

# Use Cases: Internal



QU-PILOT

Task	Company	RTO	Use-Case
T6.1	IQM	VTT	SFQ circuits for QPU control

## What & Why

- Single flux quantum (SFQ) Josephson junction (JJ) circuits
- For low dissipation & high-speed interfacing of superconducting qubits / QPU

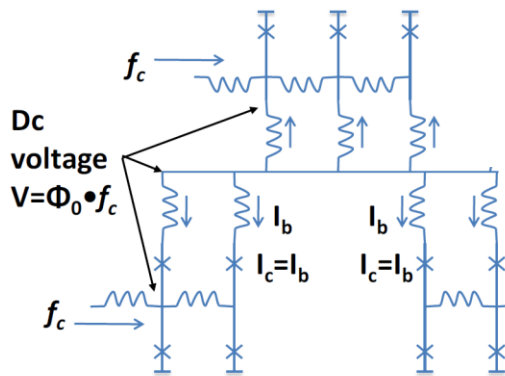
## Task

- Design & modelling & process development
- Wafer scale JJ device fab by utilizing the SWAPS fabrication technique
- Demonstrate operation at QPU-compatible temperatures (sub-100 mK)

Superconducting platform

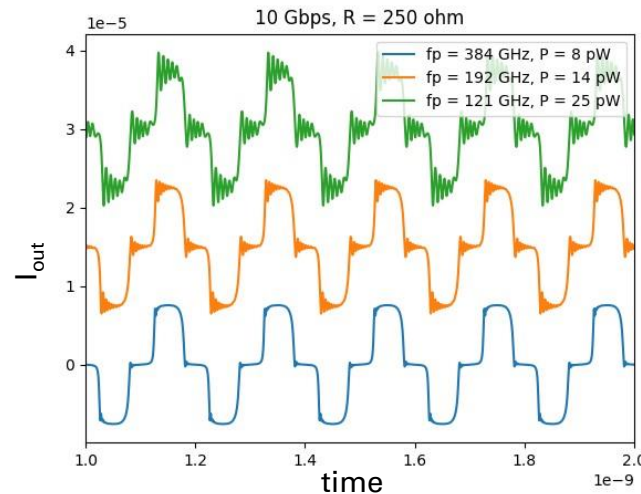
Computing

Sensing



D. E. Kirichenko, et al., IEEE Trans. Appl. Supercond., 21, 776(2011).

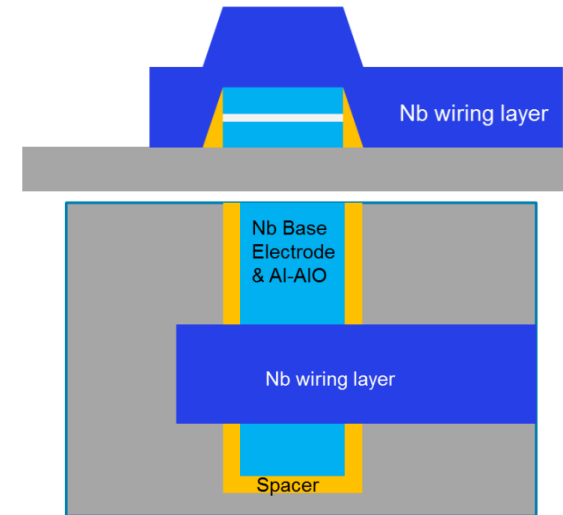
Example of energy efficient SFQ scheme.



SFQ circuit simulations by IQM.



VTT's JJ amplifier chip utilizing SWAPS junctions.  
[doi.org/10.1103/PhysRevApplied.18.024063](https://doi.org/10.1103/PhysRevApplied.18.024063)



Nb SWAPS JJ schematics.  
[\[arXiv:1706.06397v2\]](https://arxiv.org/abs/1706.06397v2).



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