

Syllabus Fall 2016

General Physics II

Course description. Light is central to modern physics and cosmology, in observation, theory and experiment. The *first light* signifies the onset of the Big Bang with a lasting imprint in the cosmic microwave background (CMB) radiation. Light propagates through vacuum at the velocity of light. Our understanding light in terms of the Maxwell equations of electromagnetic fields and its quantization in photons and the associated interactions of electric and magnetic fields with matter. In this course, we give an introduction to light and electromagnetism with some selected applications.

Professor: Maurice H.P.M. van Putten

Coordinates:

Reference material. College Physics, A. Giambattista, B. Richardson and C. Richardson, 2012, (McGraw-Hill, 4th edition). **Ch. 16-30**; *Feynman Lectures of Physics*, Volume II, online available at www.feynmanlectures.caltech.edu.

Contents

- I. What is light?**
- II. Mathematical preliminaries**
- III. Elements of calculus of vectors**
- IV. Elements of algebra**
- V. Geometrical properties of the calculus of fields**
- VI. Electric fields**
- VII. Electric field in various applications**
- VIII. MIDTERM**
- IX. Electric fields in neuro-physiology**
- X. Magnetic fields**
- XI. Magnetic fields in various applicatons**
- XII. Magnetic fields in matter**
- XIII. Maxwell equations and electromagnetic waves**
- XIV. Action principle for wave motion**
- XV. Radiation processes and relativity**
- XVI. FINAL**

Homework. Provided in class

Grading. Based on class attendance, homework, mid-term, final