Sumukh Vaidya

Purdue University | vaidyasumukh@gmail.com |+1-765-479-9514| LinkedIn| sumukhvaidya.github.io

Expertise: Laser Systems, Optics, Nanofab, Cryogenics, Vacuum systems, Programming, Data Analysis

SUMMARY

- Researcher with **5+ years of academic experience** in cutting-edge experimental physics laboratories.
- Interdisciplinary and collaborative experience of **optical system design**, **high-vacuum systems**, RF circuits, **nanofabrication**, ion implantation and **instrument control for data acquisition**.

KEY PUBLICATIONS

- **Nanotube spin defects for omnidirectional magnetic field sensing*,** Arxiv:2310.02709   *2023*
- **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.

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

INTERNSHIPS

- **Visiting Student Researcher** *JPARC, Tokai, Japan.*   *Dec '17*
- Project: Noise reduction for Central Drift Chamber
- Implemented **algorithms for tracking the trajectories** of cosmic rays entering the drift chamber.
- **Visiting Summer Student Researcher** *KEK, Tsukuba, Japan*   *May '17*
- Project: Characterization of PMTs as Muon Beam Counters
- Studied Photomultiplier tubes in **simulated experimental conditions** for the Muon g-2/EDM experiment.

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:** Laser systems, Optical Measurements (Room and Low-Temperature), Ion Implantation, Optical system design, Nanofabrication, RF circuits, Instrument Automation, Photolithography, Confocal Microscopy, AFM, SEM, FIB, High-Vacuum systems, Glove box, 2-D heterostructure assembly.