



MS & PhD PHYSICS

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EMPOWERING EVERY JOURNEY

Syed Babar Ali School of Science and Engineering



SYED BABAR ALI

SCHOOL OF SCIENCE AND ENGINEERING (SBASSE)

LUMS and SBASSE Fostering a Dynamic Learning Environment

Founded in 1985 as a not-for-profit, LUMS believes in making quality education accessible while breaking academic, geographic, and socio-economic barriers to enhance students' academic exposure.

SBASSE at LUMS is advancing innovative teaching and impactful research in science and technology. The MS programmes offer rigorous, professional, and research-focused training, with two pathways: MS-by-Coursework or MS-by-Thesis. The PhD programmes prepare students for independent, high-quality research. Key milestones include Coursework, Comprehensive (Qualifying) Exams, Thesis Proposal Defense, at least one article in a peer-reviewed journal, and final PhD Thesis Defense.

WHY MS & PHD PHYSICS AT LUMS?

The Department of Physics at LUMS hosts state-of-the-art laboratories that empower cutting-edge research and innovation.

- **Cryogenic Vibrating Sample Magnetometer (VSM)** – A cryogen-free, high-field measurement system capable of achieving ultra-low temperatures (1K) and magnetic fields up to 7 Tesla. It enables advanced studies of magnetic, electrical, and thermal properties of materials with precision and versatility.
- **Scanning Electron Microscope (SEM)** – The Nova NanoSEM 450 delivers exceptional imaging and analytical performance from the nanometer to the millimeter scale. It allows detailed exploration of surface morphology, composition, and microstructural features.
- **High Performance Computing (HPC)** – Provides advanced computational power for large-scale simulations, modelling of physical phenomena, and data analysis.
- **Nuclear Magnetic Resonance (NMR) Spectrometer** – A versatile instrument for exploring molecular and solid-state physics. It facilitates the study of magnetic interactions, spin dynamics, and electronic environments in solids, liquids, and complex materials.

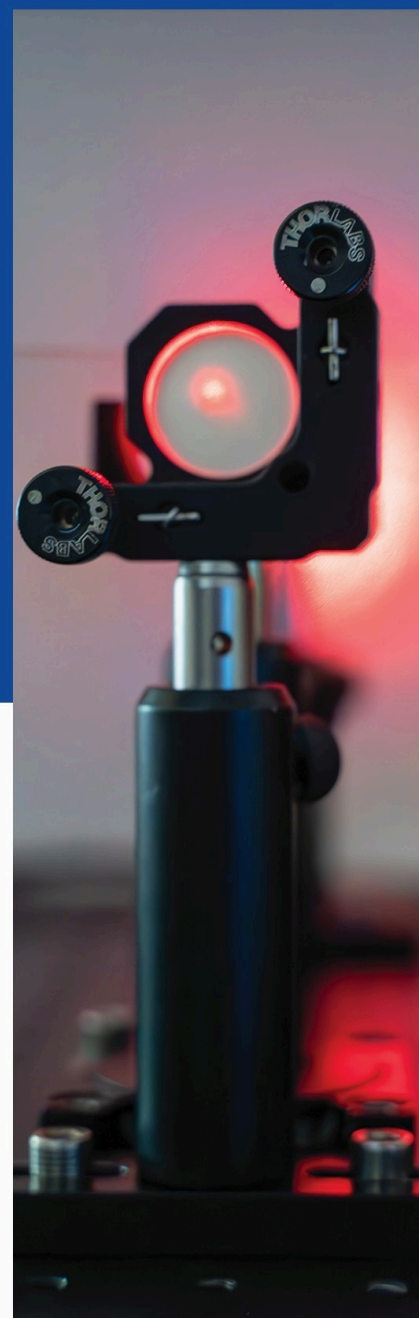
Together, these facilities enable researchers to visualise, characterise, and understand matter—from atomic arrangements to macroscopic properties—fuelling innovation across multiple scientific frontiers.

EMBRACE THE PHYSICS EXPERIENCE

- Dr. Muhammad Sabieh Anwar was awarded the civil honour *Tamgha-i-Imtiaz* by the President of Pakistan, in recognition of his exceptional contributions to education, research, and the advancement of physics.
- Higher Education Commission (HEC), Pakistan offers a six-month international research fellowship through its International Research Support Initiative Program (IRSIP) for full-time PhD students. PhD candidates from the Department of Physics have availed IRSIP funding to conduct research at leading institutions, including Harvard (USA), Technical University of Munich (Germany), the University of Manchester (UK), EPFL (Switzerland), and Aalto University (Finland).
- Quantum Technologies — Drs. Adam Zaman Chaudhry, Aeysha Khalique, Ammar Ahmed Khan, Muhammad Faryad and Muhammad Sabieh Anwar are leading the Quantum Revolution Team at LUMS. Their pioneering work on the theoretical and experimental fronts contributes to next-generation quantum technologies, including ultra-secure encryption methods and high-speed computational architectures, shaping the future of scientific research in Pakistan and beyond.
- Fundamental Physics — Drs. Rizwan Khalid, Syed Moez Hassan and Tajdar Mufti work on the frontiers of fundamental physics by asking the big questions of the origins of the Universe and the fundamental nature of the physical laws.
- Dr. Muhammad Sabieh Anwar, along with students, authored *Quantum Mechanics in the Single-Photon Laboratory* (Second Edition), which presents innovative, hands-on experiments that bring quantum mechanics to life using single photons. The book explores key concepts such as superposition, entanglement, and quantum measurement, linking theory with real laboratory practice. It serves as a valuable global resource for advancing quantum education and research.

ACHIEVEMENTS OF PHD PHYSICS ALUMNI:

- Dr. Ali Akbar received a Postdoctoral offer from the University of Nottingham, UK.
- Dr. Amna Farooq secured a Postdoctoral position at Oklahoma State University, USA.
- Dr. Abu Bakr Mehmood is serving as an Assistant Professor at Habib University, Karachi.
- Dr. Muzamil Shah is serving as an Assistant Professor at Quaid-i-Azam University, Islamabad.



INNOVATING AT THE EDGE OF UNDERSTANDING

The Physics faculty conducts active research in Basic and Applied Physics, spanning theory and experiments in fundamental physics, quantum technologies, and astronomy, with strong graduate student involvement. Faculty members and their research areas are listed below:

- **COSMOLOGY AND GENERAL RELATIVITY**
Dr. Syed Moez Hassan
- **ELECTROCHEMICAL PHYSICS, SURFACE PHYSICS, AND ICE PHYSICS**
Dr. Walther Schwarzacher
- **HIGH ENERGY PHENOMENOLOGY**
Dr. Rizwan Khalid
- **QUANTUM ALGORITHMS AND QUANTUM MACHINE LEARNING**
Dr. Muhammad Faryad
- **QUANTUM COMMUNICATION AND COMPUTATION**
Dr. Aeysha Khalique
- **QUANTUM DYNAMICS**
Dr. Adam Zaman Chaudhry
- **QUANTUM FIELD THEORY**
Dr. Tajdar Mufti
- **SOLAR CELLS AND OPTOELECTRONICS**
Dr. Ammar Ahmed Khan
- **SPIN AND PHOTON PHYSICS**
Dr. Muhammad Sabieh Anwar



“The MS Physics programme at LUMS was a truly rewarding experience. The department’s diverse research areas allowed me to pursue my field of interest and gain valuable research experience. Coming from an engineering background, I especially appreciated how the programme helped me transition seamlessly into physics through its well-structured coursework and the continuous support of the faculty during and after my studies.

SABBITA
MS Physics '21
PhD Student
University of Illinois

ADMISSION CRITERIA AND FINANCIAL SUPPORT

ADMISSION IS PURELY MERIT-BASED.

Scan the code to explore eligibility, deadlines, how to apply to the MS Physics programme and find out how LUMS can support your academic journey.



PhD Physics is a fully funded programme. Scan the code to find out details on how to apply.



PHD PHYSICS ADMISSION CRITERIA FOR FOREIGN NATIONALS

Foreign nationals must obtain a visa and a no-objection certificate to study at LUMS, with support provided by the university. Applicants from developing countries may also apply via the TWAS–UNESCO portal: <https://rb.gy/j83y7v>. Scan to find out more.



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