Sumukh Vaidya

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Expertise: Display, Optics, OLEDs, Laser and Vacuum Systems, Nanofabrication, Cryogenics, Programming

SUMMARY

- Researcher with **5+ years of academic experience** in cutting-edge experimental physics laboratories.
- Skillset of **optical systems**, RF circuits, **nanofab**, ion implantation and **automated instrument control**.

KEY PUBLICATIONS

- **Nanotube spin defects for omnidirectional magnetic field sensing*,** Nature Communications *2024*
- **Quantum sensing and imaging with spin defects in hexagonal boron nitride*,** Adv. In Phys. X *2023*
- **Quantum sensing of paramagnetic spins in liquids with spin qubits in hBN,** ACS Photonics *2023*
- **Nuclear spin polarization and control in hexagonal boron nitride,** Nature Materials *2022*
- * indicates first author/equal contribution**.** Please use Google Scholar to find other publications.

INTERNSHIPS

- **Display Hardware Engineering Intern** *Apple, Cupertino, California* *May'24-Aug'24*
  - Working with the Display **Panel Process and Optics** team to **characterize OLED display** panels.
  - **Automated** measurements of thermal shifts in luminance and color with spectroradiometers, colorimeters.
- **Visiting Student Researcher** *JPARC, Tokai, Japan* *Dec '17*
  - Implemented **algorithms for tracking the trajectories** of cosmic rays to reduce spurious noisy signals.
- **Visiting Summer Student Researcher** *KEK, Tsukuba, Japan* *May '17*
  - Studied **Photomultiplier tubes** in **simulated experimental conditions** for the Muon g-2/EDM experiment.

EXPERIENCE

- **Quantum Sensing with Low Dimensional Materials** *PhD Thesis,* Purdue University *Jan '21-Current*
  - Research in **Quantum sensing of magnetic fields** via **laser-based measurements** of 2D and 1D materials.
  - Built a **high-vacuum ion implantation** machine for creating and studying solid state quantum defects.
  - Built a **Low-Temperature Vacuum Optical Measurement** setup to perform **cryogenic measurements**.
  - Built a **confocal microscopy system** with integrated **RF electronics** for **quantum sensing experiments**.
  - **Python** and **LabVIEW** programming to **automate** combined **laser and RF experiments**.
- **Graduate Data Science Researcher** *The Data Mine,* Purdue University *Jan '24-Apr '24*
  - Collaborated with **Howmet Aerospace** on developing an **ML model** to **identify manufacturing defects**.
  - Used **PyTorch** to build and test ML models and **improve anomaly detection accuracy**.
  - **Achieved 94% accuracy** compared to 87% accuracy for human experts.
- **Organic Semiconductor Imaging and Perovskite Solar Cell Fab.** *M.Tech Thesis,* IITB *Jul '18-Aug '20*
  - Performed **Matlab simulations** of charge transport in organic semiconductors to study **OLED efficiency**.
  - **Built an imaging** setup for thin film **organic semiconductors** to determine photoemitter orientation.
  - **Fabricated next-gen Perovskite Solar Cells** in a **clean room** environment using specialized equipment.
  - **Built** and deployed the **research group website** using Jekyll. Link

EDUCATION

- **PhD, Physics** *Purdue University, Indiana* (*GPA 3.91/4.0*) *Jan '21-May '25*
  Advisor: Prof. Tongcang Li, Department of Physics and Department of ECE, Purdue University
- **B.Tech+M.Tech, Specialization: Nanoscience** *IIT Bombay (IITB), India* *Jul '15-Aug '20*
  Advisor: Prof. Dinesh Kabra, Department of Physics, IIT Bombay

TECHNICAL SKILLS

- **Programming:** Python, Machine Learning (PyTorch), MATLAB, LabView, LATEX, C++, Mathematica, Zemax OpticStudio, Comsol Multiphysics, KLayout, FPGA, git, github.
- **Experimental:** Display characterization, Laser systems, Optical system design, Optical Measurements (Room and Low-Temperature), Ion Implantation, Nanofabrication, RF circuits, Instrument Automation, AFM, SEM, FIB, Photolithography, Confocal Microscopy, High-Vacuum systems, 2-D materials.