

Physics 710
<< Quantum Optics >>

Spring 2017

Instructor: Dr. Y. H. Shih

Office: PHYS 310

Telephone: 2558 (o), 2796 (Lab.)

Lectures: M W 10:30 am - 11:45 am

Room: Fine Arts 301

Text: Yanhua Shih <<An Introduction to Quantum Optics>>

References: Eugene Hecht <<Optics>>

Rodney Loudon <<The Quantum Theory of Light>>

Prerequisites: Student should have had standard courses in Quantum Mechanics, Electrodynamics (or Electromagnetic Theory) and Mathematical Physics or Engineering Mathematics. In particular, it will be assumed that the students understand the basic theory of ordinary differential equation, basic material about Fourier transform and vector analysis.

Grading Method: Five take home exams, one research paper.

Take Home Exams: The due day of each take home exam will be noticed with the assignment. You are encouraged to discuss the problems together; however, each person should work out their exams *independently*.

Office Hours: W 12:30-3:30pm. I am usually in my Lab. (Rooms 010, 011) and happy to speak with you any time. Call me before your visit.

Topic Outline:

- I. Maxwell's EM Wave Theory of Light
- II. Einstein's Microscopic and Statistical Theory of Light
- III. Quantum Theory of Light
- IV. Measurement of Light
- V. Coherence Property of Light
- VI. Superposition, Diffraction, Propagation and Imaging
- VII. First-Order Quantum Coherence of Light
- VIII. Second-Order and Higher-order Quantum Coherence of Light
- IX. Quantum Entanglement
- X. Quantum Interferometry and Imaging
- XI. Fundamental Problems of Quantum Theory