

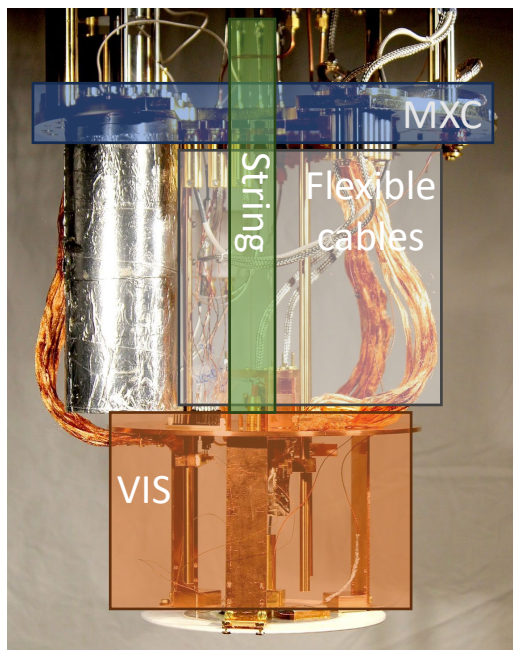


Master Thesis Project 2025 / 2026

Flexible microwave cables for cryogenic quantum experiments

Background

Quantum experiments with superconducting circuits require low-loss microwave cables suitable for a cryogenic environment. Commonly, such cables are commercially available. However, the quantum experiments that we perform are extremely sensitive to mechanical vibrations. For this reason, our quantum devices are mounted on a vibration isolation system (VIS), which consists of a mass on a spring that acts as a mechanical vibration dampener. As a result, using stiff microwave cables would propagate vibrations from the cryostat to the sample and render the VIS ineffective.



Coloured close-up of the VIS hanging from the top of the cryostat by a string, resting below the mixing plate (MXC) and connected to it only via flexible cables.



Example of semi-flexible microwave cables:
Delft Circuit cables

Master thesis project

The goal of the thesis is to simulate, design, build, and test microwave cables working in the 4 to 8 GHz range using a combination of appropriate materials. The goal is to obtain a cable that is extremely flexible, low-loss at microwave frequencies, cryo-compatible, and that does not outgas nor delaminate over time. The project can be run as a 30 or 45 credit thesis.

What will you learn?

- Investigating the properties of materials for their use as cryo-compatible microwave cables.
- Hands-on experience with electromechanical superconducting quantum devices.
- Advanced cryogenic measurement techniques.

What we expect from you

- Interest in the project, taking initiative, developing critical thinking, and discussing your results with the research group.
- Background in mechanical engineering, electrical engineering or physics.