PIYUSH CHHALLARE

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Passionate about uncovering novel magnetic and electronic phenomena in quantum materials and semiconductors, I aim to bridge fundamental physics with emerging technologies with a goal to push the boundaries of quantum research and deepen humanity's understanding of the universe's most fundamental principles.

EDUCATION

Purdue University, West Lafayette, IN **Aug 2022 - May 2026**

Major: Bachelor of Science Physics

Certificate: Quantum Information Science and Technology (QIST)

PROFESSIONAL EXPERIENCE

UNDERGRADUATE RESEARCHER | PURDUE UNIVERSITY | WEST LAFAYETTE, IN **Aug 2024 – Present**

- Synthesized high-quality single crystals from polycrystalline ytterbium-based delafossites for novel systems.
- Conducting comprehensive Magnetic Properties Measurement System (MPMS), Physical Properties Measurement System (PPMS) and Laue Diffraction measurement and analyses on both polycrystalline and single crystal samples.
- Investigating novel magnetic properties and validating the presence of exotic quantum states in these materials.
- Explored electronic properties by performing Van Der Paaw measurements and attempting thermal hall measurements on single crystals.

SURF RESEARCHER FELLOW | PURDUE UNIVERSITY| WEST LAFAYETTE, IN **May 2024 – Jul 2024**

- Acquired expertise in X-ray diffraction, Magnetic Properties Measurement System (MPMS), Physical Properties Measurement System (PPMS), X-ray Fluorescence, Laue Diffraction, and Rietveld Refinement techniques.
- Successfully synthesized novel delafossite compounds and conducted detailed magnetic property investigations using MPMS and PPMS, exploring the potential for novel magnetic behaviors to validate the existence of exotic quantum states.

DATAMINE RESEARCHER | PURDUE UNIVERSITY | WEST LAFAYETTE, IN **Aug 2023 – Dec 2023**

- Conducted Monte Carlo simulations to model Top Quark Decay using CMS data using Python programming language.
- Isolated and analyzed W and Z Boson data from the simulations, generating predictive plots of particles emitted during top quark decay.
- Developed algorithms to process and filter simulation data, enabling the research team to efficiently isolate and analyze key data points in detail.

PROJECTS

- Exploration of Magnetic Properties in Novel Triangular Quantum Magnets **Aug 2024 – Present**
- Synthessis of Ytterbium Based Delafossites & Study of their Magnetic Properties. **May 2024 – Jul 2024**
- Top Quark Reconstruction Via Real Vs Virtual W Boson. **Aug 2023 – Dec 2023**

SKILLS

- **Lab:** Crystal Flux Growth, Chemical Vapor Deposition, X-Ray Diffraction, X-ray Fluorescence, MPMS, PPMS, Laue Diffraction, SEM-EDX, Impedance Measurements, PCB Soldering, Flux growth, Circuit Design, Semiconductor Physics, Oxidation, Diffusion and Ion Implantation, Lithography, Etching, Thin Film Deposition.

- **Computational:** Python, C++, R, Algorithm Development, Monte Carlo Simulations, Introductory Q# & Qiskit, Statistical and Graphical Analysis, Curve Fitting and Error Analysis

- **Electronic:** Very Large Scale Integration (VLSI), Field-Programmable Gate Array (FPGA), Computer Architecture, Application Specific Integration Circuits (ASIC), Computational Logic, Microarchitecture, Hardware Design, Programmable Logic Controllers, Programmable Logic Devices (PLD), Complex Programmable Logic Devices (CPLD).