

Nonlinear optics, Optics 568
Mondays and Wednesdays, 13:00 – 14:15
PAIS 1140

Instructor

Jean-Claude Diels
Physics & Astronomy room PAIS 2236, phone 277 4026
CHTM, room 114A, phone 272 7830
Email: jcdiels@unm.edu
Office hours by appointment

Teaching Assistant

Ali Rastegari, arastegari@unm.edu

Reference material

Reference material will be posted on the Website:

<http://Dielslab.unm.edu>

That will include in large part sections of Chapters 3 through 5 of the third edition of “Ultrafast Phenomena” by Diels & Rudolph (in preparation).

Other reference: Nonlinear Optics, third Edition, by Robert Boyd.

Tentative Schedule

Dates and content subject to change.

Jan 18	Introduction: linear versus non-linear	
Jan 23	Complex variables, Transients, polarization phase	Chapter 1
Jan 25	Free and bound electron response/plasma	Chapter 3
Jan 30	No class (Photonics West)	
Feb 1	From coherent interaction to nonlinear optics	Notes
Feb 6	Semi-Classical multilevel systems	Chapter 3
Feb 8	Bloch's equations From Bloch to linear	Chapter 3
Feb 13	Coherent propagation	Chapter 3
Feb 15	Harmonic generation	Chapter 3
Feb 20	Third order nonlinearities	Chapter 3
Feb 22	Third order nonlinearities and Filaments	Chapter 4
Feb 27	Four wave mixing	Chapter 4
Mar 1	Self focusing, filamentation solitons	Chapter 4
Mar 6	Notations conversion factors	Chapter 4
Mar 8	velocities review-1	Chapter 4
Mar 20	velocities review-2	Chapter 5
Mar 22	Brillouin scattering	Notes
Mar 27	Second order / second harmonic, optical rectification, OPO	Chapter 4
Mar 29	Second harmonic generation, , THz, THz detection	Chapter 4, Notes
Apr 3	Wigner function, From classical to quantum,	Chapter 1, 5
Apr 5	Noise, squeezing	Chapter 5
Apr 10	Attosecond pulses	Notes
Apr 12		Chapter 13

Your activities

The homework will include some problems from the book, some from the blue.

There will be a final written project with 30 minutes oral presentation on a topic related to Nonlinear Optics to complete the course. The topic of the presentation should be finalized after the Spring semester break March 25. Equal weight for Homework and project.

Questions, Communication

Please call me at 272 7830 to make appointment. Please leave a message.

COVID-19

COVID-19 Health and Awareness. UNM is a mask friendly, but not a mask required, community. To be registered or employed at UNM, Students, faculty, and staff must all meet UNM's Administrative Mandate on Required COVID-19 vaccination. If you are experiencing COVID-19 symptoms, please do not come to class. If you have a positive COVID-19 test, please stay home for five days and isolate yourself from others, per the Centers for Disease Control (CDC) guidelines. If you do need to stay home, please communicate with me; I can work with you to provide alternatives for course participation and completion. UNM faculty and staff know that these are challenging times. Please let me, an advisor, or another UNM staff member know that you need support so that we can connect you to the right resources. Please be aware that UNM will publish information on websites and email about any changes to our public health status and community response.

Accommodations

UNM is committed to providing equitable access to learning opportunities for students with documented disabilities. As your instructor, it is my objective to facilitate an inclusive classroom setting, in which students have full access and opportunity to participate. To engage in a confidential conversation about the process for requesting reasonable accommodations for this class and/or program, please contact Accessibility Resource Center at arcsrvs@unm.edu or by phone at 505-277-3506.

Support: Contact me at 505 272 7830 or in office and contact Accessibility Resource Center (<https://arc.unm.edu/>) at arcsrvs@unm.edu (505) 277-3506.

TITLE IX

Our classroom and our university should always be spaces of mutual respect, kindness, and support, without fear of discrimination, harassment, or violence. Should you ever need assistance or have concerns about incidents that violate this principle, please access the resources available to you on campus. Please note that, because UNM faculty, TAs, and GAs are considered "responsible employees" by the Department of Education, any disclosure of gender discrimination (including sexual harassment, sexual misconduct, and sexual violence) made to a faculty member, TA, or GA must be reported by that faculty member, TA, or GA to the university's Title IX coordinator. For more information on the campus policy regarding sexual misconduct, please see: <https://policy.unm.edu/university-policies/2000/2740.html>.

Support: LoboRESPECT Advocacy Center and the support services listed on its website, the Women's Resource Center and the LGBTQ Resource Center all offer confidential services and reporting.