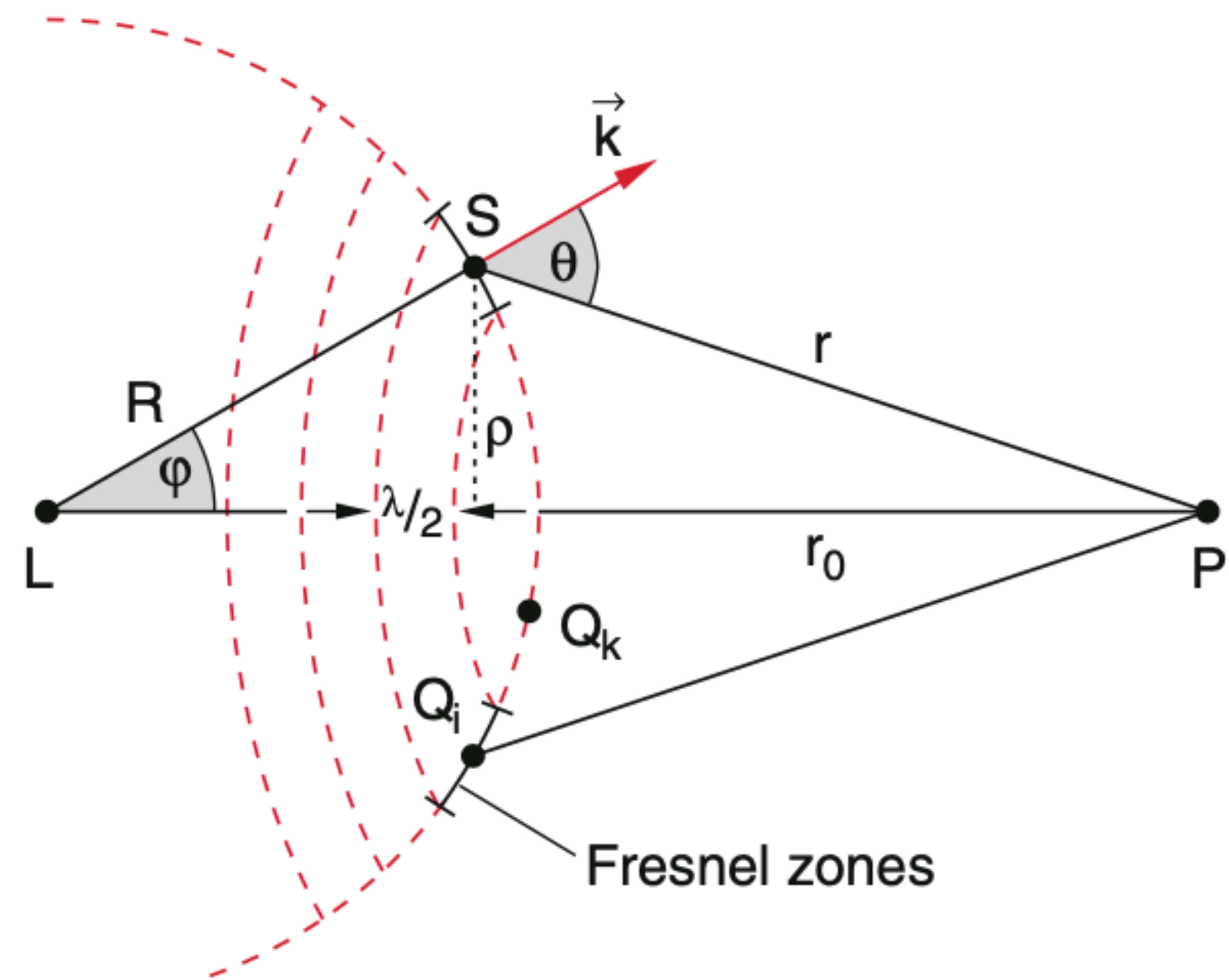


$$\sin(\theta) = \frac{\lambda}{Nd}$$

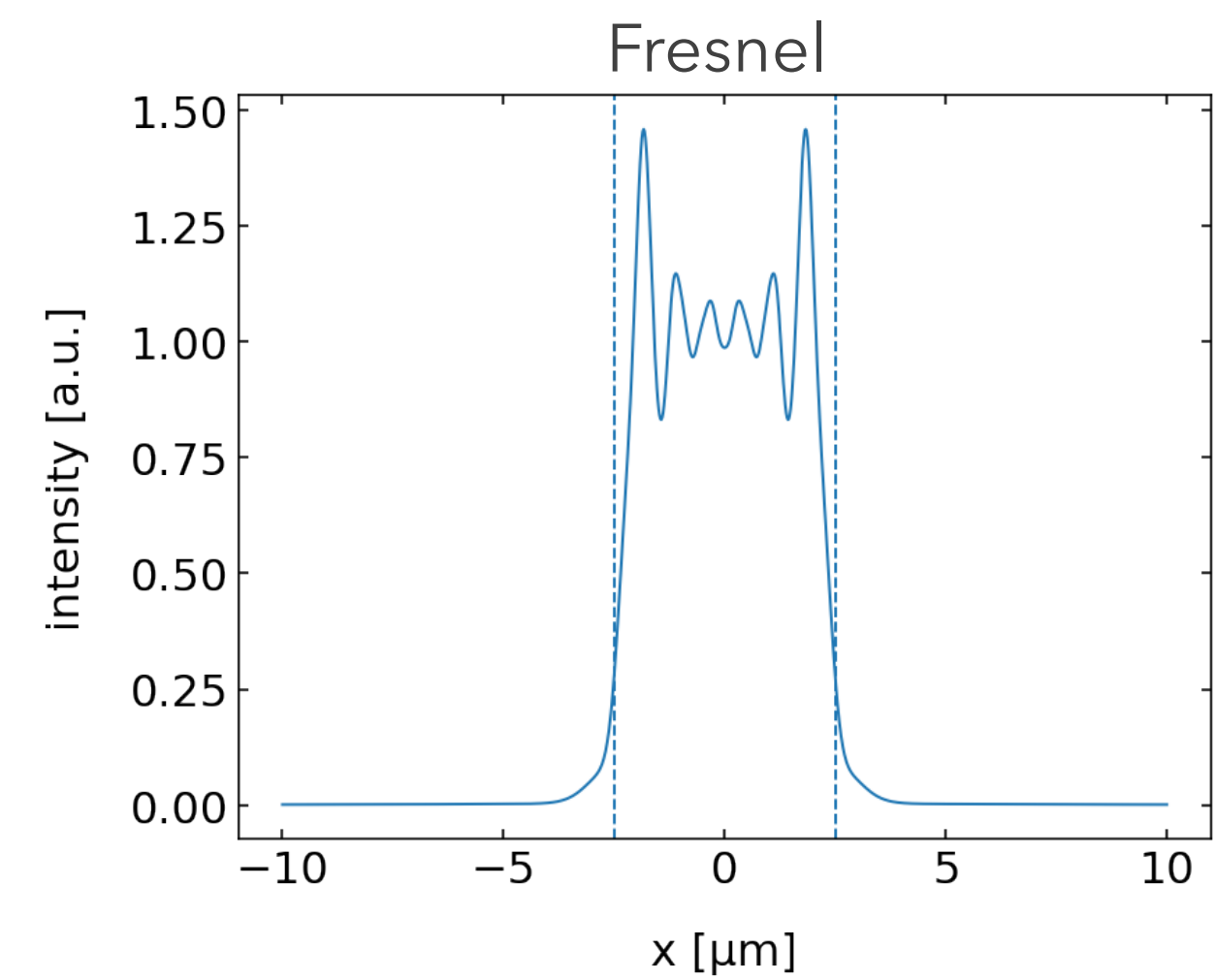
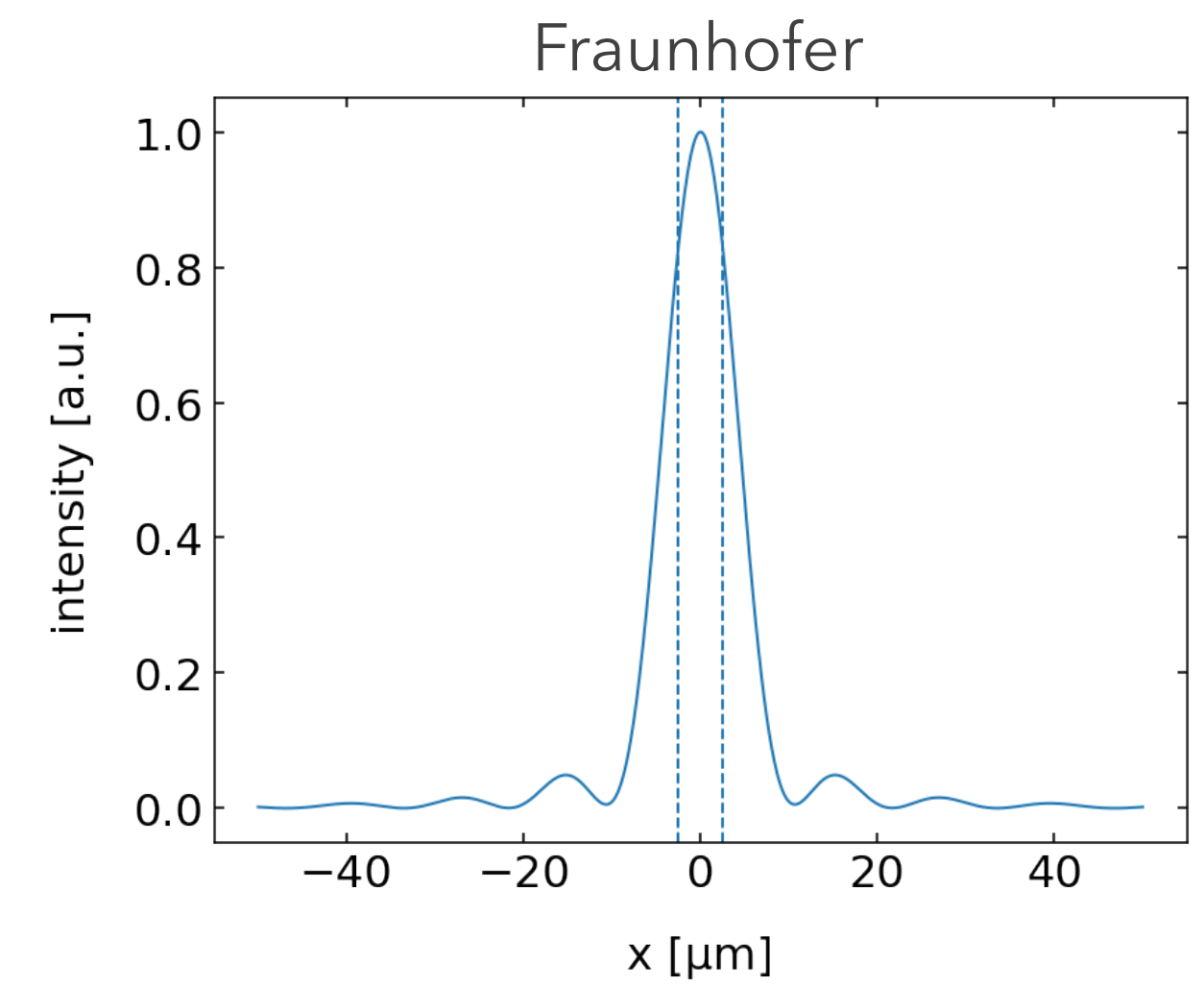
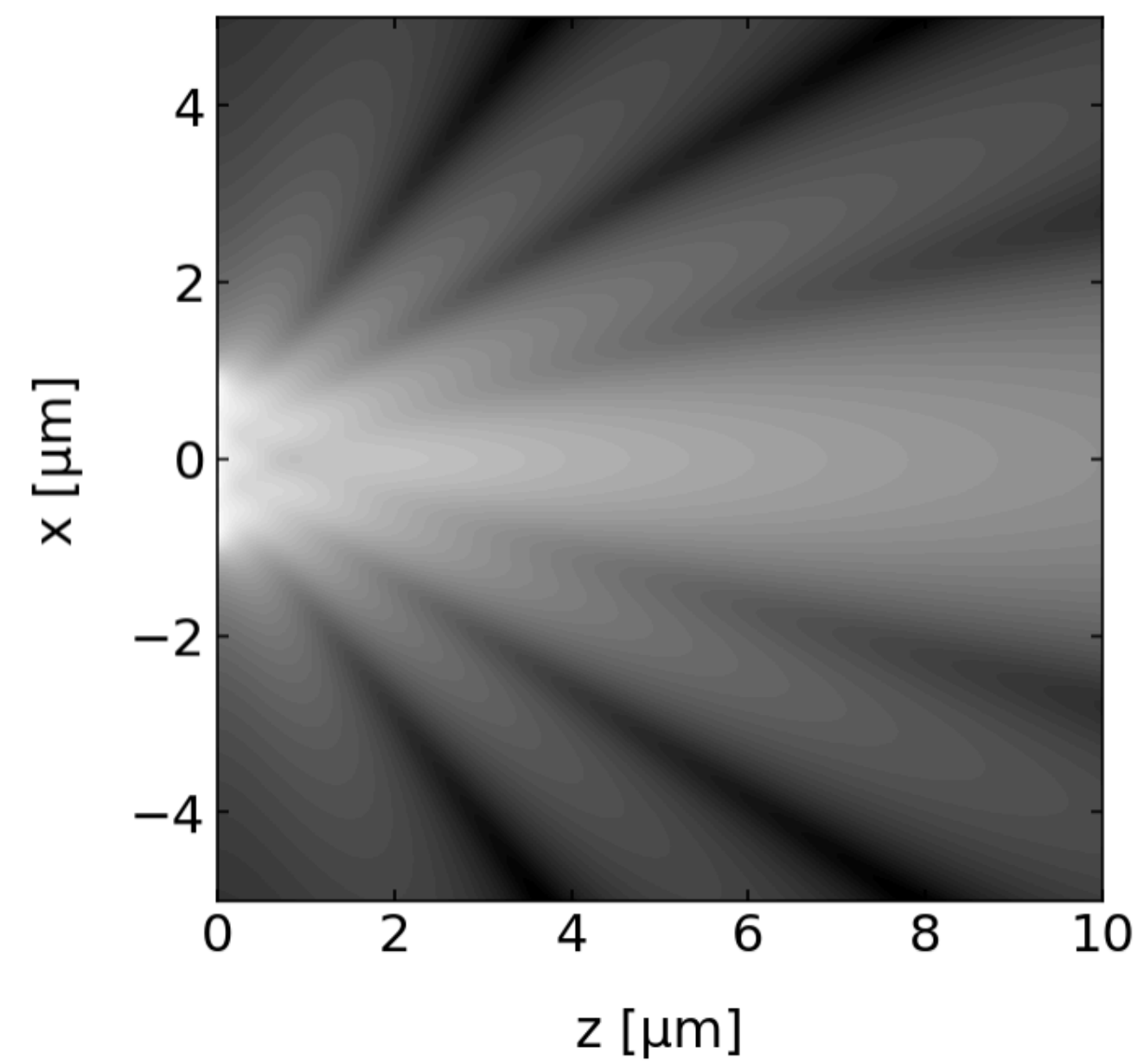
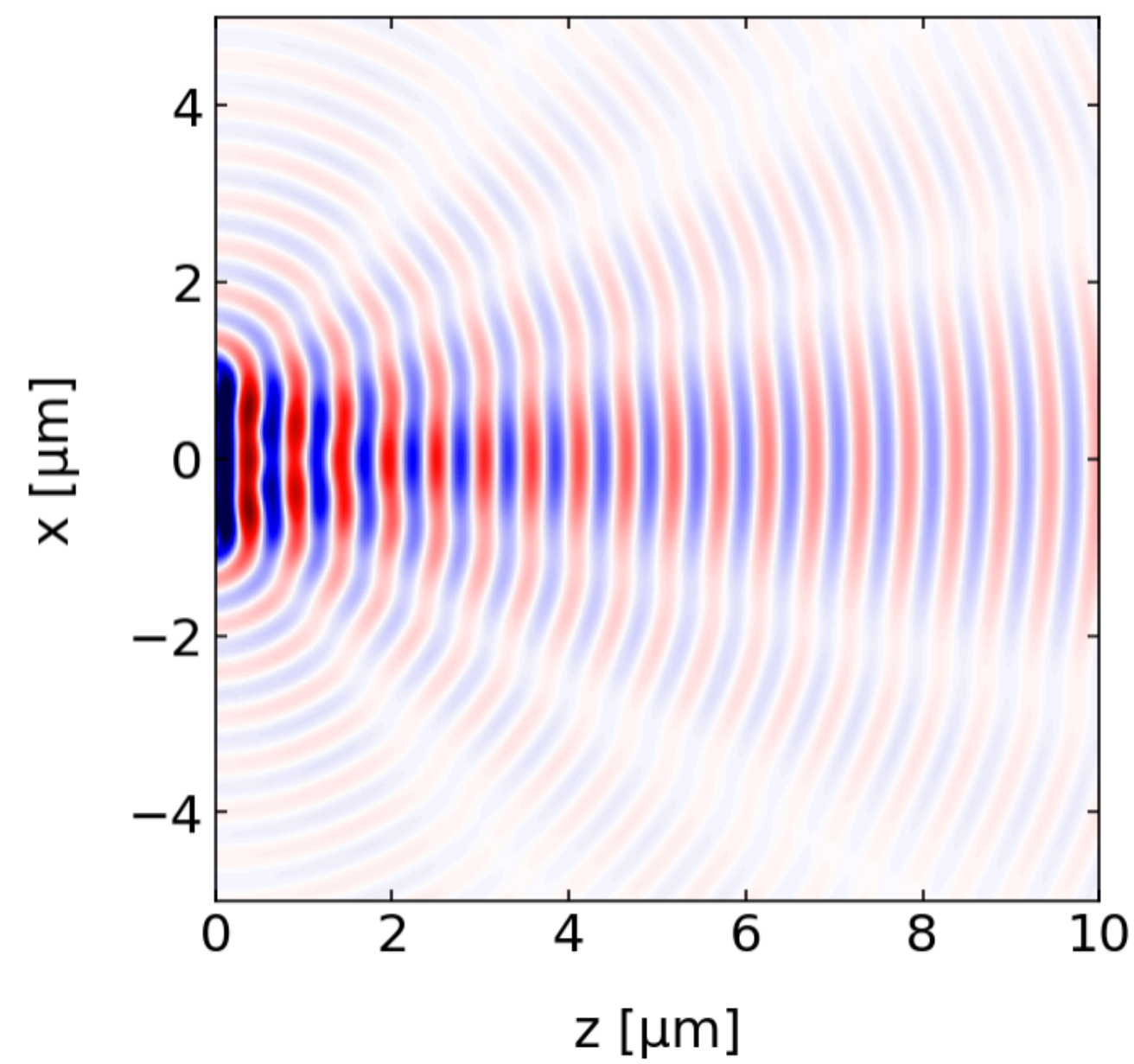
Diffraction Grating - Spectral Resolution



Fresnel Zones



Fraunhofer / Fresnel Diffraction

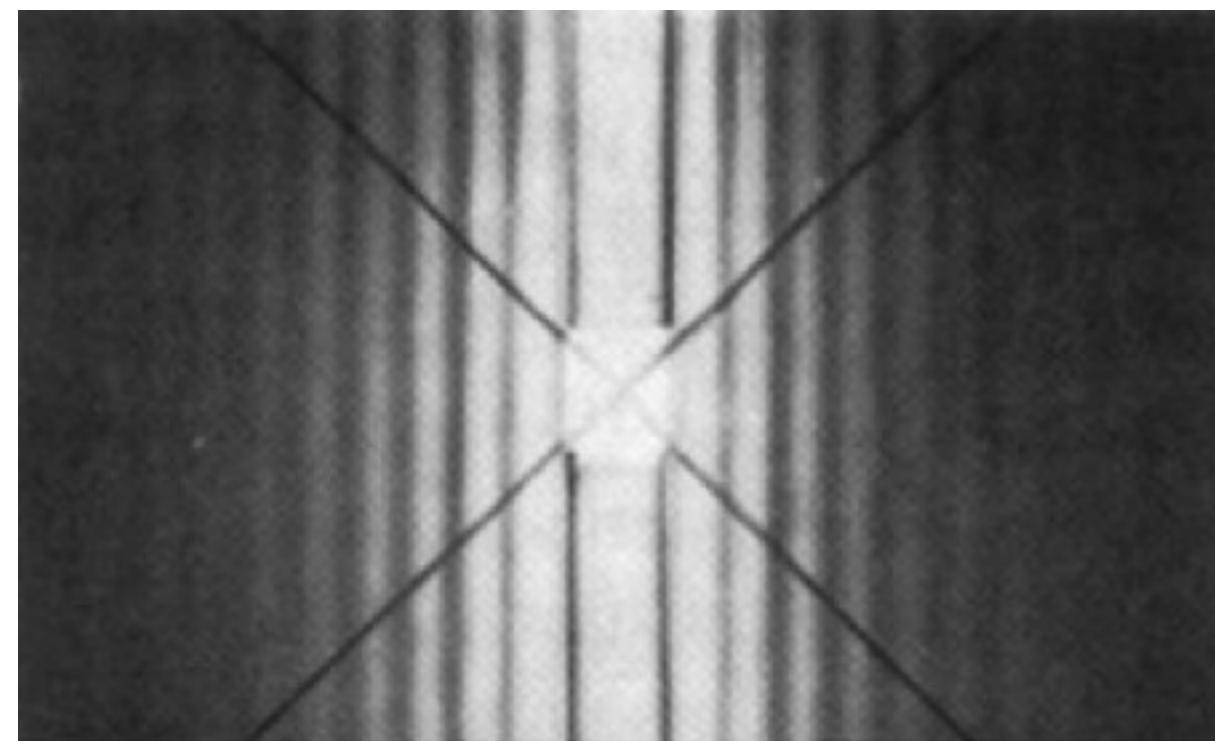


Babinet's Principle

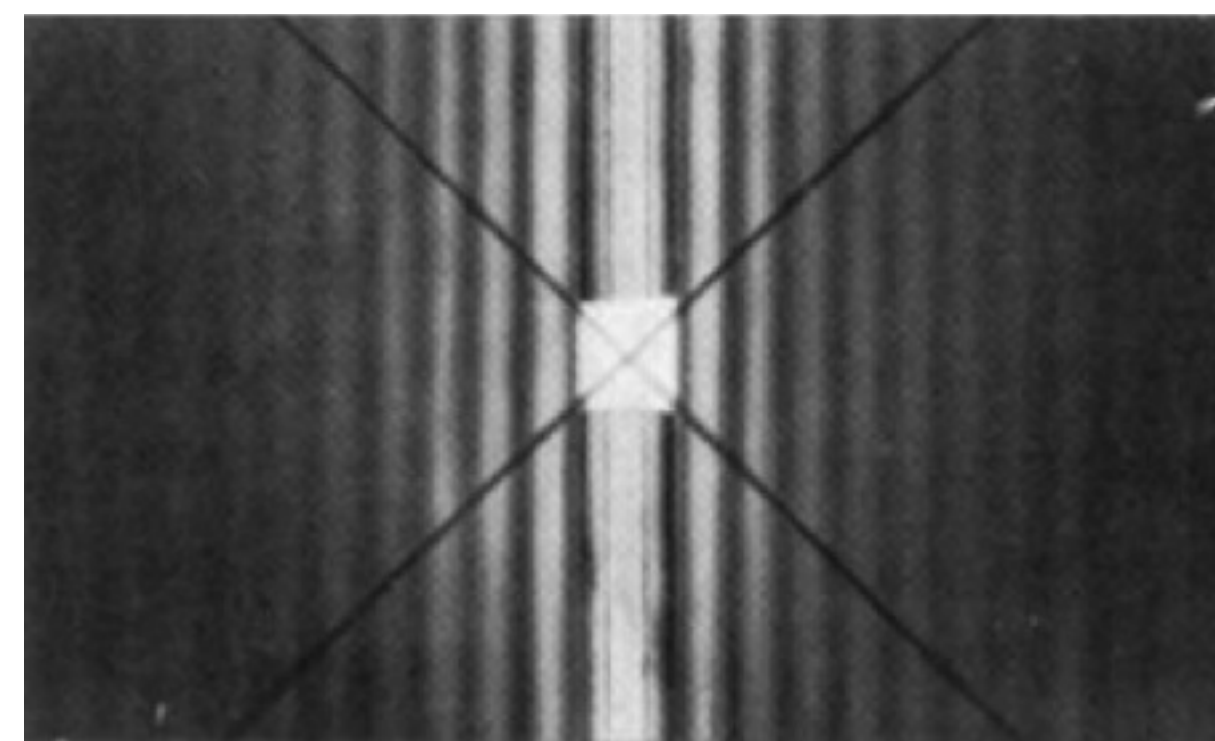
Complementary diffraction objects
have the same far field diffraction pattern



Slit

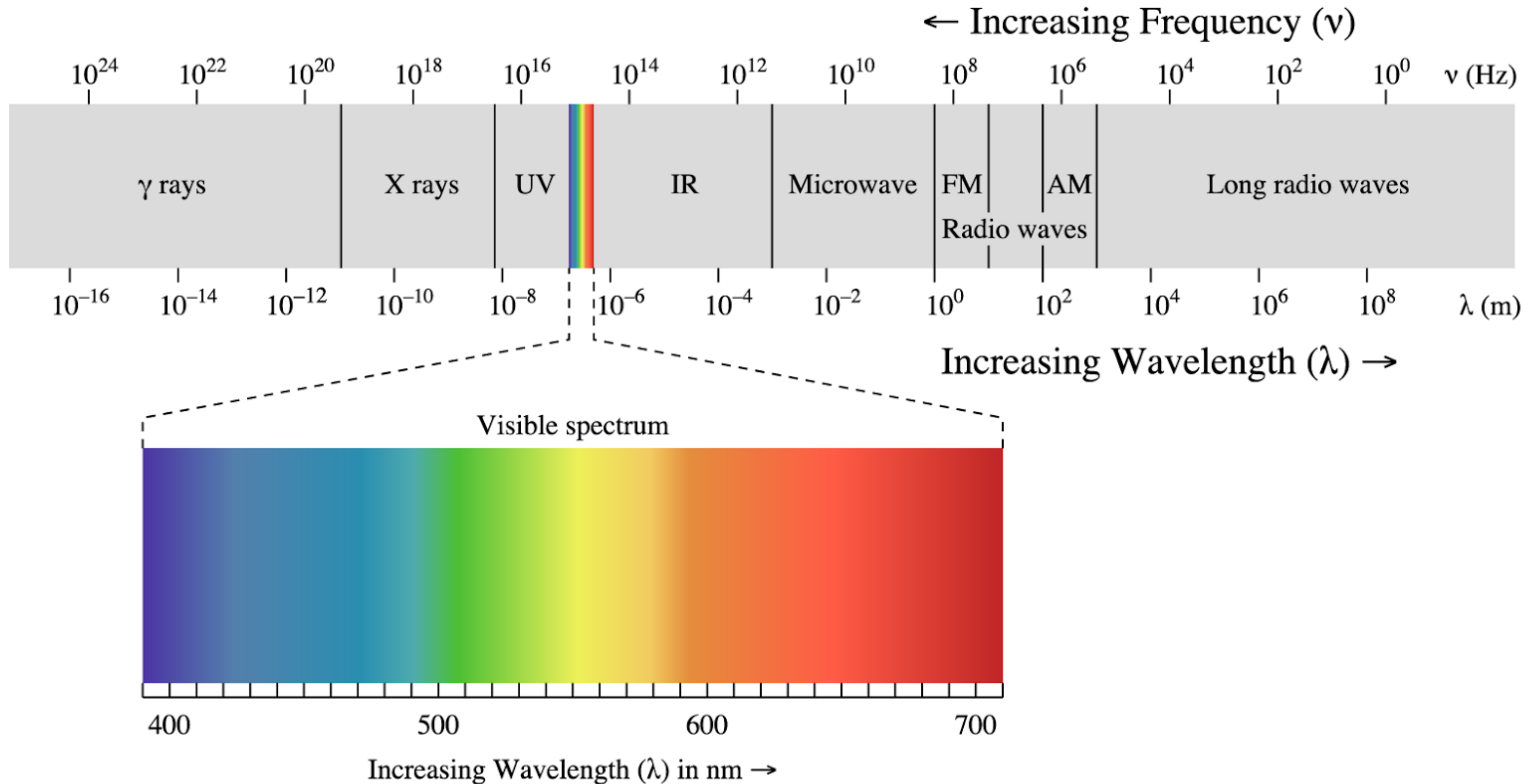


Wire

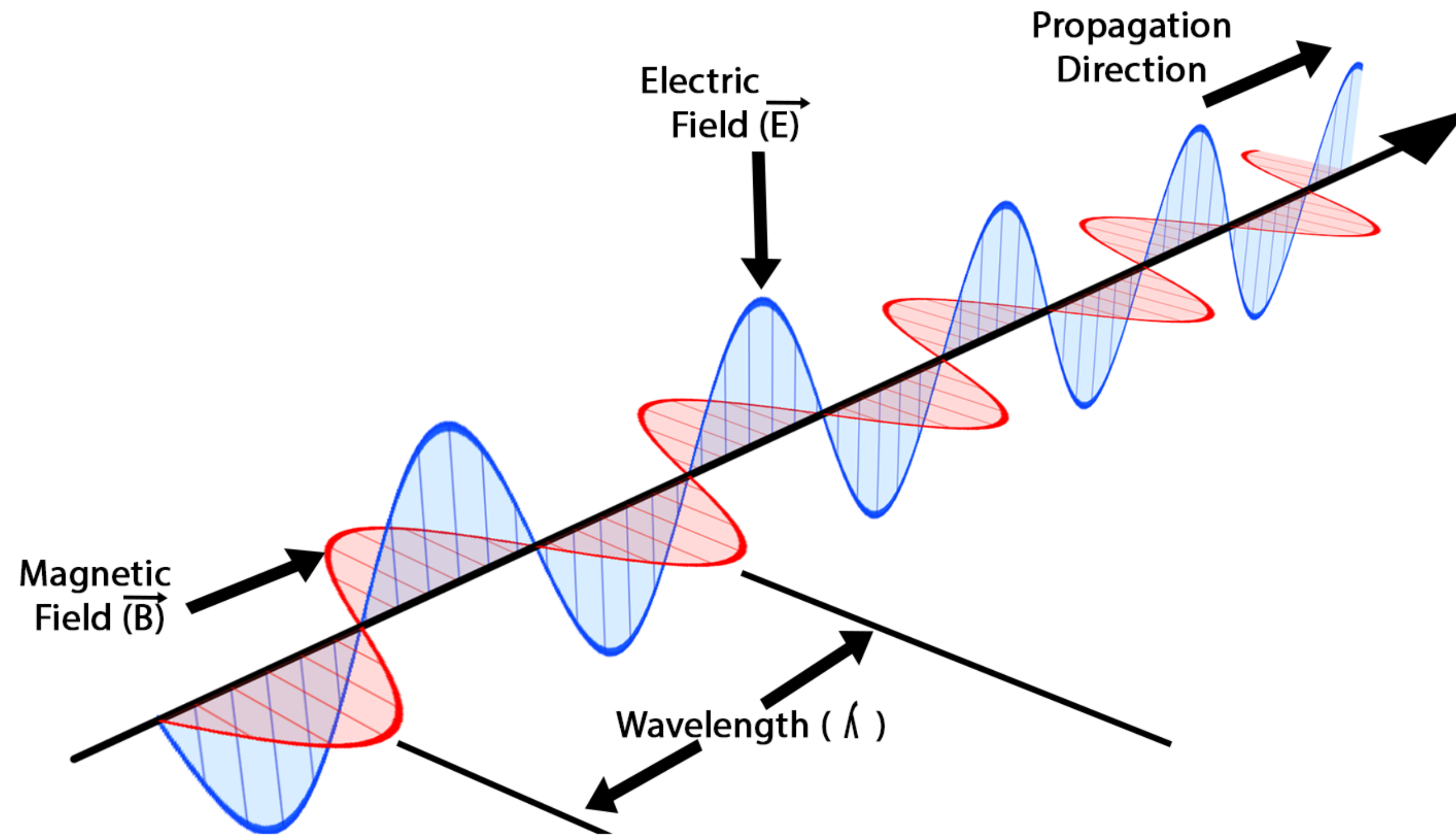


3. Electromagnetic Optics

Electromagnetic Spectrum



Electromagnetic Waves in Vacuum



vacuum

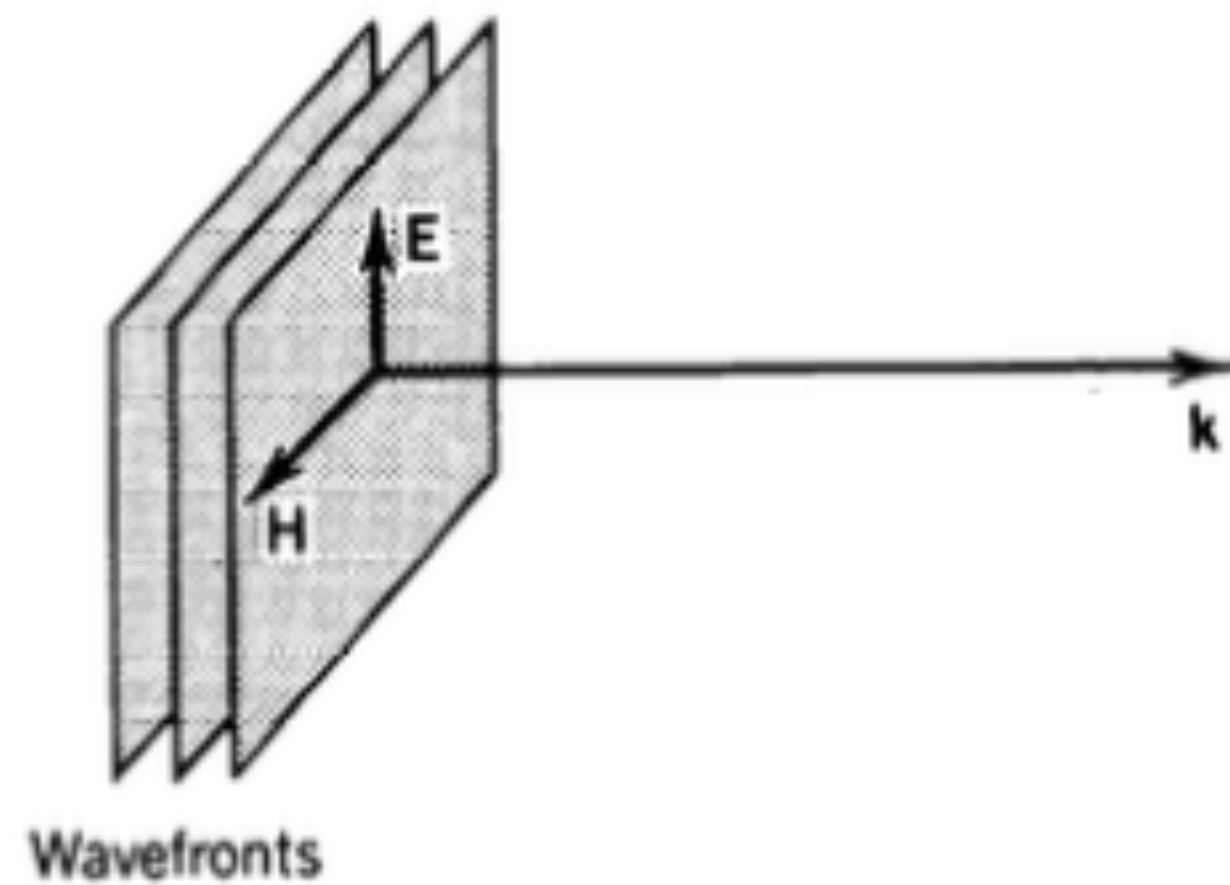
$$\rho = 0 \quad \vec{j} = 0$$

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \quad \nabla \cdot \vec{E} = 0$$

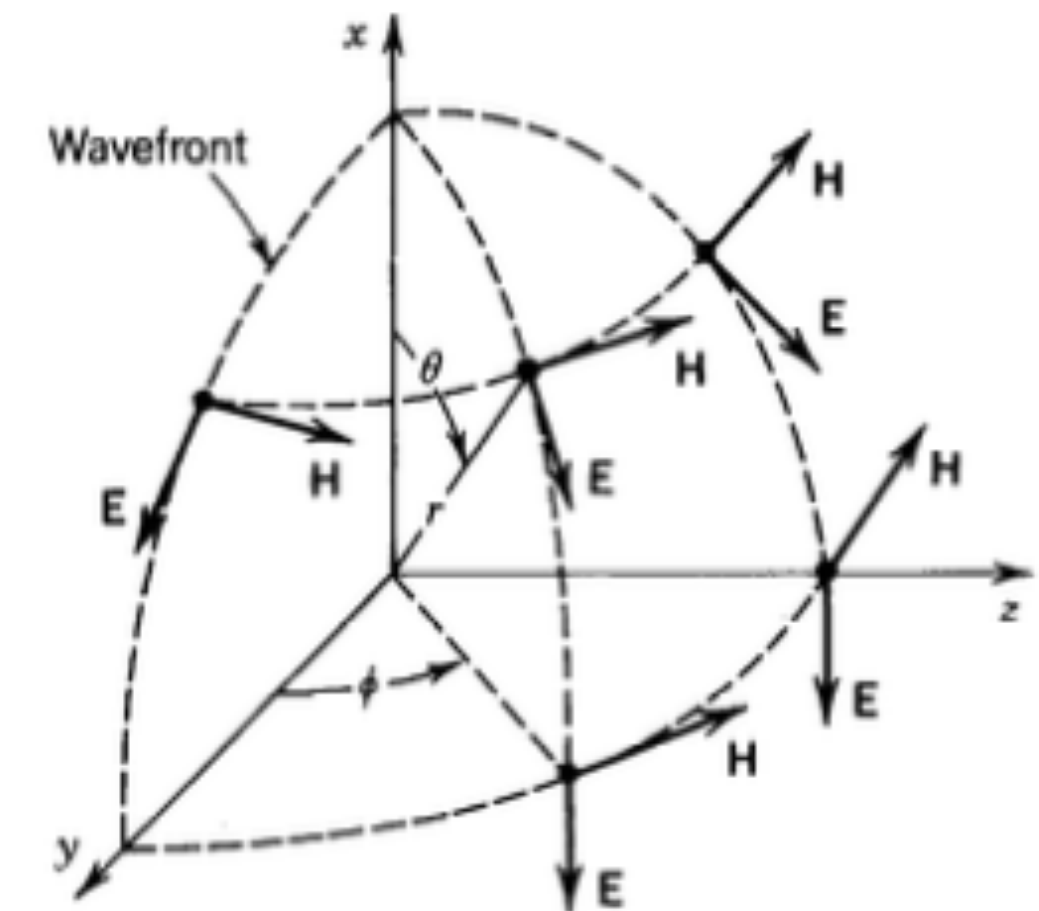
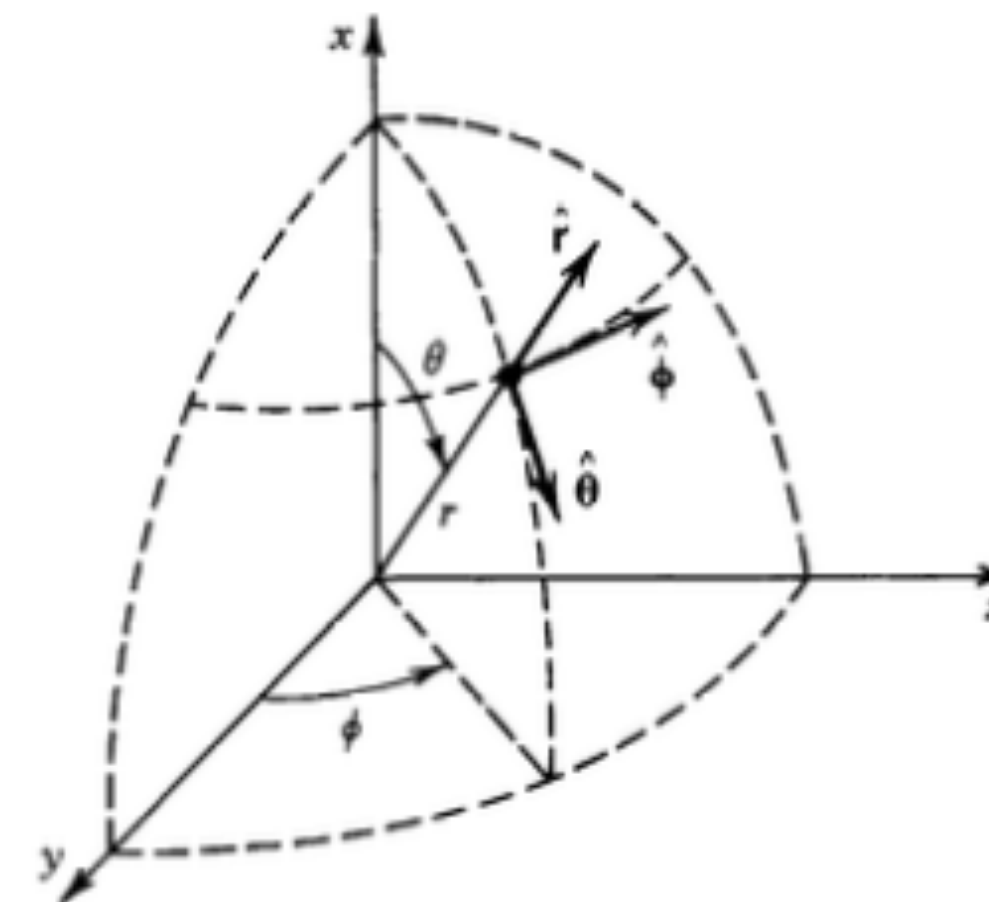
$$\nabla \times \vec{B} = \epsilon_0 \mu_0 \frac{\partial \vec{E}}{\partial t} \quad \nabla \cdot \vec{B} = 0$$

Electromagnetic Waves - Plane Waves, Spherical Waves

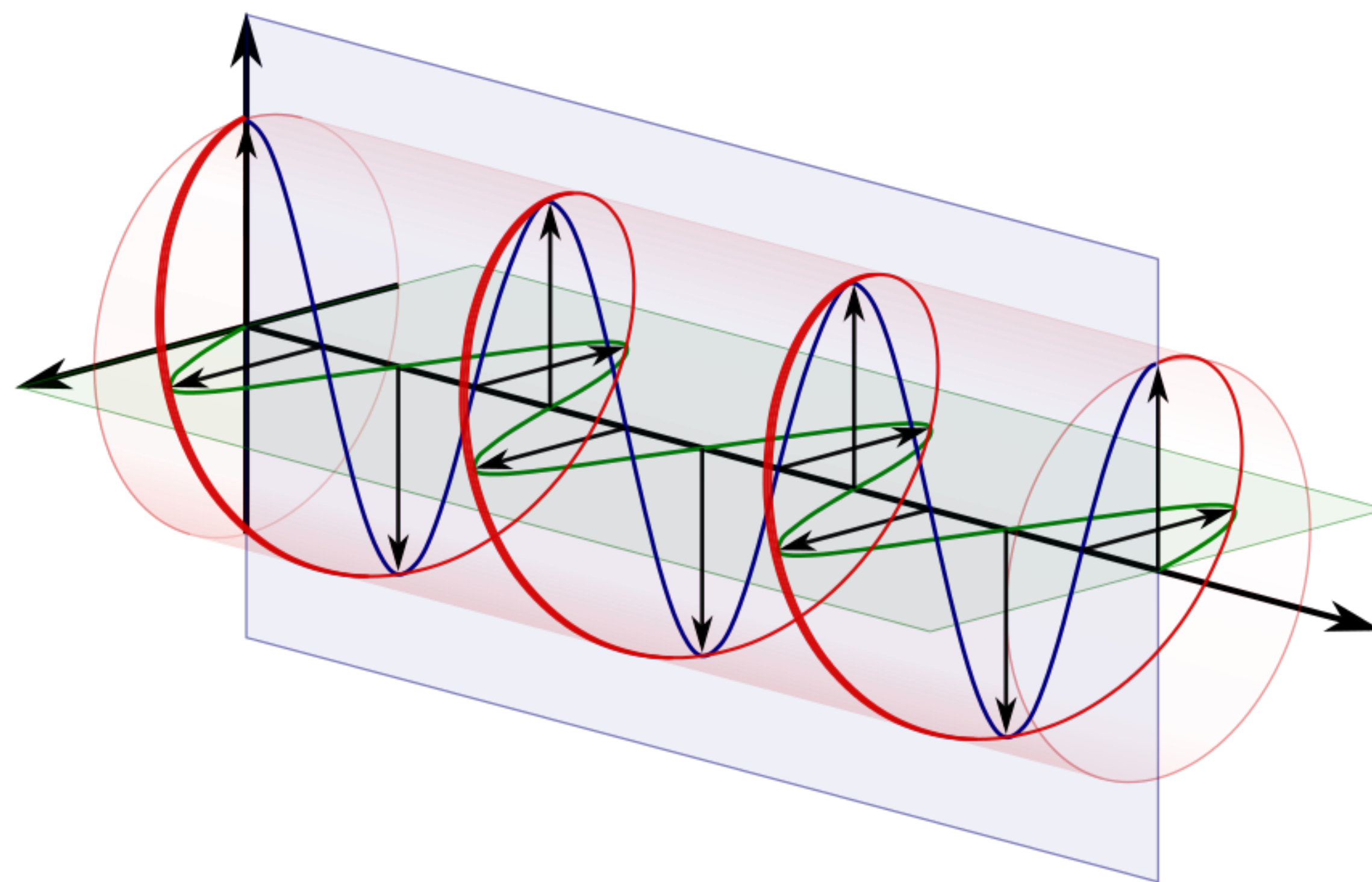
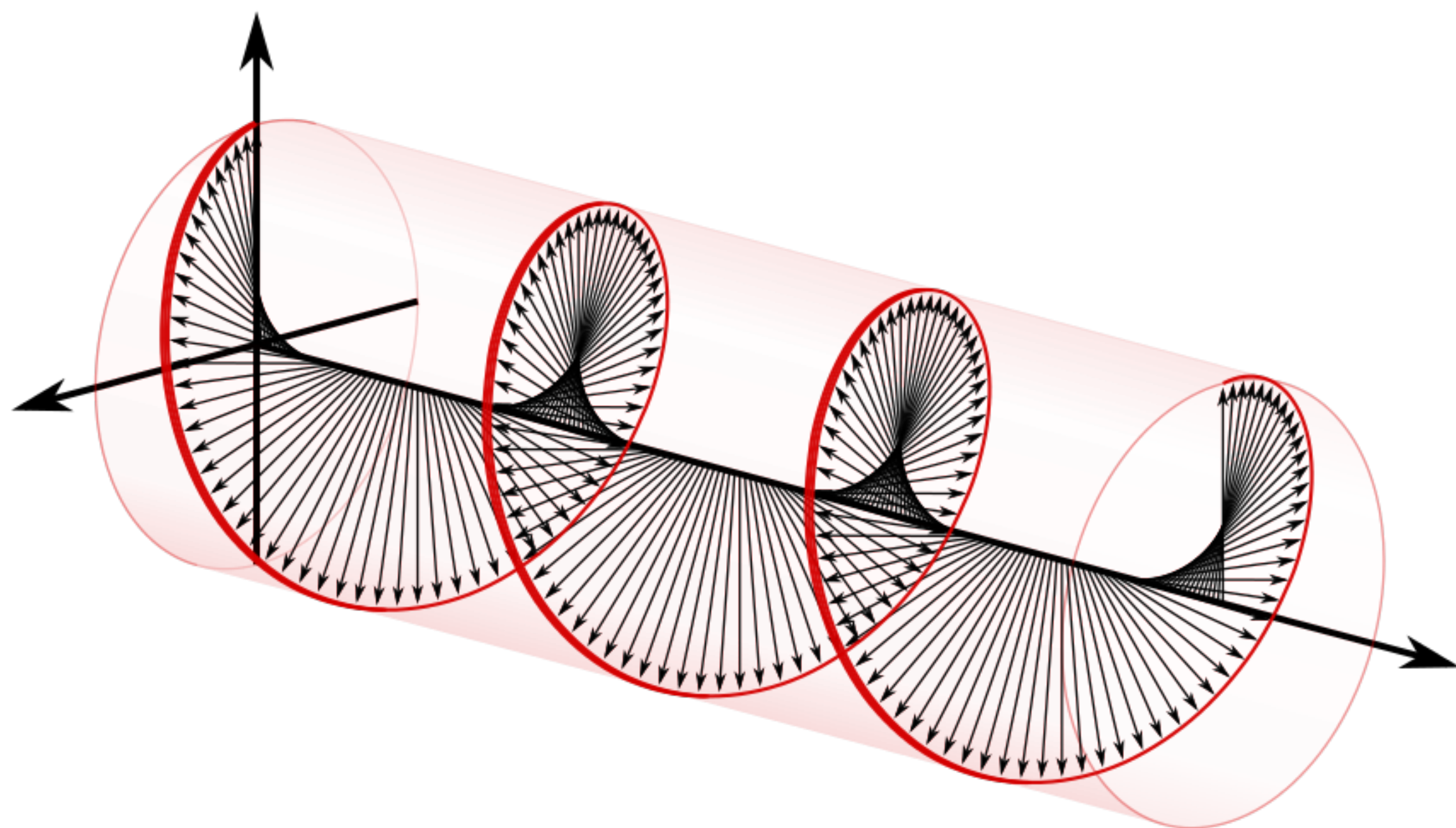
plane wave



spherical wave



Right Circularly Polarized



Left Circularly Polarized

