Indian Institute of Space Science and Technology

Thiruvananthapuram

Details of Instructional and Research labs
under the
Department of Physics

Contents

1 Applied & Adaptive Optics Lab

- **Floor area:** 106 Sq. Meters
- **Overall capital expenditure:** 647 Lakhs
- **Major instruments/ equipments:** Vibration isolation optical tables, Laser systems, Cameras, CCDs, Spectrometers, Spatial Light Modulators, Atmospheric turbulence simulators, Microscopes, Wave front Sensors, Optical fibre splicer's, Polarization cameras, Soleil-Babinet compensators, Liquid crystal retarders, Ultra precision alignment stages, Piezo-electric transducers/Phase shifters, Picomotor stages.
- **Objective of the lab**: The lab is fully equipped with state-of-the-art research facilities in the areas of Adaptive Optics, Optical Imaging, Polarization Optics, Statistical Optics, Singular Optics, Interferometry and Ultrafast Optics. The lab provides excellent learning and research opportunities to students. We collaborate with researchers in India and abroad.

Applied & Adaptive Optics Lab

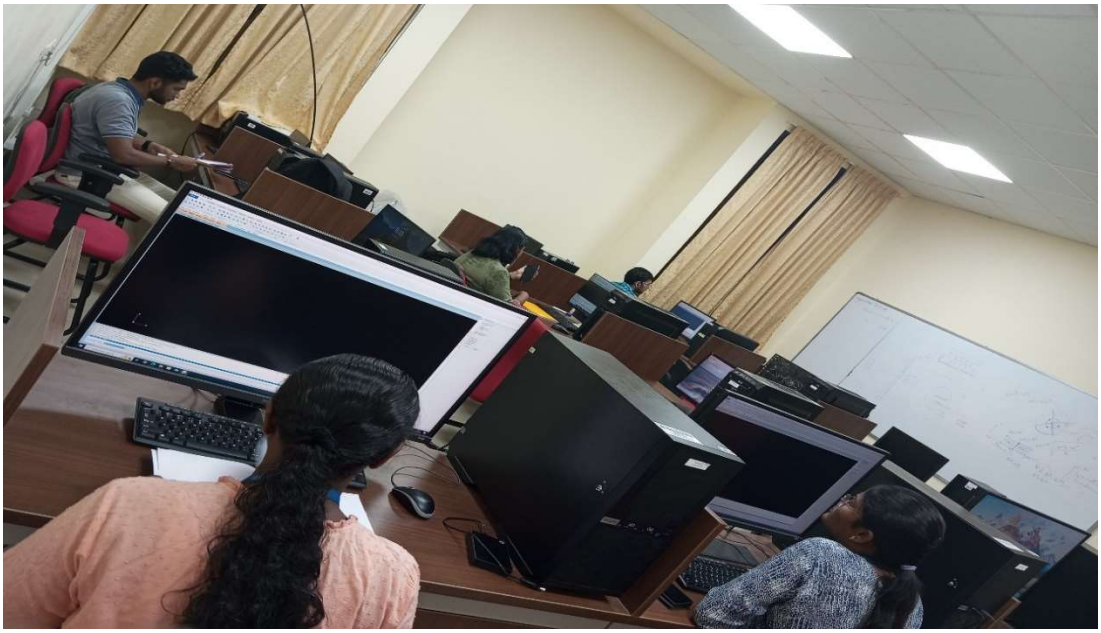
2 Atomic and Molecular Physics Lab

- **Floor area:** 100sq m
- **Overall capital expenditure:** 520 lakhs
- **Major instruments/ equipments:** Iron neutral coincidence mass spectrometer, Electron impact Mass spectrometer, Visible UV radiation source, Opd laser (nanosecond).
- **Objective of the lab:** Research

Atomic and Molecular Physics Lab

3 Computational Physics Lab

- **Floor area:** 53sq m
- **Overall capital expenditure:** 22 Lakhs
- **Major instruments/ equipment:** Workstations, Desktops
- **Objective of the lab:** Conducting programming/simulation oriented Lab courses for BTech Engineering Physics and Masters Programs in Optical Engineering, Solid State Physics and Quantum Technology.



4 Electric Propulsion Diagnostics Lab (EPDL)

- **Floor area:** 150sq m
- **Overall capital expenditure:** 230 lakhs
- **Major instruments/ equipments:** High vacuum test facility, Class 1000 clean booth, Sensors Testing vacuum facility, Low energy ion source.
- **Objective of the lab**: Research

EPDL

5 Electronic Materials and Devices (EMERALD) Lab

- **Floor area:** 90sq m
- **Overall capital expenditure:** 2 crore
- **Major instruments/ equipments:** PLD,ALD(2), CVD, Thermal evaporator, Centrifuge, Fume hood, Glove box, Spray coating, Probe sonicator
- **Objective of the lab:** For Ph.D research, to conduct funded projects, projects for B.Tech and masters students.

EMERALD Lab

6 General Physics Lab

- **Floor area:** 150sq m
- **Overall capital expenditure:** 70 Lakhs
- **Major instruments/ equipment:** Magnetic Moment in a Magnetic field, Gamma Ray Spectroscopy with Compton Effect Measurement, Electron Diffraction, Plank's Constant using a photocell, Laws of Gyroscope, Pohl's pendulum etc.
- **Objective of the lab:** Conducting General physics lab for first year B.Tech. students.

General Physics Lab

7 Modern Physics Lab

- **Floor area:** 100sq m
- **Overall capital expenditure:** 72 lakhs
- **Major instruments/ equipments:** NMR, XRD, Gamma ray spectrometer, X-Ray fluorescence set up.
- **Objective of the lab:** Conducting lab courses for B.Tech , Engineering Physics**.**

Modern Physics Lab

8 Multidisciplinary Computing Centre (MCC) Lab

- **Floor area:** 200sq m
- **Overall capital expenditure:** 950 lakhs
- **Major instruments/ equipment:** 120 Teraflops Parallel Computer Clusters with parallel file systems, GPU Servers, CPU Servers, Storage Servers, License servers, high-end Xeon Workstations, Various open and subscribed software like ANSYS, MATLAB, Comsol, Solidworks, pointwise, Libero, Thermal Desktop, Plecx, Gaussian, Chemdraw, Maple, Mathematica, Terrasolid, ADS etc.
- **Objective of the lab:** The Multidisciplinary Computing Centre (MDC) of the Indian Institute of Space Science and Technology was established to provide various computer solutions for research problems

and to facilitate and support the institute's essential teaching and academic goals. The Center aims to become a center of excellence in computational techniques and computer simulations for science and engineering and provide expertise in Big Data Analysis, Climate Modelling, Computational Fluid Dynamics, Computational Structural Mechanics, Computation-Assisted Materials Science, Computer Vision, and Virtual Reality, Machine Learning, Network Science and Engineering, Nonlinear Dynamics, Optimization, Geoinformatics, Monte Carlo Simulations.

9 Optics Lab

- **Floor area:** 93 sq m

- **Overall capital expenditure:** 90 Lakhs

- **Major instruments/ equipments:**

  - Holographic kit
  - Vibration Free table-2.4mtrs*1.2mtrs
  - Honeycomb table top & Vibration isolated support
  - Faraday Effect Apparatus
  - Advance Optical Fibre lab system
  - FOTR 1010 -1550 nm LD module with power supply
  - Speed of Light, item code EX 9932,of optics lab 1
  - Geometrical Optics comprehensive kit

- Speckle Pattern Interferometry
- Fourier optics 4f arrangement-filtering & reconstruction
- Diffraction of Light at Slit and at an Edge
- Dispersion and Resolving Power of Prism & grating spectroscope
- Fibre laser
- XP-23 Fibre optics workshop consisting of adjustable plastic cover stripper 103-s polishing film
- Kerr effect
- Dual Chanel energy meter with GPIB Model RJ-7620
- Klystron Microwave Test Bench-5
- Klystron Microwave Test Bench-4(Antenna)
- Quantum Cryptography Demonstration Kit Metric
- Vibration Isolator Optical Table System comprising, honey comb tabletop-magnetic TT 180-120 size: 1.2mx1.8m, Thickness:20cm
- Active Vibration isolated support for above Tabletop(4 leg design) (compressor included)
- Flea(R)3 FL3-GE-20S4M-C Monochrome GIGE Camera
- He-Ne Laser
- Brewster angle measurement
- Particle size determination
- LED laser diode photo diode
- Geometric phase shift interferometer
- Stokes parameter
- Surface Plasmon resonance
- Spectrometer
- Knife edge test
- White light interferometry
- Michelson interferometer with laser
- Diffraction of light
- Saagnac interferometer
- Stocks parameter
- Spectacle size measurement
- Speckle correlation
- Aberration testing
- Spectra of atoms
- Plasmonics
- Polarization by reflection
- Geometric phase
- 4f imaging

- **Objective of the lab:** Conducting lab courses for B.Tech. Engineering Physics, M.Tech. Optical Engineering, and M.Tech. Quantum Technology

Optics Lab

10 Quantum Optical Technology Lab

- **Floor area:** 92 sq m
- **Overall capital expenditure:** 3.5 Crores
- **Major instruments/ equipments:** High-power, continuous-wave titanium Sapphire laser, high-power tunable diode laser, EMCCD camera, spectrum analyser, and photo detectors
- **Objective of the lab:** To create a state-of-the-art facility for executing experimental research in the areas of quantum technology, in particular, quantum technologies with photons.

Quantum Optical Technology Lab.

11 Quantum Technology Lab I

- **Floor area:** 100 sq m
- **Overall capital expenditure:** 100 Lakhs

- **Major instruments/ equipment:** Thermal coating system, multi target thin film deposition system, Spectrophotometer, AFM, Oscilloscopes, Function generators, SR 830-Lock in Amplifiers, Interactive digital source meters, FFT Spectrum analyser.

- **Objective of the lab:** To conduct Lab courses for masters programs in Quantum technology, Optical Engineering and Solid State Physics. To perform research in quantum technology and related areas

Quantum Technology Lab I

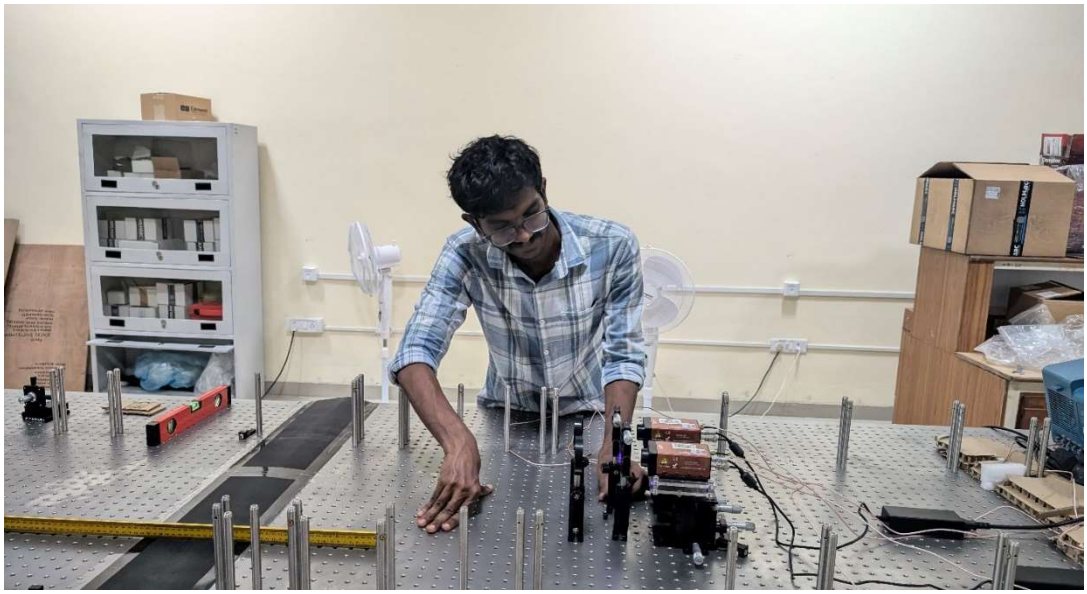
12 Quantum Technology Lab II

- **Floor area:** 100 sq. m

- **Overall capital expenditure:** 42.5 lakhs

- **Major instruments/ equipments:** Nonlinear crystals(SPDC), Dark chamber, Optical components, Opto-mechanical components, Vibration isolation tables, Photon counters, Lasers, Oscilloscopes, Function generators, Time digital converters.

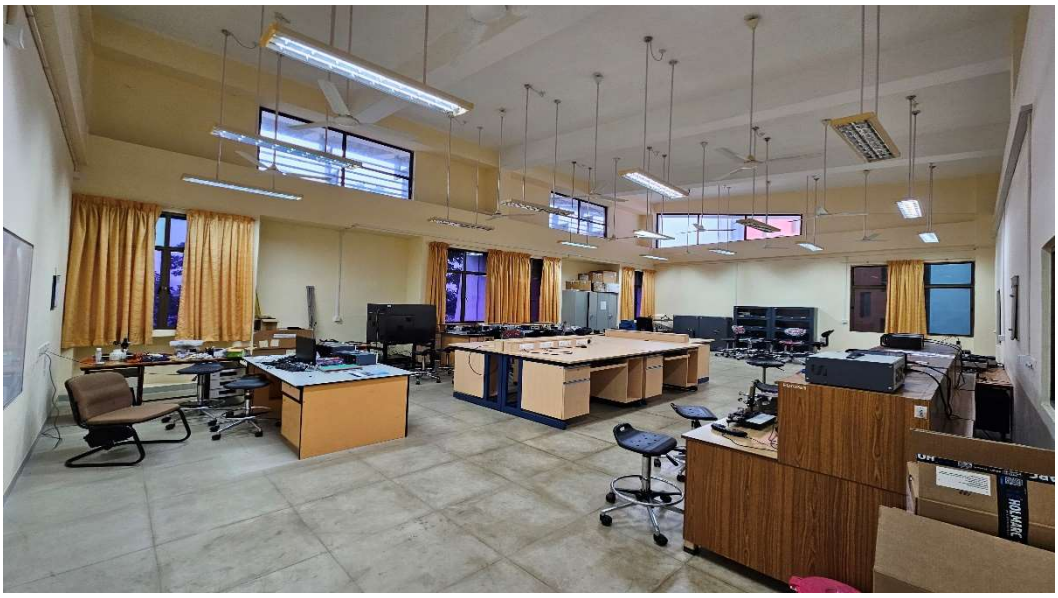
- **Objective of the lab:** Conducting lab courses for M.Tech. Quantum Technology.



Quantum Technology Lab II

13 Solid State Physics Lab

- **Floor area: 90sq m**
- **Overall capital expenditure:** 60 lakhs
- **Major instruments/ equipments:** Spectral response, plank's constant, Frank- Hertz
- **Objective of the lab:** For B.Tech and MS (dual degree) labs.



Solid State Physics Lab

14 Space Technology Innovation and Characterisation (STIC) Lab

- **Floor area:** 47sq m
- **Overall capital expenditure:** 2 crore
- **Major instruments/ equipments:** Probe station, Parametric analyzer, STM, Ellipsometer, Workstation, Optical fiber spectrometer
- **Objective of the lab:** To do ISRO projects and external projects setting up facilities for device measurements.

Space Technology Innovation and Characterisation (STIC) Lab