Student Outreach Program on Emerging Quantum Technologies: “Igniting Quantum Futures – Inspiring Students, Empowering Innovation.”

Organized by the Quantum Materials and Devices (QMD) Hub, IIT Delhi and CARE, IIT Delhi

Date: 20 August 2025
Venue: Nanofabrication Research Facility (NRF), IIT Delhi
Participants: 35 Undergraduate Students

Introduction

The **Quantum Materials and Devices (QMD) Hub at IIT Delhi** hosted a one-day **Student Outreach Program** focused on **Emerging Quantum Technologies**. The initiative was designed to **introduce undergraduate students to cutting-edge research facilities, inspire curiosity, and encourage careers in quantum science and engineering**.
A total of **35 students from diverse academic backgrounds** actively participated, gaining first-hand exposure to the exciting world of quantum device research and development.

Program Highlights

Exposure to World-Class Facilities

Students were given guided access to the **Nanofabrication Research Facility (NRF)**, one of India's premier infrastructures for **quantum device design, fabrication, and characterization**. Through live demonstrations and interactive sessions, they explored advanced tools and techniques, including:

- **Atomic Layer Deposition (ALD):** Understanding the role of high-quality dielectric layers in devices such as HEMTs and SPADs.
- **Thermal Oxidation for Mesa Isolation:** Learning how precise isolation techniques are critical in device performance.
- **Sputtering & Thermal Evaporation Systems:** Exploring thin-film deposition methods for creating reliable metal contacts.
- **Electron Beam Lithography:** Witnessing nanoscale patterning crucial for quantum device miniaturization.
- **Probe Station for Electrical Characterization:** Hands-on insights into I–V and C–V measurements for evaluating device efficiency.

Interactive Faculty Engagement

A key highlight of the day was an **interactive dialogue with leading faculty experts and post docs — Prof. Samaresh Das, Prof. Santanu Manna, Dr. Pawan Kumar, Dr. H. K. Sandhu, and Dr. Sumit Choudhary**.

The session provided students with:

- A grounding in the **fundamentals of quantum devices**.
- Insights into **global research challenges and opportunities** in quantum technologies.
- Guidance on **career pathways** in quantum science and engineering.

The open discussion encouraged students to ask questions, exchange ideas, and envision their role in India's growing quantum ecosystem.

Outcomes of the Program

- Students gained **practical exposure** to nanofabrication techniques central to quantum device innovation.
- The program successfully **bridged the gap between classroom theory and real-world experimentation**.
- Faculty interaction sparked **curiosity and research motivation**, inspiring participants to consider future careers in quantum technology.
- The event reinforced the role of **IIT Delhi's QMD Hub** as a leader in advancing India's **National Quantum Mission**.

Interactive sessions with the students

Conclusion

The **Student Outreach Program** proved to be a resounding success in **nurturing young minds and creating awareness about the transformative potential of quantum technologies**. By combining **hands-on facility exposure, live demonstrations, and expert mentorship**, the initiative contributed meaningfully to **building India's next generation of quantum scientists, engineers, and innovators**.

With initiatives like these, the **QMD Hub at IIT Delhi** continues to play a pivotal role in shaping the **quantum future of the nation**.