Xiangjun Tan

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Education

University of New South Wales (UNSW) *Sydney*

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

Peking University (PKU) *Beijing*

Summer School, Introduction to Quantum Information Technology, GPA:87 Jun. 2022 - Aug. 2022

University of New South Wales (UNSW) *Sydney*

Bachelor of Physics(Honours) Feb. 2024 - Current

Awards and Honors

Feb. 2023-2024	**Award**: "UNSW Science Talented Student"	*UNSW Science*
Dec. 2022-2023	**Scholarship**: "SQA undergraduate Student Research Scholarship "	*Sydney Quantum Academy*
Feb. 2023	**Award**: UNSW Dean's list	*UNSW Engineering*

Research Projects

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

Honours Project Supervisor: Prof. Susan Coppersmith Jan. 2024 - Current

- Developed an Effective Field Theory to elucidate Dark Matter-Nuclei Scattering, potentially paving the way for groundbreaking discoveries in dark matter characteristics.
- Innovatively mapped Nuclear Shell Quasi-Spin Pairing Model onto Quantum Circuits, enhancing the accuracy of quantum simulations related to nuclear physics.
- Conducted extensive evaluations with varied configurations to minimize quantum noise, significantly improving the fidelity of quantum computation results.
- Submitted the works to the 2024 Physics Research Poster Presentation Event in Sydney, hosted by the Australian Institute of Physics

Quantum Simulation of Phonon Scattering for Thermal Conductivity Analysis *Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing*

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

- Pioneered the mapping of the Four Phonon Scattering Hamiltonian to quantum circuits, contributing to advancements in understanding thermal transport in materials.
- Constructed an Effective Ansatz for Bosonic Vibrational Systems, facilitating more accurate simulations of phononic behaviours.
- Applied the Variational Quantum Eigensolver (VQE) Algorithm to estimate ground state energy and calculate phonon lifetimes, offering insights into material properties at the quantum level.

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

Taste of Research Supervisor: Prof. Alex Hamilton Sep. 2023 - Dec. 2023

- 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 Quantum Computation for Neutrino Oscillation and Many-body Problems *UNSW, Sydney*

Talented Student Program Supervisor: Prof. Susan Coppersmith Mar. 2023 - Jan.2024

- Delved into the fundamentals of Many-body Physics and Quantum Field Theory (QFT), establishing a solid foundation for complex quantum computations.
- Engineered an efficient algorithm for collective neutrino oscillation simulations on the IBMQ Platform, enhancing computational models in particle physics.
- Implemented advanced error mitigation strategies to minimize computational errors and optimize quantum gate operations, demonstrating the potential for reducing resource overhead in quantum simulations.
- Presented findings at QPQIS-2023 Conference in Beijing, showcasing the project's contribution to the field of quantum simulation for high energy physics.

Modeling and Simulation of Silicon Qubit Devices *Sydney Quantum Academy, Sydney*

SQA Undergraduate Research Supervisor: Dr. Chris Escott Jan. 2023 - Mar. 2023

- Acquired a comprehensive understanding of Silicon Qubits, contributing to the development of scalable quantum computing technologies.
- Devised a customized Ising Model for simulation using Matlab, facilitating the exploration of qubit interactions and quantum state behaviours.

Research on Neutrino Oscillation *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 oscillation in astrophysical contexts.
- 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, enhancing educational tools and theoretical predictions in particle physics.

Activities

UNSW Hero Program-Innovation Pro *UNSW Sydney*

Team Leader May. 2023 - August. 2023

- Directed a team in the development and presentation of 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), a university-certified society that significantly enhances the academic and professional network within UNSW.
- 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 the career development of members 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.

Quantum Computation Training Program (4th Edition) *University of Science and Technology of China*

Research Student June. 2023 - Sep.2023

- Participated in an intensive training program on Quantum Computation, gaining hands-on experience with quantum algorithms and computational models.
- Collaborated on a project that simulated quantum systems, which enhanced understanding of quantum mechanics and computational techniques.
- Acquired advanced skills in quantum programming languages and tools, preparing for impactful research contributions in quantum computing.

Technical Skills

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