

Bachelor/Master Thesis

# Simulation and analysis of 3D superconducting resonator with through silicon vias

In the past decade, quantum computing generates numerous scientific papers and is poised to reshape computing from concept. Superconducting Qubit (Quantum bit) was considered as the most promising techniques now to achieve a long lifetime and a high fidelity. Since the Qubit operates at RF/microwave frequency (c.a. 5GHz), this novel application opens a new gate for microwave engineers and is awaiting more creative microwave circuit designs.

One of the most challenging tasks is to make a Quantum chip with high scalability. The Qubit with 3D heterogeneous integrated architecture could be a possible solution. However, some underlying problems need to be addressed.

In this work, you will characterize the performance of TSV (through-silicon vias) and study how it will affect the Q-factor of the resonator. Then you will validate the design by using EM simulator and layout the design for fabrication. Publication is highly encouraged for this work.

## Prerequisites

- Necessary: Prior experience in microwave engineering and passive device design, like coupler, resonator and etc.
- Necessary: Experience programming in Python
- Necessary: Experience simulating in Ansys HFSS or similar 3D EM simulator
- Preferable: Knowledge of electrodynamic
- Optional: Knowledge of quantum electrodynamic is a plus

## Contact

If you are interested in this work, please contact me via email with a short CV and grade report. We will then arrange a short meeting where we can discuss the details.

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## Advisors

Zhen Luo