നാഷണൽ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് ടെക്നോളജി കാലിക്കറ്റ്
राष्ट्रीय प्रौद्योगिकी संस्थान कालीकट
NATIONAL INSTITUTE OF TECHNOLOGY CALICUT

DEPARTMENT OF PHYSICS

Department Profile:

Established in 2009

Faculty: 23

Students Intake:

M.Sc. Physics: 35/year

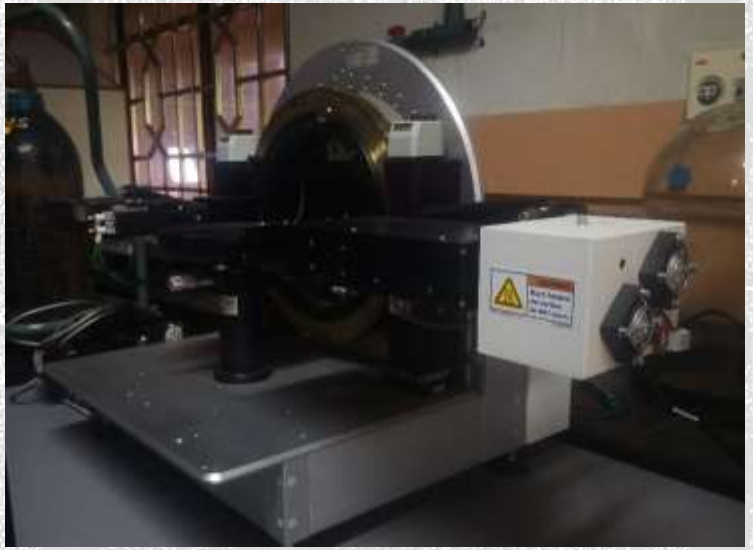
B.Tech. Engineering Physics: 40/year

PhD (Experimental, Theoretical & Computational Physics ~10/year

- UV LASER Coherent (COMPex Pro 50 F)
  - High pulse energy
  - Preset stabilized energy operation
  - Integrated, purgeable energy monitor
  - Increased static gas lifetime

UV LASER Coherent, COMPexPro 50 F

- Ellipsometer (Sopra GES -5E)
  - Used for real-time monitoring and speciation of Aerosol Black Carbon. It analyzes the aerosol by measuring the transmission of light through aerosol laden filter tape
  - Mapping functionality
  - Capable of measuring more complex structures such as multi-layers, interface roughness or inhomogeneous layers
  - Varied incidence angle



Ellipsometer, Sopra, GES -5E

Instrument Details

- Impedence measurement unit(IM6 ex Zahner-elektrik GnbH)
  - ultra low-noise potentiostat
  - widefrequency range DSS FRA
  - high CMRR precision U/I-amplifiers
  - high resolution differential ADCs

Impedence measurement unit, IM6 ex Zahner-elektrik GnbH

- Inverted Microscope (Olympus IX-73)

Observation method:

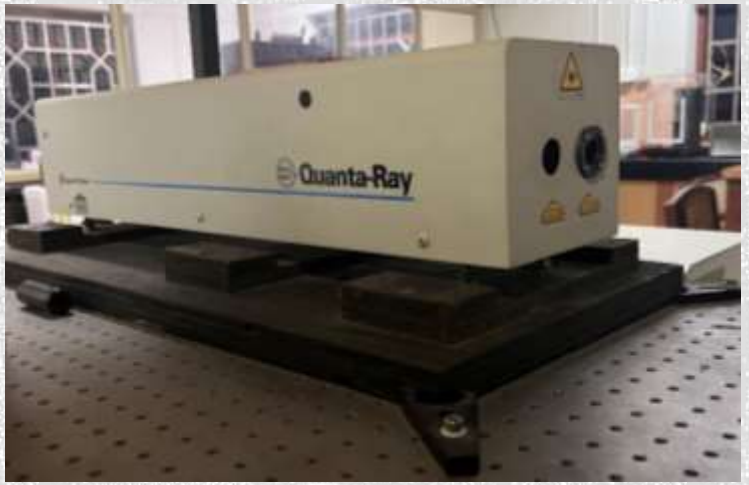
- Brightfield
- Fluorescence (Ultraviolet Excitation)
- Fluorescence (Blue/Green Excitation)

Utilization:

- Microscopic images of particle patterning and colloidal assembly

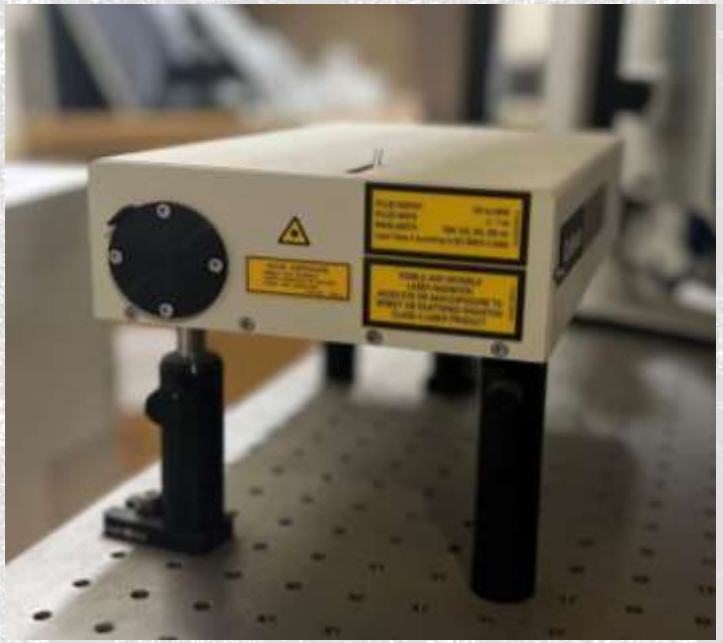
Olympus IX-73 Inverted Microscope

- Nd:YAG Laser (Quanta Ray INDI-40-10 Spectra Physics)
  - High-pulse energy Nd:YAG lasers with dual-rod oscillators
  - Gold-coated elliptical pump chambers
  - Internal sealed beam paths
  - High-damage-threshold optics
  - Used for ablation, laser-induced fluorescence etc.



Spectra-Physics Quanta-Ray Nd:YAG Laser

- High Power Nd:YAG Laser (Minilite ML11)
  - Accessible harmonic generators
  - Integrated energy attenuator
  - Single YAG rod/flash lamp pump chamber
  - Invar resonator
  - Stable resonator design



High Power Nd:YAG Laser, Minilite, ML11

- HPC Server (Lenovo Think system)
  - 96 core processor (single node)

HPC Server - Lenovo Think System

Instrument Details

- UV-Visible Spectro-photometer (Shimadzu UV 2600 I)
  - Measures Slight Differences in Absorbance
  - Scalability to near-infrared measurement
  - Enables Compliance with ER/ES Regulations and Stronger Data Management

UV-Visible Spectro-photometer, Shimadzu UV 2600 i

- Differential Photocalorimetry Unit (Perkin Elmer)
  - Fast controlled scanning rates to 750°C/min
  - In-situ ballistic cooling to 2100°C/min
  - Fast data readout rates (100 points/second)

  Applications:
  - Characterization of materials
  - Polymorph characterization
  - Process studies
  - Process simulation

Differential Scanning Calorimeter
DSC 8500 (Perkin Elmer)

- Aethalometer (AE33 Magee Scientific)
  - Used for real-time monitoring and speciation of Aerosol Black Carbon. It analyzes the aerosol by measuring the transmission of light through aerosol laden filter tape

Aethalometer AE33, Magee Scientific

Laboratory Details

- Photonic materials and devices Laboratory
  - Nanoscience and nanotechnology
  - Boron-based nanostructures
  - Luminescent carbon quantum dots
  - Low-dimensional carbon nanostructures for energy related applications

Photonic materials and devices

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- Computational Materials Science Laboratory
  - Electronic Structure Theory Calculations (DFT)
  - Computational Modelling of Materials, Surfaces and interfaces, Electrochemical catalysts, Energy materials, Magnetism, Strongly correlated electrons
  - Model Hamiltonian based computations

Computational Materials Science Lab

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- Optofluidics and Interface Science Laboratory
  - Optically-controlled particle patterning
  - Droplet microfluidics and dynamics
  - Liquid marbles
  - Soft matter physics
  - Marangoni effect

Optofluidics and Interface Sciences Lab

- Laser and Non Linear Optics Laboratory
  - Nonlinear Optics
  - Electron Spin Resonance
  - Photonic crystals

Laser and Non Linear Optics Lab

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- Organic and Nanoelectronics Laboratory
  - Organic and Perovskite solar cells
  - Plasmonics for improving the performance of solar cells
  - Nanomaterials for energy applications, Organic bistable memory devices

Organic and Nanoelectronics Lab

- Applied Optics and Instrumentation Laboratory
  - Development of Instrumentation for Atmospheric, and Environmental monitoring using principles of Optics, Radiative transfer and aerosol forcing on Climate

Applied Optics and Instrumentation Lab

- Critical Phenomena Laboratory
  - Critical Point Phenomena (Quadruple Critical Point (QCP), Critical Inflection Point (CIP), critical crossover behaviour of binary, ternary and quaternary electrolytic systems)
  - Hydrodynamics of complex fluids

Critical Phenomena Lab

- Wet Chemistry Laboratory
  - Qualitative and quantitative analysis of chemical substances.
  - Chemical synthesis

Wet Chemistry Lab

Seminar Hall Details

- Raman Hall
  - Smart TV and audio capabilities.
  - Seating capacity: 60

Raman Hall

- Please visit our website for more details:

https://old.nitc.ac.in/physics/