



भारतीय प्रौद्योगिकी संस्थान कानपुर  
Indian Institute of Technology Kanpur

# PHOTONICS SCIENCE AND ENGINEERING

POST GRADUATE PROGRAM

# PHOTONICS SCIENCE AND ENGINEERING

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Since their invention in 1960s, lasers have transformed most fields of science and technology. Laser activity started at IIT Kanpur in 1964 and by late 1960s, IIT Kanpur distinguished itself in the fabrication of lasers of various kinds. The Laser Technology Programme (LTP) at IIT Kanpur started in July 1988 with the aim and objective of training young Engineering and Science graduates for providing skilled manpower in the specialised field of lasers and photonics. The name of the programme was changed to Photonics Science and Engineering in the year 2012 which is housed at the Center for Lasers and Photonics (CELP).

It is a unique interdisciplinary programme, which draws faculty from the departments of Chemistry, Electrical Engineering, Mechanical Engineering, Civil Engineering and Physics to teach various core courses and guide Ph.D., M.Tech. and MS theses. The students make use of the facilities of the Centre for Lasers and Photonics, which consolidates the research and developmental activities in this field. In addition to the usual classroom teaching, emphasis is given to hands-on experience on lasers.

It is hard to imagine our lives without laser-based optical communications and networks; compact disc players; laser printers, laser surgery; lasers-based materials processing; and applications of laser spectroscopy in medicine and nano-materials. Today, IIT Kanpur has excellent facilities for research in the field of lasers and various laser applications. The curriculum has been designed to provide the necessary theoretical and experimental background in lasers, quantum optics, and various laser applications such as optical communications/networks & switching, holography, material processing, materials and biomedical spectroscopy, tomographic imaging, flow/temperature & stress analysis, optical signal processing & computing and optoelectronic integration. Laboratory courses constitute an integral part of the curriculum.

# POST-GRADUATE PROGRAMMES OFFERED

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- PhD
- MTech
- MS

## LABS/FACILITIES

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- Ultrafast Laser spectroscopy
- Semiconductor optoelectronic device fabrication facility
- Femto-second laser and micromachining system
- Picosecond- and nanosecond-lasers
- Micro-Raman facility
- Confocal microscopy
- Magnetron Sputtering system

# FACULTY LIST

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- **Utpal Das, Ph.D. (Michigan):** Quantum structures, Semiconductor Optoelectronic Integration.
- **Debabrata Goswami, Ph.D. (Princeton):** Ultrafast Pulses, Non-linear Spectroscopy, Quantum Computing, Coherent Control
- **Pradeep K. Kumar Ph.D. (IIT, Chennai):** Quantum cryptography, Quantum optics, Non-linear Fiber optics, optical fiber communication.
- **B. Lohani, Ph.D. (ESSC, UK):** Laser ranging, Flash scanning Laser applications, Laser imaging and cross section.
- **K. Muralidhar, Ph.D. (Delaware):** Fluid Mechanics, Heat Transfer
- **Naren Naik, Ph.D. (IISc. Bangalore):** Tomographic reconstruction and tracking algorithms; Fluorescence optical tomography; Biomedical and sub-surface multimodal tomographic imaging.
- **Pratik Sen, Ph.D. (IACS, Kolkata):** Femtosecond and picosecond ultrafast laser spectroscopy, nonlinear laser spectroscopy, protein stability, binary solvent mixtures.
- **Pradipta K Panigrahi, Ph.D (Louisiana State):** Optofluidics, Sensors and actuators, Electrohydrodynamics, Holography, Laser Schlieren, Particle image velocimetry.
- **Asima Pradhan, Ph.D. (CUNY, N Y):** Biophotonics, Laser Spectroscopy and Imaging
- **G. Rajshekhar, Ph.D (EPFL Switzerland):** Optical Metrology, Digital Holography, Biomedical Imaging, Applied Signal Processing
- **Saurabh Mani Tripathi, PhD (IIT-Delhi):** Fiber and integrated optics, development of biological and chemical sensors operating on the infrared and terahertz frequencies, plasmonics and metamaterials.
- **R. Vijaya, Ph.D. (IIT Madras):** Fibre optics, non linear optics, photonic band gap structures.
- **HarshawardhanWanare, Ph.D. (Hyderabad):** Non-linear Optics, Quantum Optics, Light Interaction in Biological Tissues.
- **Shilpi Gupta, Ph.D (University of Maryland College Park, US):** Photonics, Plasmonics, Quantum Optics
- **Sapam Ranjita Chanu, PhD (IISc):** Quantum computation and simulations with cold ions, cold atoms and quantum metrology with single pure state of cold atoms and ions
- **Mohammed Ibrahim Sugarno (IISC):** High Speed flow visualization, Emission Spectroscopy

# BROAD RESEARCH AREAS

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- Biophotonics
- Plasmonics
- Quantum Optics
- Optofluidics
- Fiber Optics
- Optoelectronics
- Ultrafast spectroscopy
- Tomographic imaging
- Nanophotonics





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# PHOTONICS SCIENCE AND ENGINEERING DEPARTMENT

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## CONTACT

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