About Faculty

Dr. Jeremy Gulley

An American physicist and academic. He has written 12 research and proceedings papers in the area computational nonlinear optics and laser-induced damage in dielectric solids. He was awarded the best presentation of a paper at SPIE's 2010 Laser Damage Symposium. In 2013 was selected as a Young Investigator by the US Air Force Office of Scientific Research, and was also selected as a Summer Faculty Fellow at the Air Force Research Laboratory in 2015. He received his B.S degree in Physics from Furman University and his Ph.D. from the University of Georgia. After short stints as a Research Associate and Instructor at the University of Georgia and Georgia Gwinnett College, Dr. Gulley joined the Physics faculty at Kennesaw State University, north of Atlanta, GA, USA in 2010. His research is in theoretical applied physics and computational ultrafast optics. In particular, his research concentrates on simulating the propagation of high intensity ultrashort laser pulses through bulk nonlinear media. These simulations are used to investigate laser induced dielectric breakdown, pulse filamentation, and ultrafast laser-induced modifications to bulk solids.

Selected awards and honors :

- US Air Force Summer Faculty Fellow (2015)
- Awardee of the US Air Force Office of Scientific Research Young Invesigator Program (2013)
- SPIE Laser Damage Symposium Best Paper Presentation Award (2010)
- Doctoral Completion Funding Award, given by the University of Georgia Graduate School, funding given to promising graduate students nearing completion of their dissertation
- Bill Cummings Award, given by the University of Georgia Department of Physics and Astronomy for outstanding performance during graduate school.

Course Co-ordinators

Dr. Saidi Reddy Parne

Dr. P. S. Reddy's (born in 1981 in Andhra Pradesh, India) research expertise is on Sensors, Photonics and Renewable energy. Prior to joining NIT Goa, he worked as a sensors specialist at Pricol Technologies limited, Coimbatore. He has obtained his Ph. D from NIT Warangal. He has authored several papers in these areas in reputed journals.

Dr. Velavan Kathirvelu

Dr. Velavan Kathirvelu is currently an assistant professor in Department of Humanities and sciences at NIT Goa. His research interest includes, distance measurement by EPR spectroscopy, electron spin relaxation of organic free radicals and transition metal ions.

About NIT Goa

The National Institute of Technology Goa (NIT Goa) is a premier technical Institute of the region. NIT Goa was established in the year 2010 by an act of parliament (NIT act 2007) and it is declared as 'Institute of National Importance'. NIT Goa is an autonomous institute and functioning under the aegis of Ministry of human Resource Development (MHRD), Govt. of India. The campus is located at Farmagudi, Ponda approximately 29 km southeast of Panaji, the capital of Goa and it is a temporary campus. The state of Goa is well connected by road ways, rail ways and air ways with various parts of the country

The Institute offers under Graduate and Post Graduate courses in three Engineering Departments: (1) Computer Science and Engineering (2) Electronics and Communication Engineering and (3) Electrical and Electronics Engineering. The Institute also offers Ph.D in all the three above mentioned engineering departments. Along with that the Institute offers Ph.D in Mechanical Engineering, Physics, Chemistry, Mathematics, Economics and English.

The Institute admits students into the B.Tech degree program on the basis of ranks obtained in the Joint Entrance Examination JEE(Main) and the scheme of Direct Admission to Students Abroad (DASA) with an intake of 30 students in each branch. The institute is sincerely attempting to deliver quality education and to achieve excellence in teaching, learning and research with high professional ethics.

For M.Tech Programme, the Institute admits students through valid GATE score followed by CCMT (Centralized Counselling for M.Tech Admissions). Each department is offering 20 seats for the said programme, out of which 18 seats will be filled up through CCMT and the remaining 2 seats are meant for the sponsored candidates.

http://www.nitgoa.ac.in/

For more details please contact

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GIAN
GLOBAL INITIATIVE OF ACADEMIC NETWORKS

GLOBAL INITIATIVE ON ACADEMIC NETWORK (GIAN)

10 Days Course on

Computational Nonlinear Optics

7-18 November 2016

under the aegis of

Government of India
Ministry of Human Resource Development

सत्यमेव जयते

Venue:

National Institute of Technology Goa
Farmagudi, Ponda, Goa-403401

Overview of the Course

The goal of computational optics is to numerically model the behavior of light and its interactions with matter. The classical theories of electricity and magnetism were unified with optics into one super-discipline by Maxwell in the 1800's. The behavior of light waves on the macroscopic level was well described by this approach, but not at the microscopic level of the atom. The discovery of quantum mechanics during the first half of the 20th century revolutionized how we described light and its interactions with matter. In particular, the latter birth of the laser made possible strong coherent electric field strengths not previously available, opening up the experimental field of nonlinear optics.

Nonlinear optics refers to cases when the material response to a light field does not scale directly with the field strength. This occurs whenever the electric field of the light is comparable to those found within the atom. Unlike linear optics, there are very few problems in nonlinear optics that can be solved exactly by theory alone. Thus we require numerical simulations to understand and model how high intensity light propagates through nonlinear media. Such calculations inform and guide the modern use of lasers in medical surgery, signals communication, remote sensing, micro/nano machining of solids, and many other areas of applied and fundamental research.

The course will cover: The basic theory of classical optics, propagation of plain waves, linear propagation of Gaussian beams and pulses, numerical methods of solving Maxwell's equations, approximate unidirectional models of long-distance field propagation, the classical linear and nonlinear material response to electromagnetic fields, practical inclusion of laser-induced ionization for laser pulse propagation, nonlinear propagation and laser-induced damage in solids, a review of the quantum theory for solids, quantum mechanical treatments of laser-material response, and current quantum mechanical calculations of the nonlinear response in solids during pulse propagation.

Apart from this, this course will cover current research on the applications of laser optics in medicine, communications, defense, and industry.

Course Outline

- Brief introduction to classical and modern optics
- Propagation modeling of with Gaussian optics
- Computational methods of solving Maxwell's equations directly
- Modeling the classical field-material response in linear media
- Modeling the classical field-material response in nonlinear media
- Introduction to unidirectional methods of modeling field propagation
- Modeling ionization in nonlinear media during propagation
- Propagation and laser-induced damage in transparent solids
- Introduction to quantum modeling of the field-material response in nonlinear media
- Propagation and quantum modeling of the field-material response in solids
- Problem solving session with examples.

Course Objectives

- To provide an understanding of the principles and concept of modern optics.
- To introduce the methods of Gaussian optics and computational methods of approximating and solving the Maxwell equations in matter.
- To introduce the methods of modeling linear and nonlinear field-material interactions for propagation simulations.
- To provide an understanding of current research in modeling high power, ultrafast optics.

Expected Outcome

- Analytic beam and pulse propagation by Gaussian optics and plain wave approximations.
- Numerical simulations of laser pulse propagation by finite differencing and spectral methods.
- Foundations of classical and quantum theories for both linear and nonlinear optics.
- Numerically solving quantum mechanical equations for basic multi-level systems exposed to intense laser fields.
- Foundations of ultrafast laser-induced ionization and damage in solids.
- Numerical simulations of electronic laser-material interactions in simple solids.

Who Can Attend ?

- Executives, engineers and researchers from manufacturing, service and government organi-zations including R&D laboratories.
- Student students at all levels (BTech/MSc/MTech/PhD) or Faculty from academic institutions and technical institutions.

Important Dates

Last date for receiving applications :
15 October 2016

Intimation to participants :
1 November 2016

Course Dates :
7-18 November 2016

Registration Fee

The participation fees for taking the course is as follows:

Participants from abroad : US $500

Participants from Industry: Rs. 8000/-

Participants from Academic/Research Organizations: Rs 7,000/-

Students and research scholars:Rs.2000/-
(For SC/ST students : Rs 1,000/-)

The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, free internet facility.

The participants will be provided with accommodation and food on payment basis.

To register for the course, visit :
http://www.nitgoa.ac.in/gian/