Tao Lu

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EDUCATION

CALIFORNIA INSTITUTE OF TECHNOLOGY Pasadena, CA, USA

Graduate Student in Physics Sep. 2023 - Present

PEKING UNIVERSITY Beijing, China

Bachelor of Science in Physics Sep. 2019 - Jul. 2023

Academics: Overall GPA: 3.84/4.00

Advanced Courses: Quantum Field Theory (95.3/100), Introduction to Scattering Spectroscopy of Solid (96/100), Solid State Theory (96/100), Lie Group & Lie Algebra (92/100), General Relativity (95/100)

RESEARCH INTERESTS

Condensed Matter Experiments in Strongly Correlated Systems

- **Magnetism:** quantum spin liquid, multiferroics, low dimensional magnetism
- **Topological Materials:** topological quantum chemistry, topological electronic band, etc.

Specific Techniques

- **Scattering Spectroscopy:** Raman, X-ray scattering, neutron scattering, etc.
- **Strain Experiment:** Elastocaloric Effect
- **Quantum Material Design and Synthesis**

RESEARCH EXPERIENCE

CALIFORNIA INSTITUTE OF TECHNOLOGY Pasadena, CA, USA

Research Assistant, Ye Research Group Sep. 2023 – Present

Advisor: Prof. Linda Ye, Caltech PMA and IQIM

- Will use elastocaloric effect to study exotic elementary excitations in frustrated and low-dimensional magnetic systems.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY Cambridge, MA, USA

Visiting Undergraduate Researcher in MIT Physics Jul. 2022 - Dec. 2022

Advisor: Prof. Riccardo Comin, CMX, MIT Physics

- Studied the chemical doping effect of vdW multiferroic NiI2 via CVT crystal synthesis.
- Obtained the phase diagram of $Ni_{1-x}Cr_xI_2$ ($0 \leqslant x \leqslant 0.25$) via EDS, MPMS, XRD, Raman and magneto-optic probes (MOKE, linear/circular dichroism, crossed polarized imaging, etc.); Studied the interplay of ferroic orders by combing transport and optical probes.

PEKING UNIVERSITY Beijing, China

Undergraduate Research Assistant at School of Physics Jun. 2021 - Jun. 2023

Advisor: Prof. Yuan Li, ICQM, School of Physics, Peking University

- Studied field-induced fractionalized excitations in a candidate Kitaev magnet $Na_3Co_2SbO_6$ using inelastic neutron scattering (conducted in J-PARC, Japan).
- Designed and built an outer light path for HORIBA Raman Spectrometer to accommodate magneto-Raman measurement with a magnetic cryostat.
- Synthesized high-quality triangular lattice crystals $K_2Co(SeO_3)_2$ and $K_2Co_2(SeO_3)_3$ for studying possible molecular orbitals inside frustrated systems and finished the pre-characterization using MPMS and PPMS.

RESEARCH SKILLS

- **Programming:** Python, C++, MATLAB, Mathematica, LaTeX
- **Computation:** SpinW for spin wave calculation/fitting
- **Crystal Growth:** flux method, CVT, PVD
- **Spectroscopy techniques:** inelastic neutron scattering (INS), (magneto-)Raman, energy dispersive X-ray spectrometry (SEM/EDS), X-ray absorption spectroscopy (XAS), X-ray magnetic circular dichroism (XMCD)
- **Material Characterization:** X-ray Laue diffraction, powder/single-crystal XRD, MPMS, PPMS
- **Magneto-optic Effect Probes:** MOKE, linear/circular dichroism, cross-polarized imaging
- **Device Fabrication:** PDMS-supported transfer procedure, 2D vdW heterostructure fabrication

AWARDS & HONORS

- Outstanding Graduate, Peking University 2023
- Honours Bachelor's Degree in Physics 2023
- Wei Ming Physics Student Scholarship, Peking University 2022
- Merit Student Award, Peking University 2020, 2020-2021, 2021-2022
- Qin Wanshun & Jin Yunhui Scholarship, Peking University 2020-2021, 2021-2022
- Benz Scholarship, Peking University 2019-2020