# Xiangjun Tan

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## Education \_\_\_\_\_

Peking University (PKU)	Beijing
Summer School, Introduction to Quantum Information Technology, GPA:88	Jun. 2022 - Aug. 2022
University of New South Wales (UNSW)	Sydney
Bachelor of Quantum Engineering/Physics double degree, Graduated with Distinction, Top10%	Sep. 2021 - Feb. 2024
University of New South Wales (UNSW)	Sydney
Bachelor of Physics(Honours), Thesis Supervisor: Prof. Susan Coppersmith	Feb. 2024 - Dec. 2024
Expected graduate within 3 years to finish a 5-year full degree by overloading the coursework.	

# Publications \_\_\_\_\_

[1] Xiangjun Tan\* "Quantum Computing for Phonon Scattering Effects on Thermal Conductivity" arXiv, 2407.15808. [Link]

## Awards and Honors \_\_\_\_\_

May 2024-2025	Award: "IBM Quantum Researcher Program, awarded \$105,000 AUD"
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 Information UNSW, Sydney Honours Project Supervisor: Prof. Susan Coppersmith, collaboration with Prof. Baha Balantekin Jan. 2024 - Current · Developed an effective model to boost the calculation of Dark Matter (WIMP) -Nuclei Scattering through quantum simulation, supported by IBM Ouantum. · Innovatively mapped Nuclear Shell Quasi-Spin Pairing Model onto Quantum Circuits, enhancing the accuracy of quantum simulations related to nuclear physics. • The energy difference between the ground state and quantum estimated energy was quantified as a function of quantum gate fidelity and the number of variational parameters based on the model and superconducting quantum platform. · Submitted the works to the 2024 Physics Research Poster Presentation Event in Sydney, hosted by the Australian Institute of Physics Institute of Theoretical Physics, **Quantum Simulation of Phonon Scattering & Topological Phonon Surface States** CAS, Beijing Research Assistant Supervisor: A/Prof. Tiantian Zhang Dec. 2023 - Current · Pioneered mapping the Multi Phonon Scattering Hamiltonian to quantum circuits and evaluated by Variational Quantum Eigensolver with quantum 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 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 quantum simulation circuit for Collective Neutrino Oscillation under two flavours. · Encoded an efficient algorithm for collective neutrino oscillation simulations on the IBMQ Platform for up to 16 Qubits. · 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. [Poster Link] Modeling and Simulation of Silicon Qubit Devices Sydney Quantum Academy, Sydney

 SQA Undergraduate Research Supervisor: Dr. Chris Escott
 Jan. 202

 • Created a model to describe the physical defect, especially for the dilution in the materials. The code has been uploaded to [Github].

Devised a customized Ising Model for simulation using Matlab, facilitating the exploration of qubit interactions and quantum state behaviours.

Jan. 2023 - Mar. 2023

#### **Research on Neutrino Oscillation in Different Mediums**

Physics Research Project Supervisor: Dr. Michael Schmidt

- · 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**

Team Leader

- · 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 nonspecialist 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**

President / Founder

- · 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.

#### **Quantum Computation Training Program (4th Edition)**

Research Student

- · 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**

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

UNSW Sydney

May. 2023 - August. 2023

Aug. 2022 - Jan. 2023

University of Science and Technology of China

June. 2023 - Sep.2023

UNSW Sydney

Apr. 2023 - Present