

PHYS 471

Optics

Preliminary syllabus

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Optics

1. Geometrical optics

- Ray optics. Refraction, reflection, dispersion
- Mirrors and lenses
- Optical instruments: magnifying glass, microscope, telescope, spectrometer, camera, eye, eyeglasses

2. Interference and diffraction

- Optical waves. Phase and group velocities. Doppler effect
- Interference. Standing waves.
- Basic interferometers
- Coherence. Coherence time, width, length
- Fraunhofer diffraction. Single slit, two slits
- Diffraction grating
- Resolution of optical instruments
- Fresnel diffraction

3. Polarization

- Fresnel equations
- Birefringence
- Polarization control instruments: polarizers, waveplates
- Optical activity, Pockels effect, Faraday effect

4. XX Century optics

- Blackbody radiation
- Principles of lasers
- Nonlinear optics. Kerr effect, second-harmonic generation, acousto-optical effect
- Fiber optics
- Holography
- Quantum optics