

## **Research areas**

The vibrant research environment enables the faculty and scholars enjoy a host of opportunities for research in the following fields.

### **Complex Systems and Nonlinear Dynamics:**

Complex systems, Dynamics of Complex Networks, Nonlinear Dynamics and Chaos Theory, Mathematical modelling and Statistical Physics

### **Energy and Environment:**

Solid Oxide Fuel Cells (SOFCs), Cathode materials for SOFC, Electrochemical gas sensors, Catalysis, Ion-Solid interactions, Carbon materials, Photocatalysis, Electrocatalysis, Heterogeneous catalysis, Volatile organic compound and alcohol sensors, Hierarchical nanomaterials, Supercapacitors, Volatile organic compound oxidation, Enteric pathogen removals, Wastewater treatment, Enzyme technology, Immobilization and Adsorption, Dye sensitised solar cells, water-splitting, Waste to energy conversion

### **High Energy Physics:**

Particle Physics model building and collider phenomenology, models beyond the Standard Model, Flavor Physics, Neutrino Physics, Dark Matter, Astroparticle Physics and Cosmology.

### **Micro Electro Mechanical Systems (MEMS):**

Modeling and Simulation of MEMS using COMSOL software  
Materials Modeling and Simulation using Quantum Espresso software

### **Nanoscience and Nanotechnology:**

Nanostructures, Growth and characterizations, Quantum dots in glasses.

### **Photonics, Fiber Optics and Laser Technology:**

Crystal growth and characterization, Nonlinear optics, Photonic glasses, Fiber optic devices for sensing applications and Optoelectronic devices.

### **Physics of Plasma:**

Basic experimental plasma physics, Nonlinear experiments in DC/RF plasma, Modelling of Nonlinear Plasma Dynamics, Plasma enhanced chemical vapour deposition, plasma assisted material processing, Dusty plasma, Space plasma, Magneto plasma, Diagnostics in plasma and Plasma assisted smart textile.

**Relativity, Geometry, Mathematical Physics and Physics Pedagogy:**

Ricci Flow, General Relativity, Differential Geometry, Mathematical Physics, Classical and Quantum Physics, Non-Riemannian Geometry, Homogeneous Spaces, Lie Groups, Finite Groups, Higher Order-Higher Derivative Flows, Bach Flow, Conformal Gravity, Wormhole Physics, and 2+1 Gravity.

**Semiconductor Materials and Thin film Technology:**

Amorphous and Crystalline semiconductor materials- Devices and Characterization, Biosensors, Semiconductor based gas sensors, low dielectric constant thin films for ULSI device applications, Surface Science.