

## Topics in Modern Optics, Optics 569

Instructor: Jean-Claude Diels

Mon. and Wed. 14:00- 15:15,

P & A room 184

The main topic of this class will be interaction of intense pulses of light with matter, and their linear and nonlinear propagation through various media, including air. The type of light waveform being considered range from single pulse, picosecond to femtosecond pulse trains or frequency combs, to attosecond pulses.

A semi-classical quantum mechanical treatment of the interaction of atoms or molecules with a classical field covers practically all phenomena from saturation to harmonic generation to nonlinear propagation. In most practical instances, a generalized “Bloch Vector Model” can be used to get a physical feeling for the type of interaction, and how the physical situation can be exploited to optimize the desired result.

The various interactions properties will be applied to the creation and manipulation of ultrashort pulses, and sources of frequency combs.

Parts of this course is covered in *Ultrashort Laser Pulse Phenomena* J.-C. Diels and W. Rudolph, Academic Press (first edition out of print, second edition too expensive, third edition not done yet – hopefully completed in 2018). In lieu of a textbook, material will be provided as pdf and ppt files.