



VTT

# Photonics for superconducting Quantum Computing

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EPIC Online Technology Meeting on Quantum Computing

19/05/2020 VTT – beyond the obvious



# Who are we?

- Leading research and technology company in the Nordic countries
- A state-owned, non-profit limited liability company with a special task and a government general grant for strategic research
- Expert services for domestic and international customers and partners in both private and public sectors
- Offering both R&D and contract manufacturing services
- Turnover 245 M€ (2019)
- Personnel 2,100 (31.12.2019 )

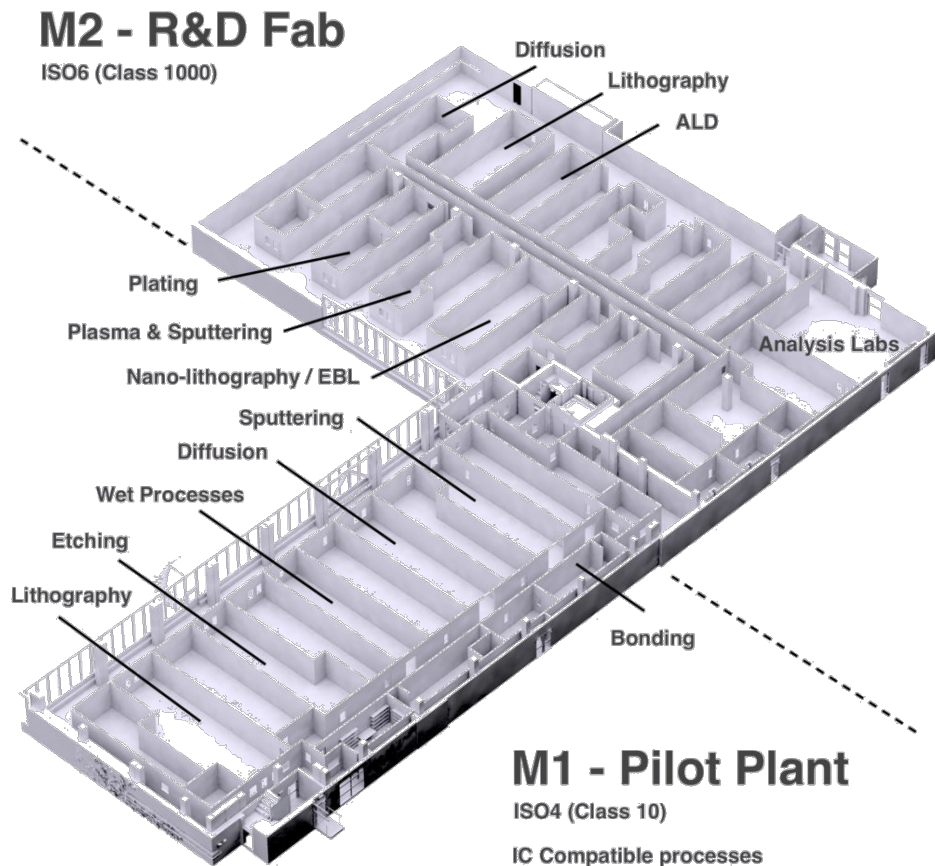
[www.vtt.fi](http://www.vtt.fi)

{About us > What is VTT > Annual reports}



# Micronova fab: From R&D to production

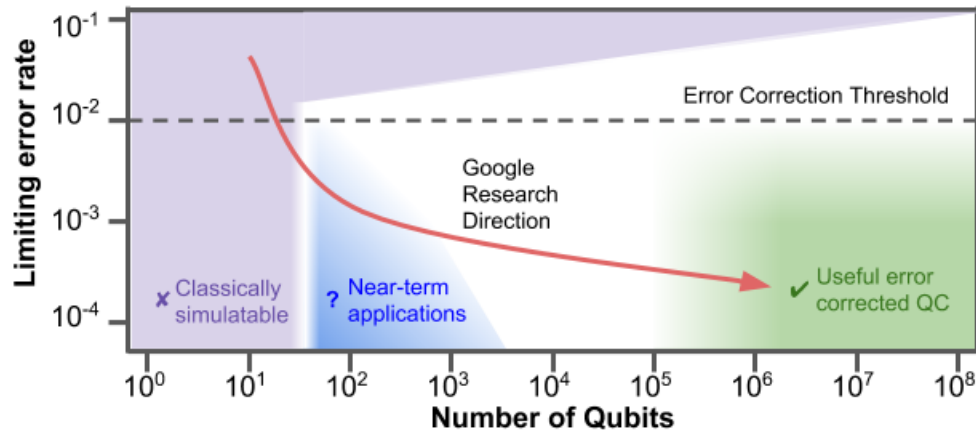
- Clean room class ISO4-6 (10-1000)
- Total clean room area 2'600 m<sup>2</sup>
- IC-compatible processes for photonics, MEMS, superconductors,...
- 150 mm wafer size (200 mm partially available, full transition in 2 years)
- Custom runs and MPW runs
- R&D and production in MEMS, radiation detectors, silicon photonics, superconducting devices



# What can we do for you?

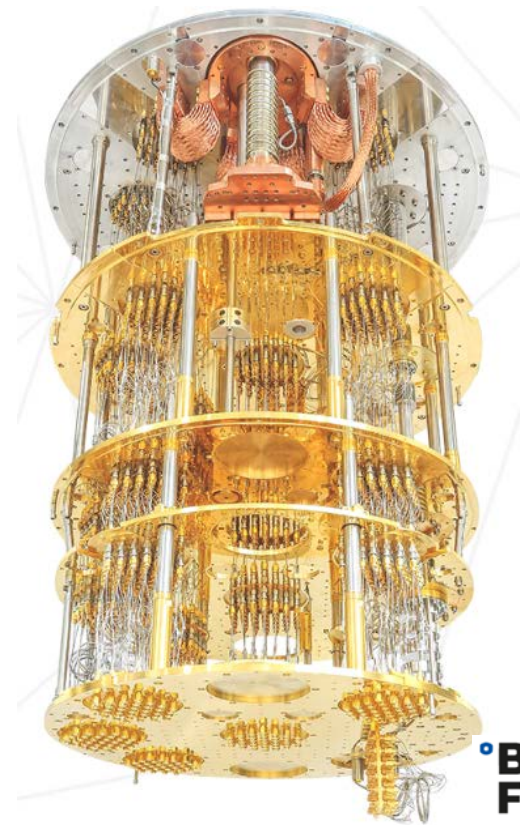


# Scaling-up quantum computers



(source: Google <https://ai.googleblog.com/2018/03/a-preview-of-bristlecone-googles-new.html>)

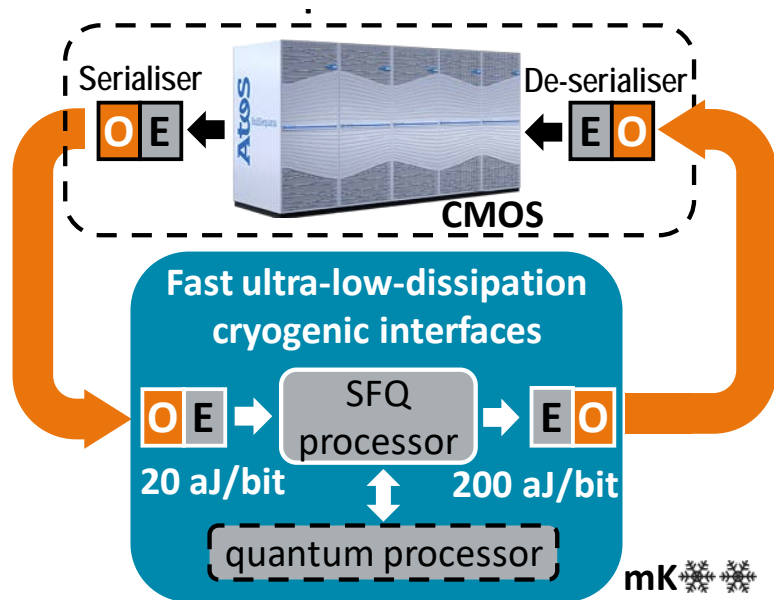
The operating environment and control systems need a quantum leap, too!



**BLUE  
FORS**

*The state-of-the-art cryostat (Bluefors Oy) with control RF cabling (220 coaxial cables).*

# High-speed and energy-efficient photonic interfaces



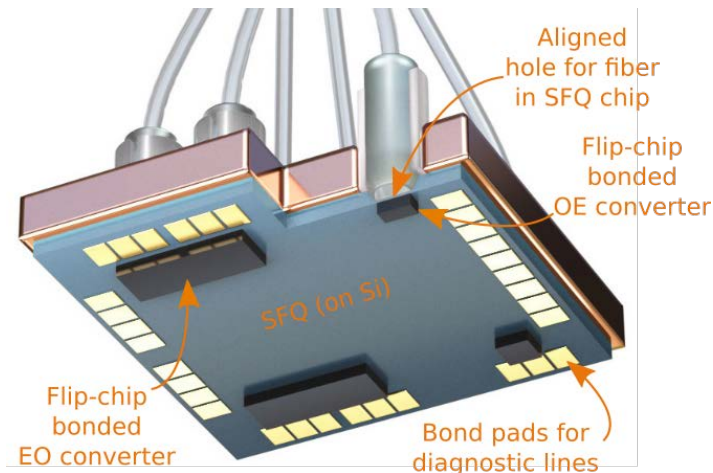
FET Open aCryComm

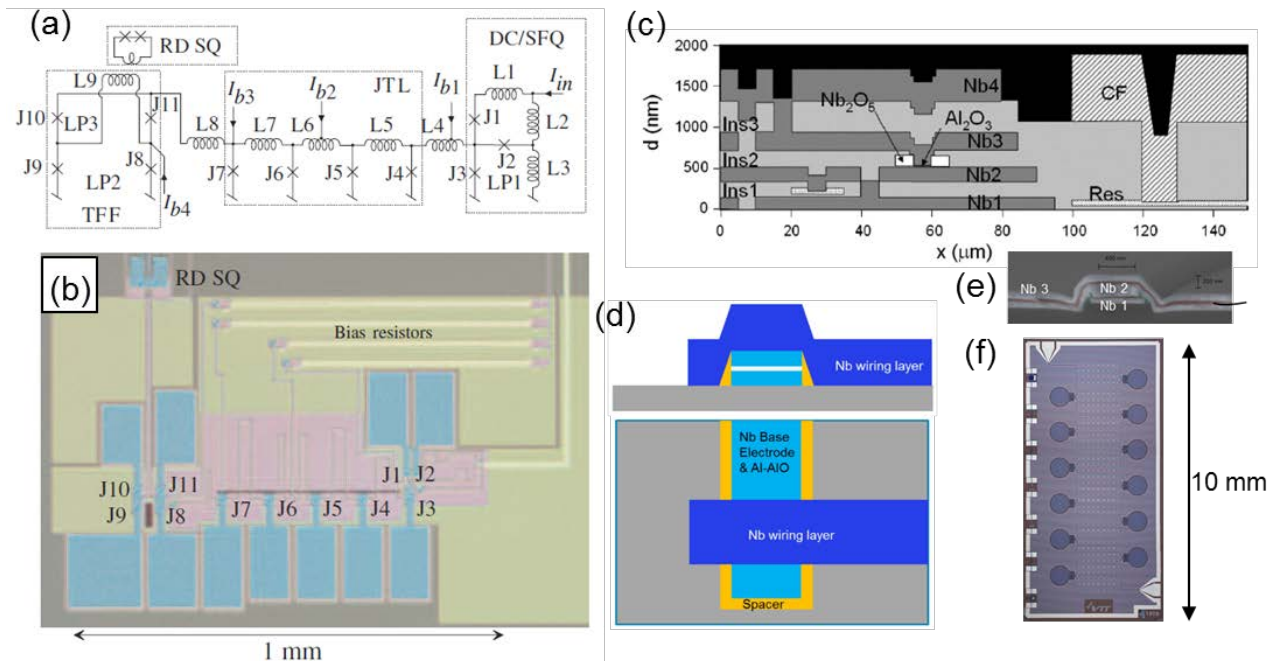


At VTT we have a large cleanroom where we fabricate

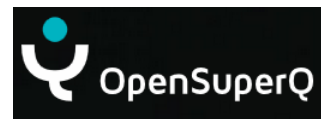
- Integrated SiPh devices
- SFQ logic
- superconducting qubits

Plus unique capabilities to integrate them all





Other collaborations:



Establish VTT as world-class open-access foundry for production of superconducting devices, following the success of SQUID sensors (already in production in Micronova)

- Superconducting Nanowire Single Photon Detectors (SNSPDs)
- Single Flux Quantum (SFQ) classical logic
- Superconducting qubits
- Josephson parametric amplifiers



**What can you do for us?**

**What can we do together?**

# Very recent news

VTT

VTT to acquire Finland's first quantum computer – seeking to bolster Finland's and Europe's competitiveness

News, Press release

🕒 12.05.2020 - 08:00

{[www.vtt.fi](http://www.vtt.fi) > News and ideas}



“The development and construction of Finland's quantum computer will be carried out as an **innovation partnership** that VTT will be opening up for **international tender**. The project will run for several years and its total cost is estimated at about **EUR 20–25 million**.”

<http://tiny.cc/QCtenderVTT>

Published 14 May, deadline 16 June

# bey<sup>0</sup>nd

## the obvious

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