

WHAT *IS* PHYSICAL OPTICS, ANYWAY?

- **Nanowave engineering** (You *did* love Emag, didn't you?)
 - ▷ Macroscopic wave properties
 - Diffraction
 - Interference
 - ▷ Vector properties
 - Polarization
 - ▷ Statistical description
 - Partial coherence
 - Partial polarization
 - ▷ Applications
 - Polarization-sensitive systems (polarizers, analyzers, compensators)
 - Interferometers
 - Diffractive systems (gratings, structures, ...)
 - Diffraction-based computation of imaging properties

OPTICAL PHYSICS \neq PHYSICAL OPTICS

- Optical physics
 - ▷ Study of non-relativistic aspects of the emission and absorption of light
 - Linear gain, absorption, dispersion
 - Laser device physics
 - Nonlinear optics
 - Surface plasmons
 - ▷ Quantum optics
 - Quantum effects in optical coherence and noise
 - Laser linewidth

QUANTUM ELECTRODYNAMICS \neq OPTICAL PHYSICS

• QED

- ▷ Study of relativistic and quantum aspects of the emission and absorption of light
 - Real and virtual processes
 - ◇ Compton effect ($\gamma + e^-$ and $\gamma + e^+$)
 - ◇ Electron-electron scattering
 - ◇ Lamb shift
 - ◇ $g - 2$ of e^\pm, μ^\pm
 - e^\pm pair production by γ 's in matter
- ▷ Atomic physics
 - Positronium (an “atom” consisting of e^- and e^+)
 - Muonium (an “atom” consisting of e^- and μ^+)