Xiangjun Tan

xiangjun.tan@student.unsw.edu.au

Education

University of New South Wales (UNSW) *Sydney*

Bachelor of Physics(Honours), Thesis Supervisor: Prof. Susan Coppersmith Feb. 2024 - Dec. 2024

University of New South Wales (UNSW) *Sydney*

Bachelor of Quantum Engineering/Physics double degree, Graduated with Distinction, Top10% Sep. 2021 - Feb. 2024

Peking University (PKU) *Beijing*

Summer School, GPA:88 Jun. 2022 - Aug. 2022

Expected graduate within 3 years to finish a 5-year full degree by overloading the coursework.

Awards and Honors

Feb. 2023-2024 **Award**: "UNSW Science Talented Student"

Dec. 2022-2023 **Scholarship**: "SQA Undergraduate Student Research Scholarship $3333 AUD"

Feb. 2023 **Award**: UNSW Dean's list

Research Projects

Physics Beyond the Standard Model Enhanced Through Quantum Simulation *UNSW, Sydney*

Honours Project Supervisor: Prof. Susan Coppersmith, collaboration with Prof. Baha Balantekin Jan. 2024 - Dec. 2024

- Developed an effective model to boost the calculation of Dark Matter (WIMP) -Nuclei Scattering through quantum simulation under the second-quantisation.
- Innovatively mapped Nuclear Shell Pairing Model onto programmable gates for the algorithm, enhancing the accuracy of quantum simulations, which could be related to the target nuclear response function.
- Quantified the relation between the estimation energy difference and other variables in the model and developed a benchmark to see how to suppress the error. The relative error has been reduced by 88.2% according to my second-order perturbation correction.

Quantum Simulation of Phonon Scattering & Topological Phonon Surface States in 2D Materials *Institute of Theoretical Physics, CAS, Beijing*

Research Assistant Supervisor: A/Prof. Tiantian Zhang Dec. 2023 - Feb.2024

- Pioneered mapping the Multi Phonon Scattering Hamiltonian to quantum circuits and evaluated by the Variational Method with error mitigation strategies.
- Constructed an Effective Ansatz for Bosonic Vibrational Systems, facilitating more accurate simulations of phononic behaviours, which will contribute to the thermal conductivity of the materials
- Applied the Tight-binding model for graphene-like hexagonal lattice, analysis of the surface states and the topological property on a supercell with different boundary conditions.
- Explored how the topological defects and dilution affect the topological phonon surface states.

Quantum Hall Effect in 2D Systems *UNSW, Sydney*

Taste of Research Supervisor: Prof. Alex Hamilton, Collaborate with Dr Zhanning Wang Aug. 2023 - Dec. 2023

- Experimentally measured the Quantum Hall Effect at ultra-low temperatures (below 2 Kelvin) and high magnetic fields (up to 9 Tesla), contributing to the understanding of quantum electronic properties in 2D materials.

Research on Neutrino Oscillation in Different Mediums *UNSW, Sydney*

Physics Research Project Supervisor: Dr. Michael Schmidt Aug. 2022 - Jan. 2023

- Investigated the time evolution of the Effective Hamiltonian in vacuum and matter, advancing the theoretical framework for neutrino oscillations.
- Derived novel expressions for evolution in dark matter environments, offering insights into how neutrinos interact with unseen cosmic matter.
- Developed an interactive model for neutrino oscillation using Python and finished the internal presentation. [Article Link]

Activities

UNSW Hero Program-Innovation Pro *UNSW Sydney*

Team Leader May. 2023 - August. 2023

- Directed a team in developing and presenting a pitch for innovative quantum computation technology, highlighting potential impacts on various industries.
- Conducted comprehensive research to underpin the pitch, ensuring the presentation was grounded in the latest quantum computing advancements and market needs.
- Developed and delivered a compelling presentation to stakeholders, effectively communicating complex quantum computing concepts to a non-specialist audience.
- Facilitated collaboration between team members with diverse expertise, fostering a creative and productive environment for idea generation and problem-solving.
- Successfully engaged with industry experts and potential investors during the pitch, garnering positive feedback and establishing valuable connections for future collaborations.

UNSW Research Seminar Association *UNSW Sydney*

President / Founder Apr. 2023 - Present

- Founded and currently presides over the Research Seminar Association (RSA). This university-certified society significantly enhances the academic and professional network within UNSW, including two thousands of society members.
- Successfully organize weekly seminars featuring researchers and students to discuss cutting-edge topics, promoting interdisciplinary learning and collaboration.
- Spearheaded collaborations with international companies to provide job-sharing opportunities, contributing to members' career development by directly addressing employment challenges in the research sector.
- Led initiatives that resulted in a measurable increase in membership and engagement, establishing RSA as a pivotal platform for academic and professional exchange at UNSW.

Technical Skills

Programming	Matlab, C, Python
Professional Softwares	Matlab, Ltspice, Mathematica
Drawing & Typesetting	Photoshop, Office, LaTeX
Languages	Chinese(Native), English