SRM UNIVERSITY *AP*

Andhra Pradesh

Department of Physics

SRM University-*AP*, Andhra Pradesh

About

Physics is the most fundamental science that deals with the properties and interactions of matter and radiation. Understanding the world around us, including modern technological advancements, is based on centuries of developments in physics. As such, physics provides the basis for all applied sciences and technologies.

Currently the Department of Physics at SRM University-*AP*, Andhra Pradesh offers the *Bachelor of Science Honours (BSc Physics (H)), Master of Science (MSc) and PhD graduate program in physics*. The academic programs give the students a solid foundation in skills like problem-solving, observation skills, numerical aptitude, practical thinking, and reasoning ability. Physics with a minor in another programme can lead to a variety of careers, which the students can choose after the completion of the programme. The department also encourages research opportunities for undergraduate students, as well as graduate students, in several areas of experimental and computational/theoretical physics.

Highlights

4.19 Cr
Total Outlay for Research Projects

175
Research Publications

14
Govt. Funded Projects

116
Q1 Journal Publications

12+
Nature Index Journal Publications

9
Patents

Vision:

The Department of Physics aims to provide stimulating, elevating, and problem-oriented programmes of study in basic and applied physics. All the courses are designed in accordance with scientific as well as industrial research and are taught by faculty members in the relevant fields of research.

Mission:

The mission of Physics department is to teach and learn physics in through interactive, collaborative, performance, and ***project-based pathway***. Physics majors and minors have effective curricula, with a depth of study for students to pursue physics and engineering at the undergraduate level. The students can embark on a career in technology or science education, both in industry and higher education.

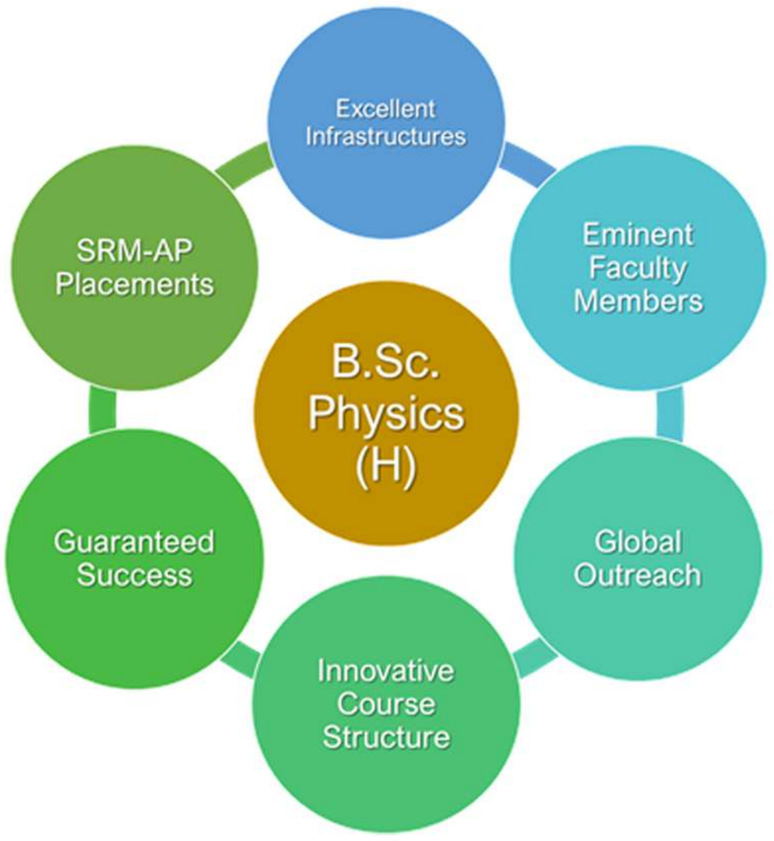
Academic Programmes

BSc Physics (Hons) with Research

BSc Physics (Hons) with research is a four-year program with **172 credits**.

BSc Physics (Hons) curriculum is designed considering the fundamental aspect of Physics and is application-oriented for skill development. The laboratory classes are designed to provide as much hands-on experience in the area of Applied Physics. The project courses and industrial visits will provide exposure to the students in the desired advanced scientific and technological area.

Courses such as ***Quantum Mechanics, Solid State Physics, High Energy Physics and Statistical Mechanics*** will help to a strong base in Physics, whereas the course such as "***Free space and fiber optical communication, Introduction to Quantum Computation, and training in LabVIEW software***" will help students to choose a career path in communication, device industry and higher studies in world-class universities.



MSc Physics

MSc in physics at SRM University-*AP*, Andhra Pradesh requires two years of full-time study which amounts to 84 credits with a span of four semesters program. The main objective of MSc Physics is to develop expertise in quantum technology by learning courses such as ***Quantum mechanics, Quantum computation, Quantum communications*** and/or to develop expertise in device physics by learning courses such as *Condensed matter physics, Instrumentation and experimental analysis, Electronic circuit and spintronics*. The department encourages research opportunities for master students in several areas of experimental and computational/theoretical physics. The detailed curriculum and syllabus can be found on the department website.

PhD Physics

Department of Physics offers full-time PhD degree programme in various emerging research areas of Applied Physics. The objective of the programme is to guide scholars in an innovative way to become top-class researcher in various fields of study leading to a PhD degree. A vibrant research atmosphere with state-of-the-art research facilities will be provided. Students will have the opportunity to work with high-profile faculty advisors. The details of PhD admission can be found out at *https://srmap.edu.in/research-home/phd-programme/*

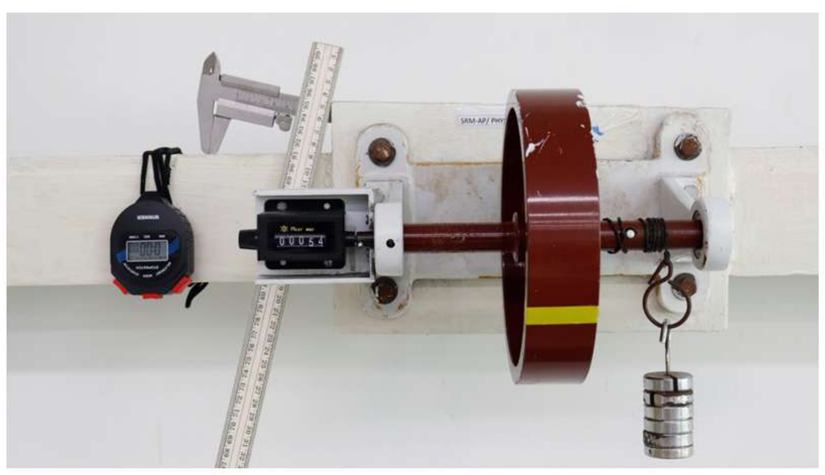
Scopes and Opportunities

- The Department's national and international collaboration is strong. The student will get exposure through faculty members.
- The faculty members are expert in training students and has a commendable track record in teaching and research.
- Learning Environment and easy accessibility of faculty members to discuss doubts and career paths.
- Problem-based curricula to help in clearing National and international level exams (e.g. NET, GATE, JEST, GRE)
- Wide choices of Minor/elective subjects and can take part in research projects in cutting-edge areas of research.
- Internship (National and International institutes) and can take part in university placements
- Higher studies in reputed institutes (National and international)
- Placement opportunities in public sector units such as BHEL, DRDO, ISRO, BARC and many more private sector Semiconductor, Telecommunications and battery industries.

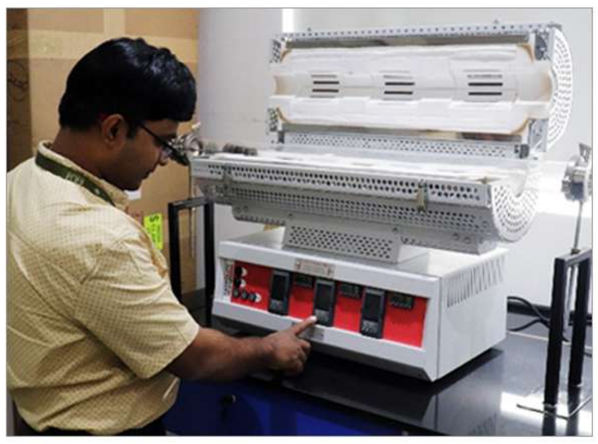
Academic and Research Labs

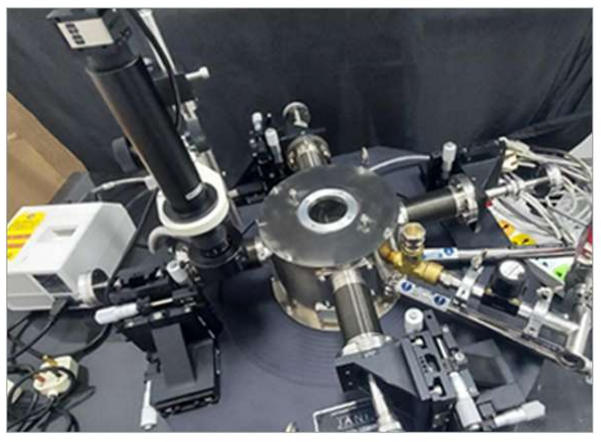
The academic and research laboratories are equipped with advanced instruments with ***updated research and industrial relevance***.

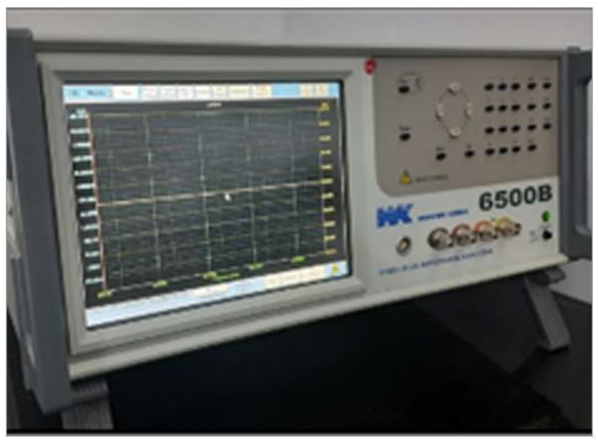
Academic Labs

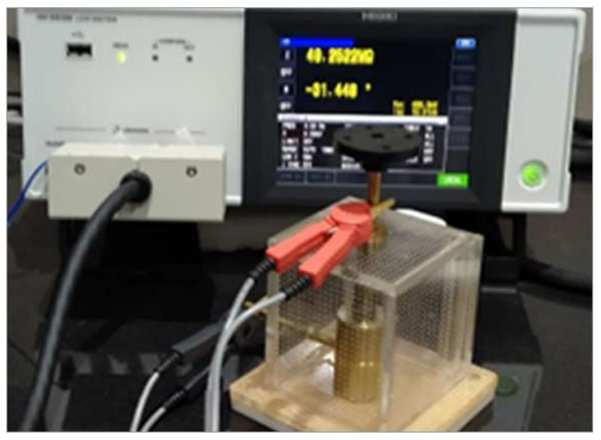


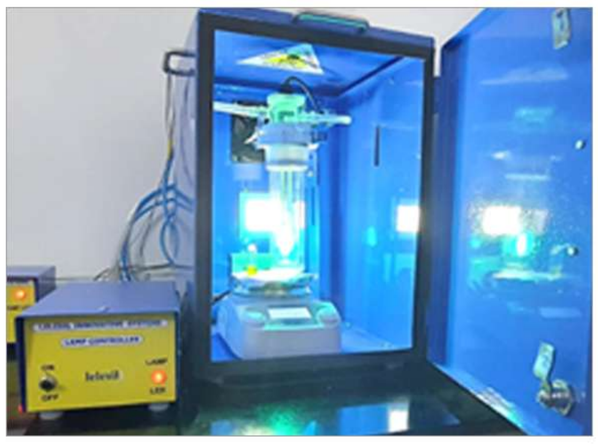
Research Labs:

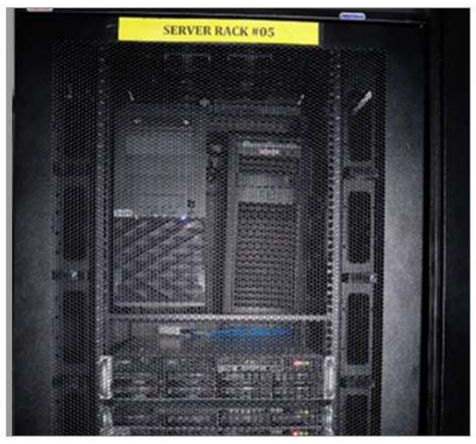






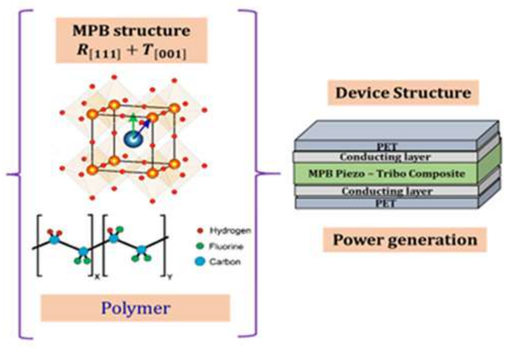


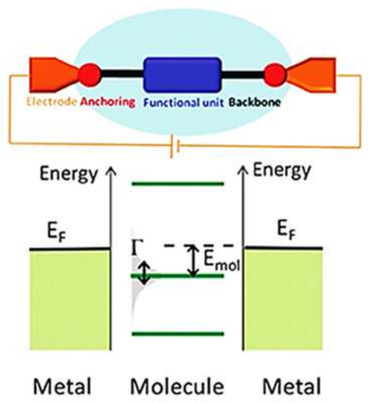


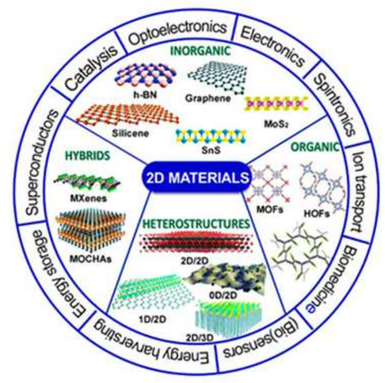


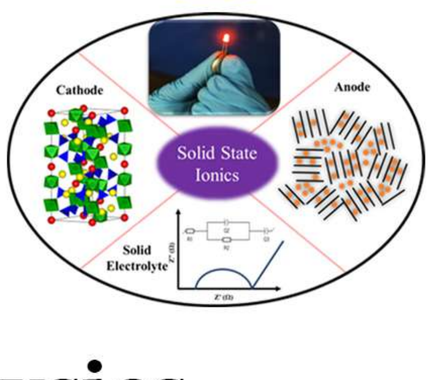
Research Area:

Advanced Materials and Device Applications

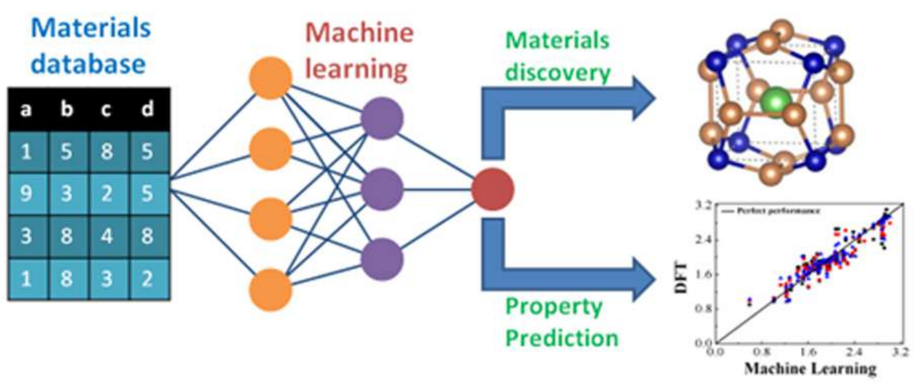


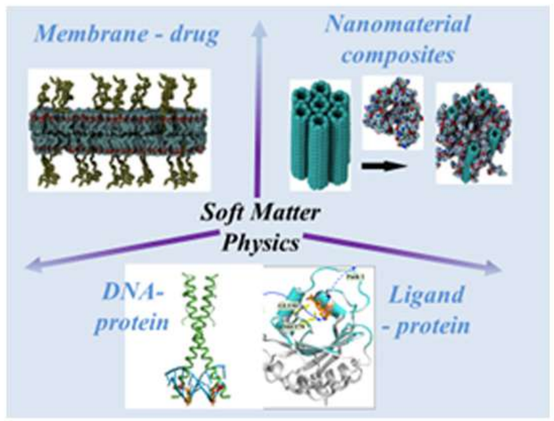


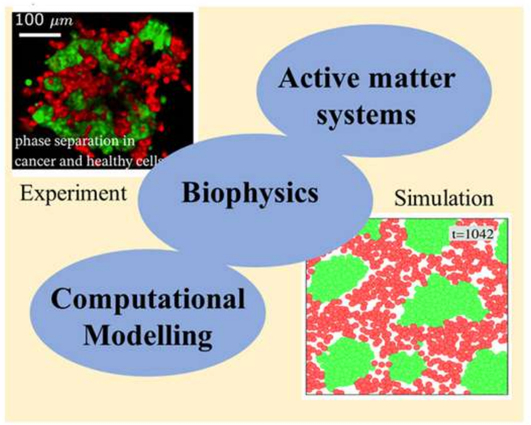


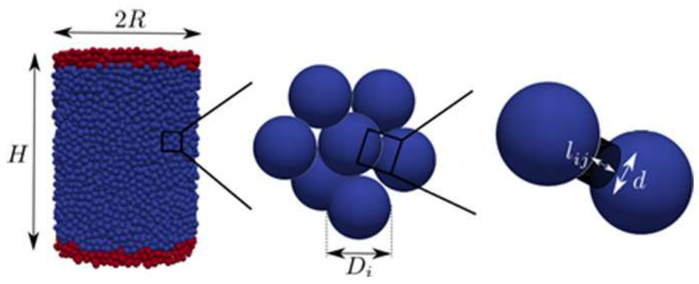


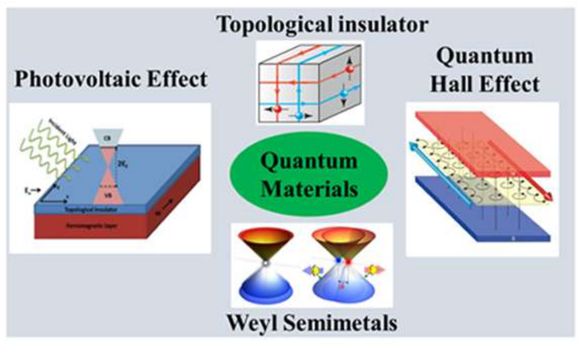
Computational Materials and Soft Matter Physics

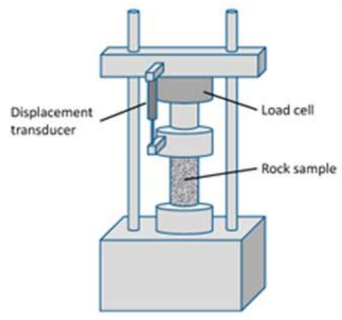




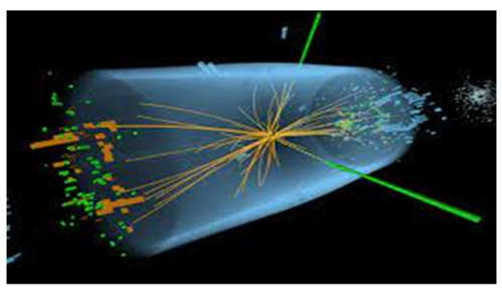


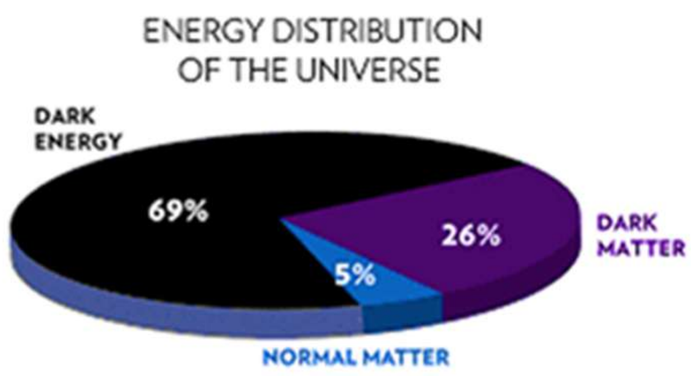




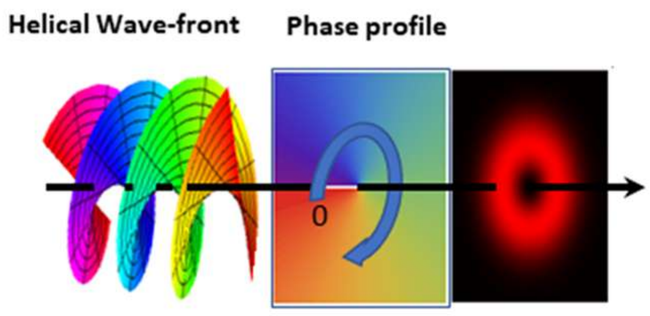


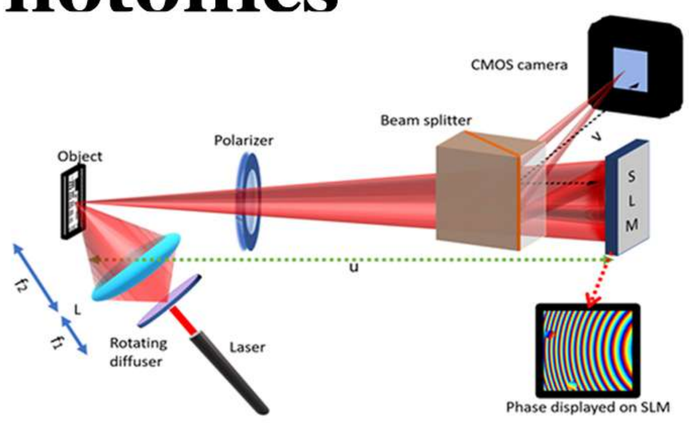
High Energy Physics





Laser Physics and Photonics





Achievements of Students…

Mr Bennet Benny (BSc Physics with Research): Recipient of the prestigious Erasmus Mundus Scholarship of ***33,600 EURO and with 100 % tuition fee waiver*** to pursue QuanTEEM Master in the University Bourgogne Franche-Comté France, Technische Universität Kaiserslautern, Germany, Aarhus Universitet, Denmark and Moscow Institute of Physics And Technology, Russia. He was also involved in *NTU–India Connect Research Programme 2022 (Spring term Jan – June, 2022)* for research titled "*Computational Study of Systems of Self-Driven Particles*" at Nanyang Technological University (NTU), Singapore. He published a research article titled "*Design principle of MoS2/C heterostructure to enhance the quantum capacitance for supercapacitor application*" in the Journal of Energy Storage (IF 6.583). He was awarded Sakura Internship Program 2019 at the Japan Advanced Institute of Science and Technology (JAIST), Japan for research work on electronic structure calculations using DFT and QMC computational methods.

*Watch here what **Mr Bennet** says about his experience.*

https://www.youtube.com/watch?v=XiohK-FnigQ&t=3s

Sreelekha Bhuvaneswari (BSc Physics with Research): She has received several accolades during her four-year BSc Physics with Research including a One-year internship with Prof. Sreeram Ramakrishna for a research project at the National University of Singapore (NUS), Singapore 2022. Also, she published a patent titled "A fibre material with moisture retention capacity with thermal tolerance and a method for manufacture" Application number - 202141023375 (2021).

Anjana Tripathi (PhD student): Ms Anjana secured a postdoctoral position at Denmark Technical University in the group led by **Prof. Norskov**.

Selected Research Publications...

- Lewis acid-dominated aqueous electrolyte acting as co-catalyst and overcoming N2 activation issues on catalyst surface, Ashmita Biswas†, Samadhan Kapse†, Bikram Ghosh, **Ranjit Thapa**, Ramendra Sundar Dey, ***PNAS***, Accepted, 2022. *[IF: 11.205]* †Same Contributed First Author

- Resonant Second-Harmonic Generation as a Probe of Quantum Geometry, **Pankaj Bhalla**, Kamal Das, Dimitrie Cucer, Amit Agarwal, ***Physical Review Letter***, *(2022)*, *[IF: 9.185]*

- Energy parameter and electronic descriptor for carbon-based catalyst predicted using QM/ML, S Kapse, S Janwari, UV Waghmare, **R Thapa**, ***Applied Catalysis B: Environmental*** *286, 119866 (2021) [I.F: 24.319]*

- Complex Structural Disorder in a Polar Orthorhombic Perovskite Observed through the Maximum Entropy Method/Rietveld Technique, Alicia María Manjón-Sanz T. Wesley Surta, **Pranab Mandal**, Alex J. Corkett, Hongjun Niu, Eiji Nishibori, Masaki Takata, John Bleddyn Claridge, and Matthew J. Rosseinsky, ***Chemistry of Materials***, *34, 29-42, (2021) [IF: 10.508]*

- Tailoring magnetic order via atomically stacking 3d/5d electrons to achieve high-performance spintronic devices,K Huang, L Wu, M Wang, N Swain, **M Motapothula**, Y Luo, K Han, M Chen, ***Applied Physics Reviews*** *7 (1), 011401 (2020) [I.F: 19.16]*

- Direct Growth of Wafer-Scale, Transparent, p-Type Reduced-Graphene-Oxide-like Thin Films by Pulsed Laser Deposition, Juvaid, M. M., Sarkar, S., Gogoi, P. K., **Ghosh, S.**, Annamalai, M., Lin, Y. C., & Jani, H., ***ACS nano*** *14 (3), 3290-3298 [I.F: 18.027]*

- Thickness-insensitive properties of α-MoO_3 nanosheets by weak interlayer coupling, J.H. Kim, C.Hyun, H.Kim, **J. K. Dash**, K.Lhm and G.-H Lee, ***Nano Letters***, *19 (12), 8868-8876 (2019) [I.F: 12.262]*

- Success of Social Inequality Measures in Predicting Critical or Failure Points in Some Models of Physical Systems Asim Ghosh, **Soumyajyoti Biswas**, Bikas K Chakrabarti, ***Frontiers in Physics*** *(2022) [IF: 3.5]*

- Protein bioelectronics: A review of what we do and do not know, C. D Bostick, **Sabyasachi Mukhopadhyay**, Israel Pecht, Mordechai Sheves, David Cahen, David Lederman, ***Reports on Progress in Physics***, *026601, 81(2018) [IF: 17.802]*

- Scattering of Poincare beams: Polarization speckles, **Salla Gangi Reddy**, Vijay Kumar, Yoko Miyamoto, and R. P. Singh, ***Optics Express***, *25, 19886- 19893 (2017) [IF: 3.833]*

- Evaluation of band edge parameters, Li ion dynamics and excellent electrochemical properties of Li4Ti5O12 anode thin films, S Subash, S Yasui, S Yasuhara, **LN Patro**, KK Bharathi, ***Electrochimica Acta*** *354, 136741 (2020) [IF: 7.336]*

Selected Patents...

1. **Goutam Kumar Dalapati, Ghosh Siddhartha, Karra Tharun**, "*A Heat-Resistant Body Part Covering Apparatus For Thermal Shock Protection and Method of Fabrication*" Indian Patent Application no **201941047185**, published, 2020.

2. **Dr Sabyasachi Mukhopadhyay, Ashwini Nawade**, "*Poly Dimethyl Siloxane (PDMS) Microchannel Based Nanoscale Devices that Effectively Measure Electron Transport at Single Layer of Molecules and a Method for Manufacture of the Same*" Indian Patent Application no **202141017530**, published, 2021.

3. **Dr Sabyasachi Mukhopadhyay, Bhuvaneswari Sreelekha** "A fiber material with moisture retention capacity with thermal tolerance and a method for the manufacture of the same" Indian Patent Application no **202141023375**, published, 2021.

4. **Pranab Mandal, P. TulasiRao, K. N. Malleswari** and Dr. Chandan Dey, "*A method and set-up for characterization of temperature dependence of impedance, relative dielectric permittivity, piezoelectric coefficients and pyrocurrent under controlled gas environment*" Indian Patent Application no **202141051103**, published, 2021.

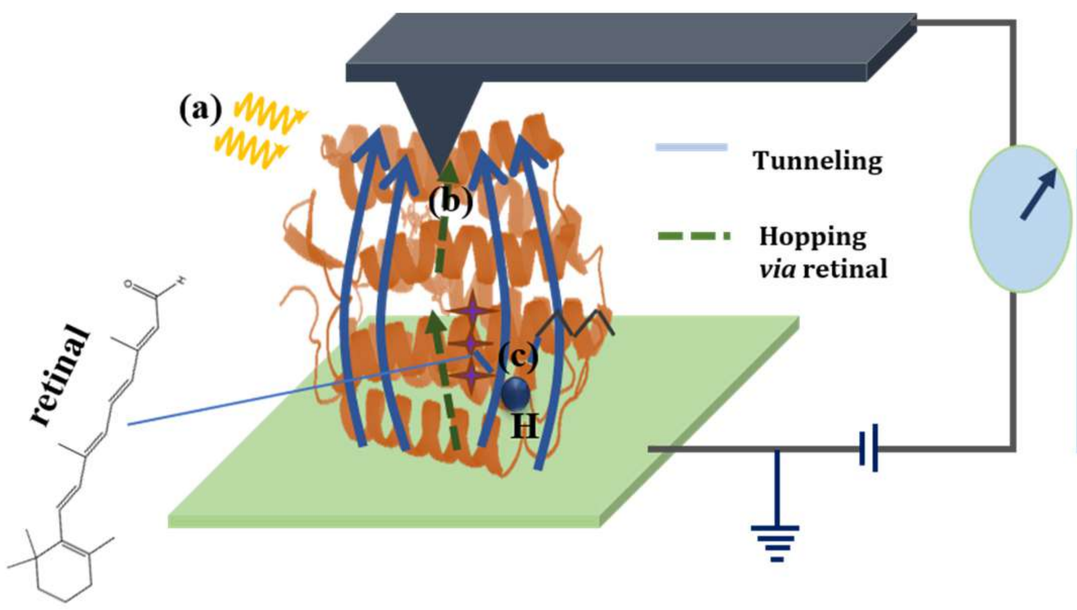
5. **Jatis Kumar Dash, Abzal, Shaik Md., Kalyan Kurapati, Janga Sai Lakshmi**, "*Two-Dimensional Transition Metal Oxide Layers and a Method for their Synthesis*" Indian Patent Application no **202241005220**, published, 2022.

6. **Dr Ranjit Thapa, Samadhan Kapse**, Shivanna M, Shwetha K R, Dr. Nagaraju D H, "*Ruthenium Clusters on Iron Oxide/MWCNTs Catalysts -Method of Preparation and their Hydrogen Evolution Reaction Application*" Indian Patent Application no **202241006087**, published, 2022.

7. **Pranab Mandal**, PNSBSV Prasad V, **Nagamalleswari Katragadda**, Vasudeva Bevara, Syed Ali Hussain, Pradyut Kumar Sanki, "*Piezoelectric Sensor and a Method for its Preparation*" Indian Patent Application No **202241034906**, published, 2022.

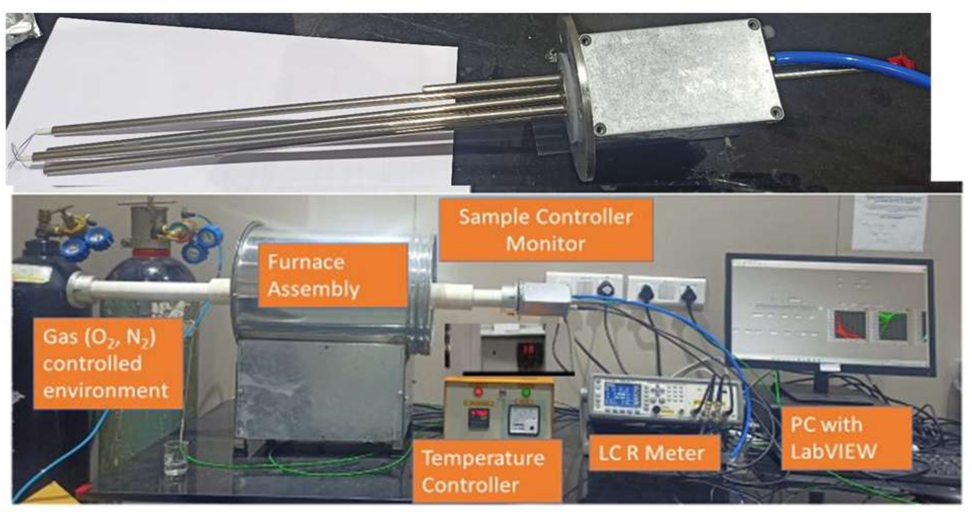
8. PNSBSV Prasad V, Syed Ali Hussain, **Pranab Mandal**, Pradyut Kumar Sanki, "*A System and a Method for Non-Invasive Measurement of Glucose Concentration in a Body*" Indian Patent Application No. **202241048027A**, published, 2022.

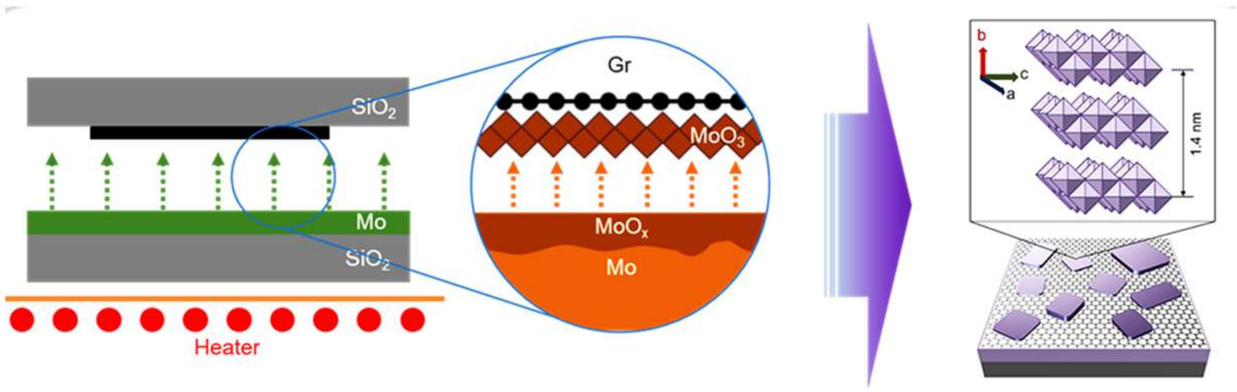
Patent figures



Modulation of optoelectronic and mechanical properties across (bio) molecular junctions under external stimuli

A method and set-up for characterisation of temperature dependence of impedance, pyroelectric current





Two-Dimensional Transition Metal Oxide Layers and A method for their Synthesis

Faculty Members:

Professors

Prof. Ranjit Thapa

Professor
PhD: Jadavpur University, India

Research Interests

1. Quantum Mechanics/Machine Learning
2. Catalyst: Theory
3. Carbon and Boron Based Materials

Associate Professors

Dr Sabyasachi Mukhopadhyay

Associate Professor
PhD: JNCASR, Bengaluru, India

Research Interests

1. Optoelectronic Materials
2. Molecular Electronics
3. Atomic Force Microscopy

Dr Johannes Kirscher

Associate Professor
PhD: George Washington University, USA

Research Interests

1. Optoelectronic Materials
2. Molecular Electronics
3. Atomic Force Microscopy

Assistant Professors

Dr Gangi Reddy Salla

Assistant Professor
PhD: PRL, Ahmedabad, India

Research Interests

1. Free-space optical communication
2. Scalar and vector optical vortex beams
3. Polarization speckles: Mueller Polarimetry

Dr Pranab Mandal

Assistant Professor
PhD: JNCASR, Bengaluru, India

Research Interests

1. Piezoelectrics and ferroelectrics
2. Magnetoelectric multiferroics
3. Oxide ion conductors

Dr Jatis Kumar Dash

Assistant Professor
PhD: IOP, Bhubaneswar, India

Research Interests

1. 2D materials and device applications
2. Metal/Semiconductor heterostructures
3. Thermoelectric materials and devices

Dr Laxmi Narayana Patro

Assistant Professor
PhD: IIT Madras, India

Research Interests

1. Solid state Ionics
2. All solid state batteries
3. Nonlinear conductivity

Dr Siddhartha Ghosh

Assistant Professor
PhD: University of Florida, USA

Research Interests

1. Physics at the interfaces
2. Wettability studies of metal-oxide thin-film
3. Nano-magnetism

Dr Mallikarjuna Rao Motapothula

Assistant Professor
PhD: NUS, Singapore

Research Interests

1. Heterogeneous catalysts
2. Ion beam applications
3. Functional nanostructures

Dr Soumyajyoti Biswas

Assistant Professor
PhD: SINP, Kolkata, India

Research Interests

1. Statistical physics, complex systems, machine learning
2. Fracture, breakdown, earthquakes
3. Multi-agent modes of society

Dr Amit Chakraborty

Assistant Professor
PhD: IACS, Kolkata, India

Research Interests

1. Theoretical Particle Physics
2. Higgs Boson and Dark Matter Phenomenology
3. Beyond Standard Model using ML

Dr Supravat Dey

Assistant Professor
PhD: IIT Bombay, Mumbai, India

Research Interests

1. Statistical Physics
2. Soft-matter
3. Biophysics

Dr Debabrata Pramanik

Assistant Professor
PhD: IISc, Bangalore, India

Research Interests

1. Computational Biophysics
2. Statistical Physics
3. Rare Events Sampling

Dr Pankaj Bhalla

Assistant Professor
PhD: PRL, Ahmedabad, India

Research Interests

1. Topological Quantum Materials
2. Transport/optical properties in 2D materials
3. Many body physics

Dr Ravi Kumar

Assistant Professor
PhD: IIT (ISM) Dhanbad

Research Interests

1. Optical Information Processing
2. Digital Holography
3. Computational Optical Imaging

Contact:

Faculty Co-ordinator

Dr Pranab Mandal

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