Longxiang Huang B.Sc.

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Education

Technical University of Munich (TUM) — Garching, Germany
M.Sc. in Quantum Science and Technology — 2022 - 2025 *(expected)*
- GPA: 1.09(1.0 = best, 5.0 = fail), Ranking: 2/67.

University of Science and Technology of China (USTC) — Hefei, China
B.Sc. in Physics (Atomic and Molecular Physics) — 2018 - 2022
- Enrolled in the honors program, **School of the Gifted Young (SGY)**.
- GPA: 3.54/4.30, Score: 85.58/100.

Awards and Honors

- **Deutschlandstipenduim 23/24**, TUM — 2023.10
- **The Second Prize of the 16th (2020) University Physics Innovative Research Experimental Paper Competition**, USTC — 2020.12
- **Excellent Student Scholarship-Bronze**, USTC — 2020.01
- **Excellent Student Scholarship-Silver**, USTC — 2018.12

Publications

1. **Longxiang Huang***, Jacquelin Luneau*, Stefan Filipp, Peter Rabl, and Klaus Liegener. Sub-harmonic Driving via Multi-photon Processes. *(In preparation)*.
2. Johannes Schirk*, Florian Wallner*, **Longxiang Huang**, *et al.* Protected Fluxonium Control with Sub-harmonic Parametric Driving. *arXiv:2410.00495 [quant-ph]*, 2024.

Research & Projects

Master's Thesis — 2023.10 - 2024.10
Analytic Investigations of Sub-harmonic Driving for Fluxonium Qubits
Walther-Meißner-Institute for Low Temperature Research (WMI), BAdW

- Implemented Floquet-Magnus Expansion on single Fluxonium qubit to explain the existence of the su-harmonic driving, and predicted the exact resonant condition of the third-order driving, with power laws for higher-order sub-harmonics;
- Discovered a new perturbative series by going to a designed frame without anharmonic terms to increase the speed of convergence on a strong nonlinear system;
- Used developed a general perturbative theory on transmon qubits, and emerged with previously reported results but behaved better in stronger regimes.

Bachelor's Thesis — 2022.03 - 2022.06
Reduction of Qubits in Variational Quantum Eigensolver on Trapped Ions
Key Laboratory of Microscale Magnetic Resonance, CAS

- Learned the variational quantum algorithms and 'Strong Quantum Contextuality' that classifies contextual subspace of a given Hamiltonian, leading to reduced scales;
- Implemented 'Tapering Off' methods and Contextual-subspace Variational Quantum Eigensolver(Cs-VQE) algorithm on ground energy of the water molecular, where the original 14 qubits reduce to 7;
- Designed the hardware-efficient quantum circuit in 7 qubits based on trapped ions, compared results simulated on Qiskit in different scales and optimizers.

Research Assistant — 2021.12 - 2022.03
Gate Pulse Shaping Technique for Mølmer-Sørensen Gates on Trapped Ions
Key Laboratory of Microscale Magnetic Resonance, CAS

- Deduced the evolution operator of ions with bichromatic light by Magnus formula;
- Developed a program searching for the maximal fidelity of the Mølmer-Sørensen gate by optimizing its pulse shaping, and visualized evolutions of phonons and spins.

Research & Projects

Research Assistant 2020.03 - 2021.07

Visualization of Position of Beam Based on 2D Lateral Effect Position Sensing Detector

Key Laboratory of Microscale Magnetic Resonance, CAS

- Learned 2D Lateral Effect Position Sensing Detector intended to report the specific position of the beam and assist in monitoring and stabilizing optical system;
- Designed a paradigm PCB for the double-channel dividing circuit using the operational amplifier and processed real displacement by dividing output signals;
- Welded the circuit board independently and packaged the whole electronic system, which has already been used in the Doppler cooling system for trapping Ca ions;
- Designed and built a 405nm optical system with a 3-axis adjustable displacement platform for tracking and analyzing processed signals compared to the real displacements, which are linear relevant with a 1.032 scale factor.

Student Project Team Leader 2020.09 - 2021.01

Investigations Based on Stimulated Raman Scattering of CVD-Diamond

Physics Experiment Teaching Center, University of Science and Technology of China

- Explored the 532 nm laser frequency conversion technology based on the stimulated Raman effect of the diamond and built an optical system including an optical cavity that can select and amplify the output of a specific frequency;
- Used the stimulated Raman effect of diamond to transform the frequency of the incident laser and obtained a short and stable outgoing laser, with the optical component of the 1st and the 2nd Stokes's effect, as verified by a spectrum analyzer;
- Calculated the energy conversion rate (1st stokes effect about 1% and 2nd about 0.1%) and put forward improvement on the experiment with parallel surfaces;
- Won the second prize of the 16th (2020) University Physics Innovative Research Experimental Paper Competition.

Internships

Walther-Meißner-Institute for Low Temperature Research (WMI), BAdW

Garching, Germany 2024.12 - now

- Researched the new architecture of superconducting qubits – the Fluxoniums, and calculated their eigenenergies and wavefunctions of several the lowest eigenstates;
- Derived quasi-solvable solutions to analytical expressions of the lowest two states in half-flux sweetspot with comparsions to numerical results.

Garching, Germany 2023.04 - 2023.10

- Researched the new architecture of superconducting qubits – the Fluxoniums, and calculated their eigenenergies and wavefunctions of several the lowest eigenstates;
- Derived quasi-solvable solutions to analytical expressions of the lowest two states in half-flux sweetspot with comparsions to numerical results.

Shanghai Institute of Optics and Fine Mechanics, CAS

Shanghai, China 2021.07 - 2021.08

- Debugged and improved the external protection circuit of the atomic chip to prevent the large constant current from fusing the wires on the Atomic chip;
- Developed programs based on the Optimized Fringe Removal Algorithm to obtain absorption images of cold atoms without fringes.

Skills

Languages: Chinese, English.

Programming: `Python`, `Wolfram Mathematica`, `C`, `MATLAB`.

Wet Laboratory: Circuit board (PCB) designing and drawing, Circuit board (PCB) wielding, Mechanical drawing, Designing and Setting up simple optical system, and Simulation of multi-physical field coupling model.