Sweden’s quantum technology landscape

Nordic Quantum Meeting 2026

Vaishali Badrish Adya

WACQT Fellow, Assistant Professor

KTH, Royal Institute of Technology

From a research centre to a national quantum ecosystem

WACQT

Sweden's 12-year flagship: a quantum computer + a broad competence base

The Testbed

Open access to real quantum hardware for researchers and industry

NQCIS

National infrastructure for secure quantum communication

The new SFOs

Government strategic research areas in quantum technology

Excellence Cluster

The VR / Vinnova call — research all the way to innovation

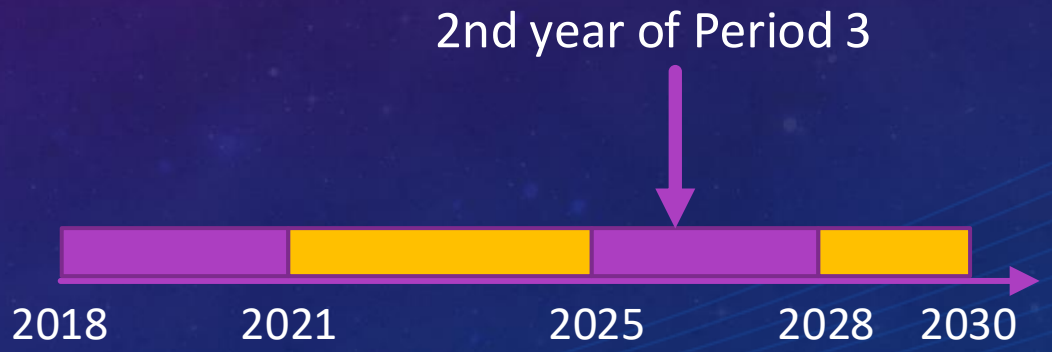
A national centre

Coordinating the whole Swedish quantum landscape

A little about me ☺

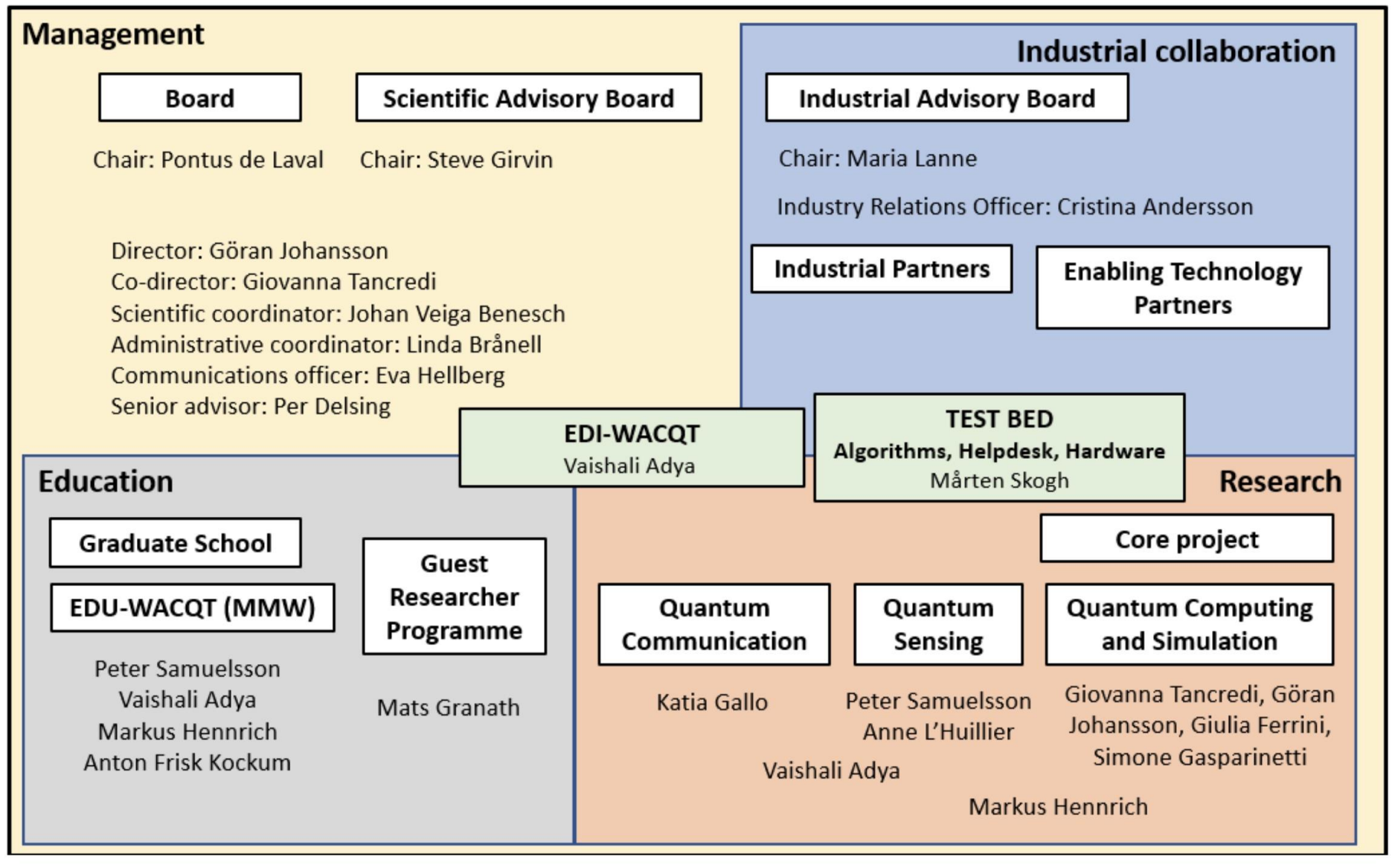
WACQT: at a glance

Main goals	i) To build a broad competence base in Sweden for Quantum Technology ii) To build a quantum computer based on superconducting circuits
Two parts	Core project on quantum computing Excellence program including all of Quantum Technology
Universities:	Chalmers, KTH, Lund, SU, LiU, GU 200+ people involved
Duration:	12 years, (3+4+3+2 years) started 1/1 2018
Involving industry	Big industry for applications SME and spin-outs for enabling technology
Funding:	1.500 MSEK Knut and Alice Wallenberg foundation Universities Industry partners



Content courtesy : G.Johansson

WACQT organisation structure

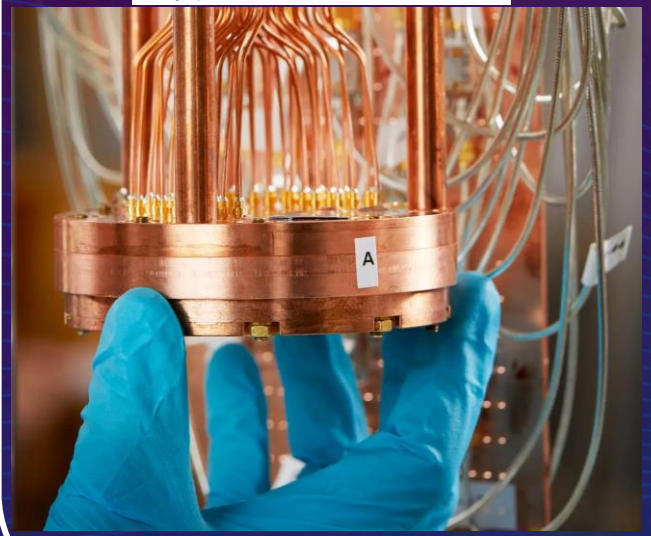


Excellence includes education, research, and industry!

Content courtesy : G.Johansson

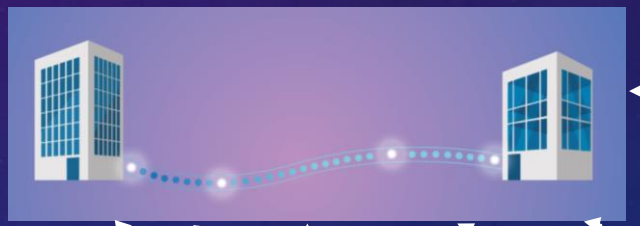
WACQT Scientific organisation

Core project



Computing & algorithms

Quantum Communication



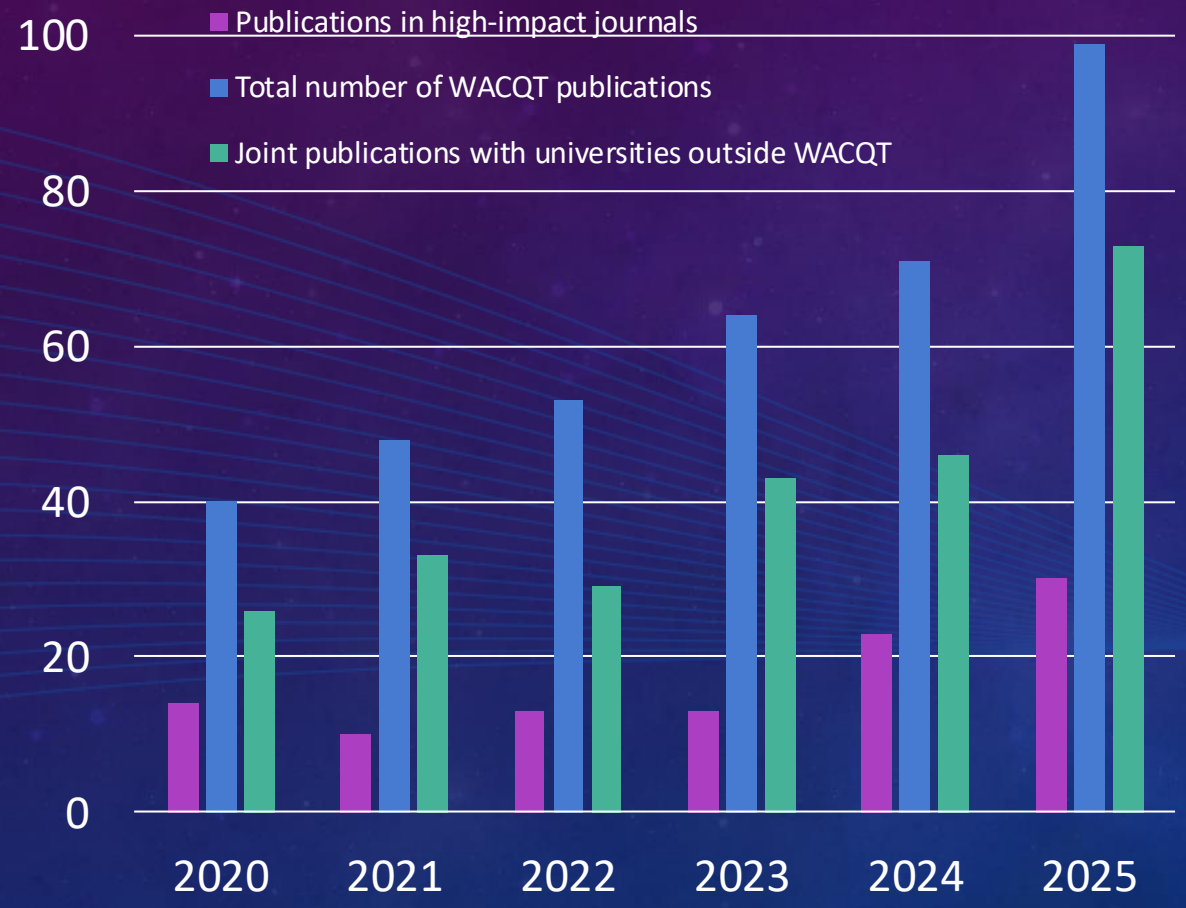
Quantum Sensing

CHALMERS STOCKHOLM UNIVERSITY KTH LINKÖPING UNIVERSITY LUND UNIVERSITY

WACQT Excellence Program

Picture courtesy : WACQT webpages

WACQT 2025 report



EDU-WACQT (Peter Samuelsson)

Course development: 14 supported
Summer interns: 16 positions

SE-FI postdoc program
Final year, 5 ended.

Guest Researcher Program (Mats Granath)
1 long-term and 16 short-term visits
5 supported workshops and symposia

Content courtesy : G.Johansson

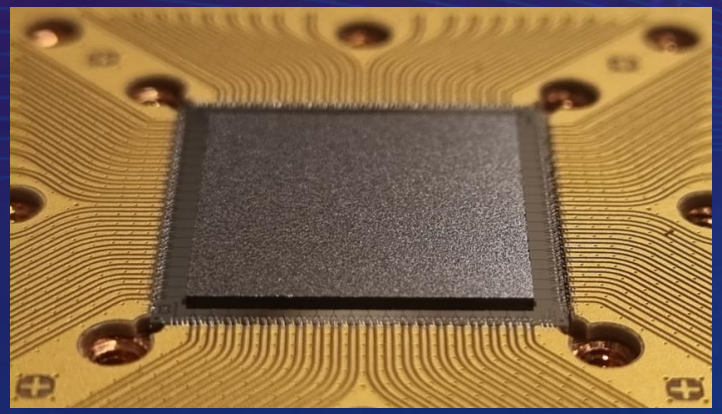
WACQT's quantum computer - Core project

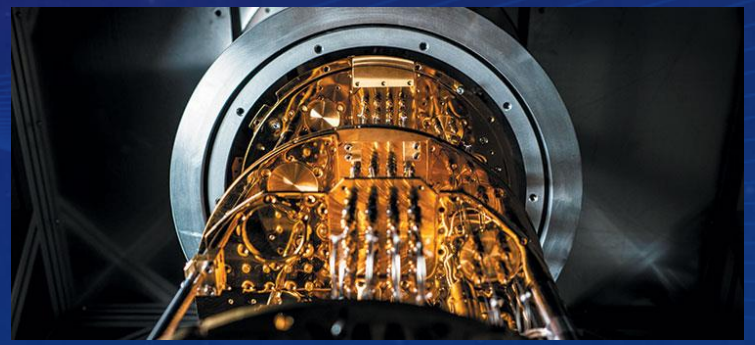
Giovanna Tancredi leads the core project

25 qubit processor
Superconducting circuits

Core-team at Chalmers April 2025

Goal 100 qubits. Fab in Chalmers' clean room.





Dilution cryostat cool the processor to 10 mK

Content courtesy : G.Johansson

WACQT testbed

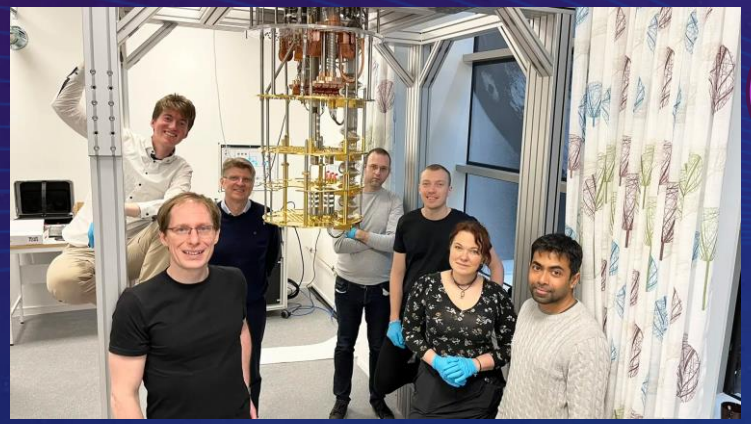
Quantum algorithm testbed
25 qubit QPU, 2026

Quantum hardware testbed
Cryogenic testing of Quantum technology hardware
Q2 2024

Quantum helpdesk
Help users run quantum algorithms.
Premium access to IBM hardware.
Q1 2024

See talk by Junjie later for details!

+ Research Arena 2026
Lead: Lars Tornberg
AstraZeneca



Lead: Mårten Skogh, Chalmers Next Labs

- Budget: 17 M$
- 10 employees
- Build up phase during 2024
- Funded by Knut and Alice Wallenberg Foundation

Content courtesy : G.Johansson

Quantum sensing, metrology and control

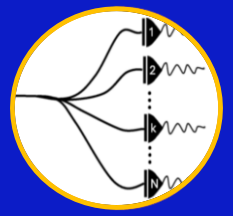
Sensitivity

SYSTEMS

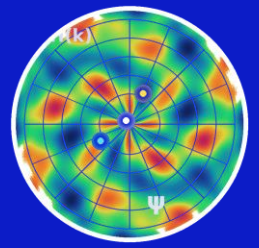
DEVICES

MATERIALS

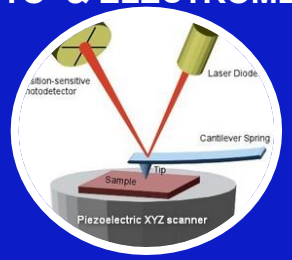
HIGH-DIM SYSTEMS & SIMULATIONS



QUANTUM MATERIALS THEORY



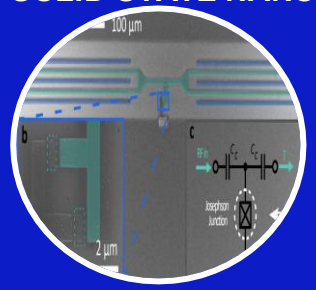
MECHANICAL RESONATORS OPTO- & ELECTROMECH.



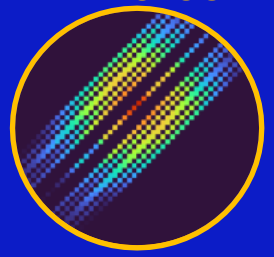
TRAPPED IONS & ATOMIC GASES

RARE-EARTH IONS & FUNDAMENTAL TESTS

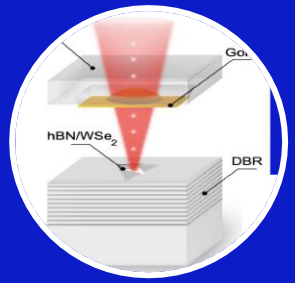
MICROWAVE RESONATORS SOLID-STATE NANOSYSTEMS



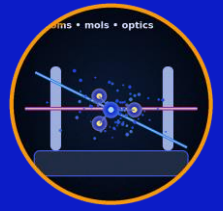
PHOTOELECTRON METROLOGY



QUANTUM PHOTONICS



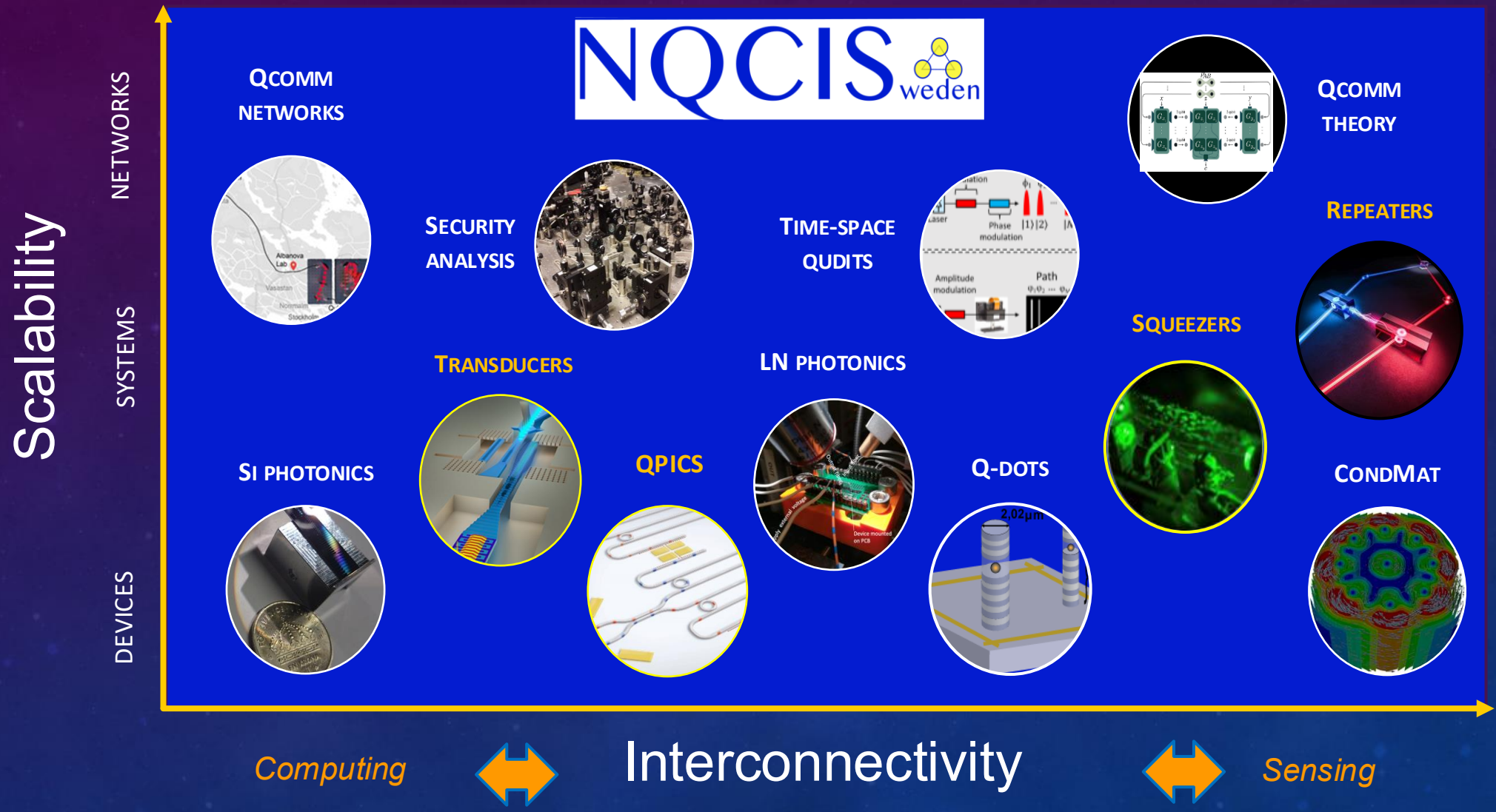
ATOMS, MOLECULES & OPTICAL DEVICES



Theory & simulation ⟷ Quantum sensing ⟷ *Metrology & applications*

Content courtesy : P.Samuelsson

Quantum communication in WACQT



Content courtesy : K.Gallo

WACQT Graduate school

Present size:

- Lead : Peter Samuelsson
- ~ 80 WACQT PhD students, including industrial and affiliated.
- ~ 30+ graduated PhDs + 2 Lic.
- Current rate of graduation ~1 per month

Purpose:

- Establish a young Swedish QT community.
- Secure a QT baseline competence.
- Broaden the competence of the PhD students.

Main activities:

- Summer schools, every second year.
- Lab course, every second year.
- Field trips.

Content courtesy : P.Samuelsson

Swedish Quantum Industry

Users

VOLVO
AstraZeneca
JEPPESEN A BOEING COMPANY
Hitachi Energy
SAAB
ERICSSON
SEB
FOI

8 iPhDs + 5 iPostDocs

Enablers

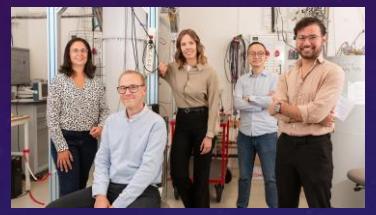
Spectracure
Intermodulation products
Low Noise Factory
ConScience, Quant. Scopes
SP/RISE, Atlantic Quantum

4 iPhDs + 2 iPostDocs

Spin-off companies

Deep Light Vision AB
Atlantic Quantum AB
ScalinQ
Sweden Quantum AB
quCertify
Iloomina
Quantum Scopes
WACQT-IP
QET

All started 2021 or later



ScalinQ

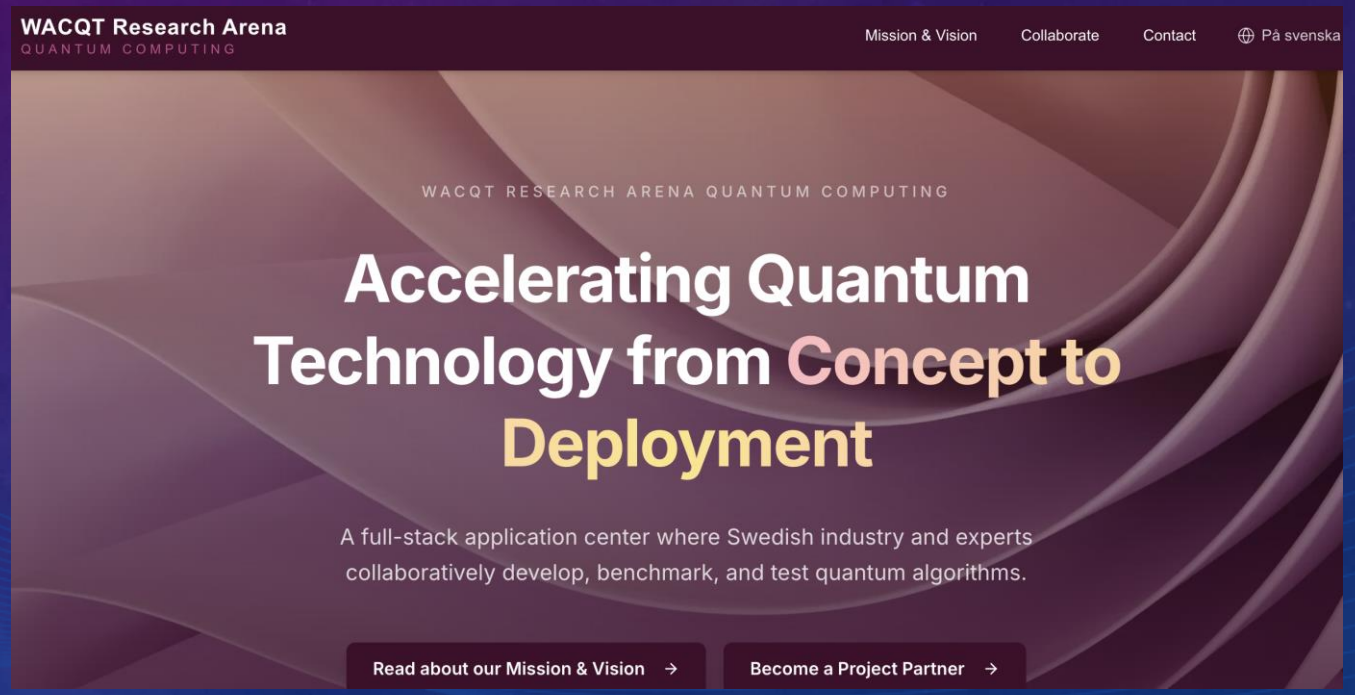
Sample Holders

55+ organisations on our last industry day!!

Content courtesy : G.Johansson

WARA (WACQT Research Arena)

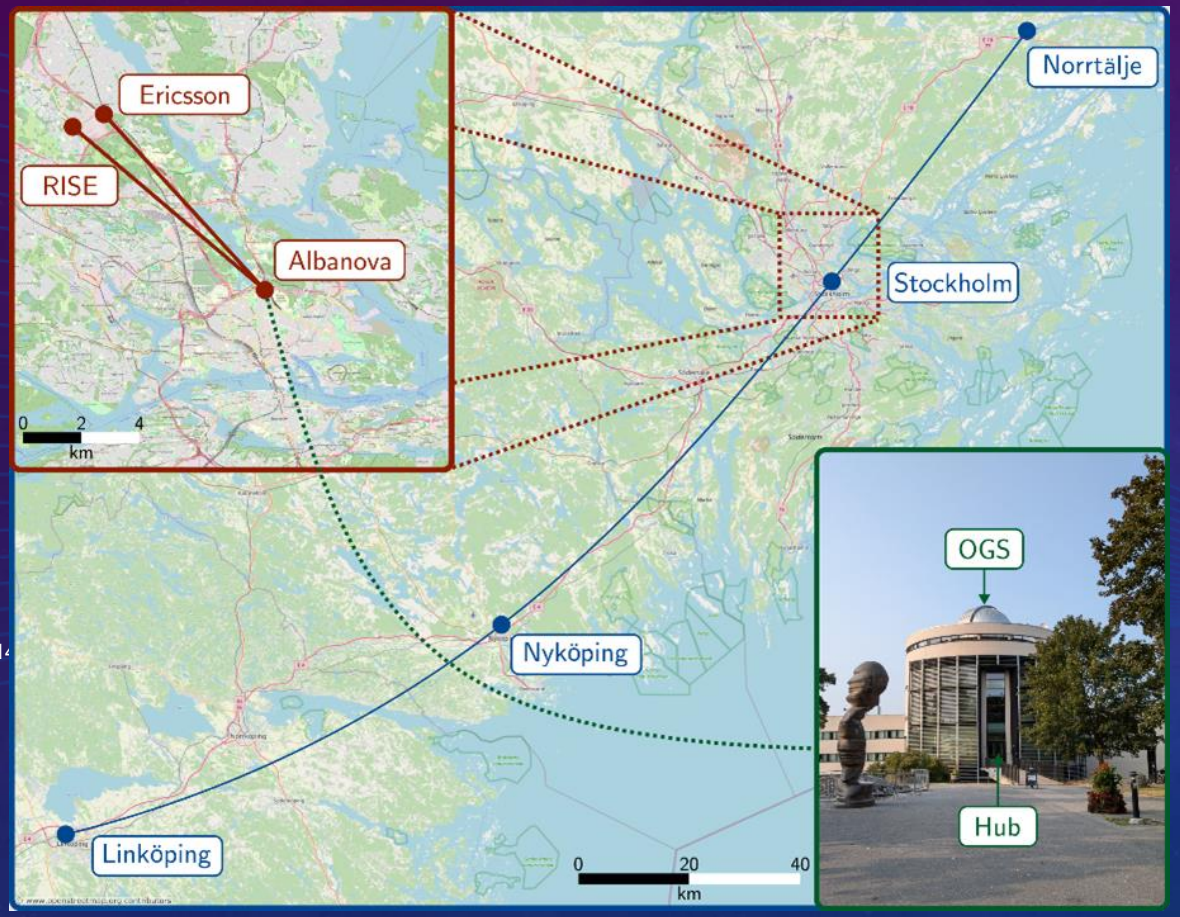
- Bridge between academia and industry
  - Lower the barrier for Swedish companies wanting to explore quantum computing
- Provide access to hardware, algorithm support way
  - Swedish industry and researchers can collaboratively develop, benchmark, and trial quantum algorithms
- WARA Quantum Computing integrates existing infrastructure through Chalmers Next Labs and the WACQT Quantum Technology Testbed
- Projects are co-financed on a 50/50 basis. Industry contributes in-kind resources, WARA provides quantum expertise and resources
- **Currently lead by Lars Tornberg, AstraZeneca**



https://www.wara-qc.se/en

National Quantum Communication Infrastructure in Sweden (NQCIS)

EuroQCI – 10 M€/2.5 years - a testbed for secure quantum communication



Kista
camp

ERICSSON

KTH

KTH VETENSKAP OCH KONST

ERICSSON

AlbaNova open testbed

Stockholms universitet

AVANCEZ 1829

CHALMERS

QUANTUM SCOPES

Free space interface

Nyköping

LINKÖPINGS UNIVERSITET

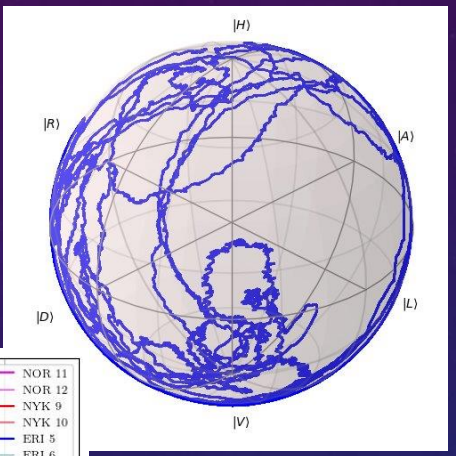
quCertify

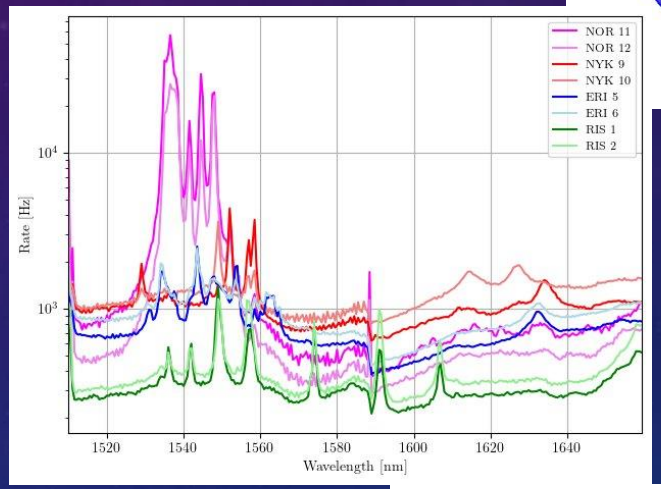
Linköping University
(towards Denmark)

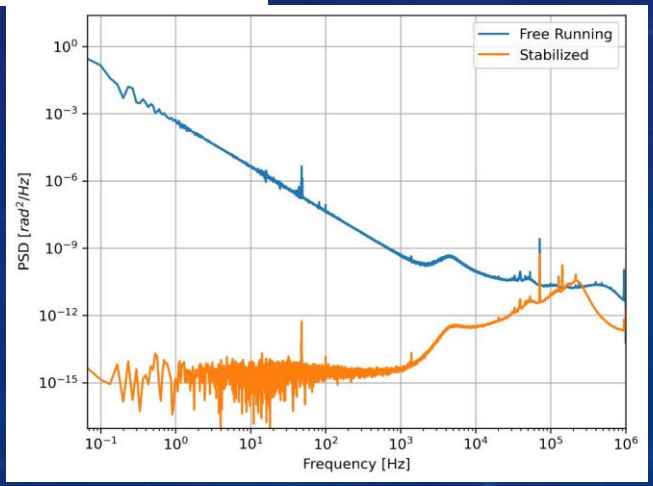
Content courtesy : K.Gallo

NQCIS activities

- QKD on long-distance plus access multi-core fiber [10.1109/ECOC66593.2025.11263078]
- Storage of polarization qubits in a buffer and routing of quantum packets [10.1364/CLEO_FS.2025.FF115_4]
- Maintenance planning for high availability [10.1109/ECOC66593.2025.11263028]
- Sagnac-based TF-QKD [10.1364/CLEO_FS.2025.FF114_6]
- Laser frequency stabilization for TF-QKD [10.1109/CLEO/Europe-EQEC65582.2025.11111496]
- Information transmission using on-demand single photons and error correction [10.1109/ICTON67126.2025.11125197]
- Physical phenomena affecting QKD performance on fiber links



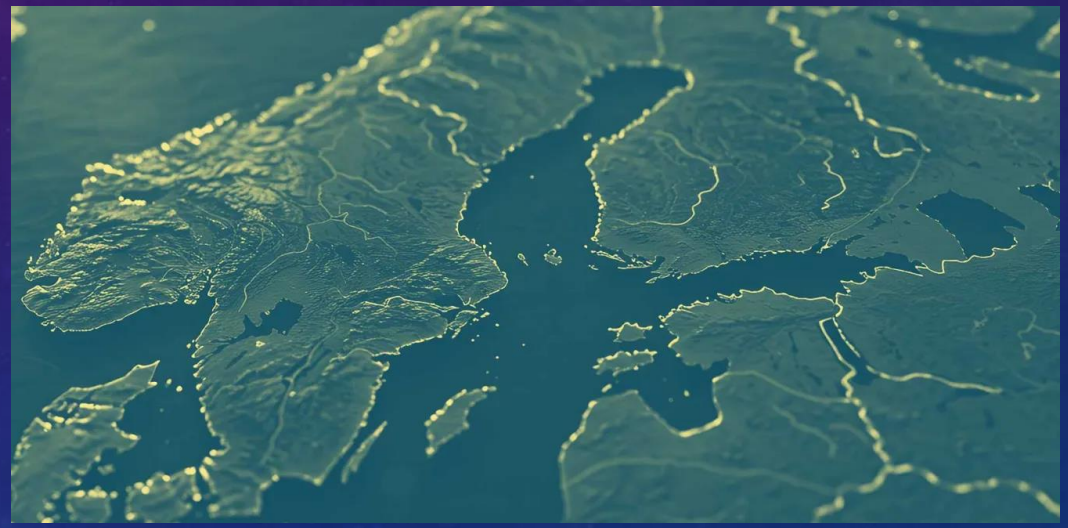




Content courtesy : G.Foletto

NordicQCI : Stage 2 of QCIs

- Goal : establish cross-border quantum-secured connections between Estonia-Finland and Finland-Sweden
- Terrestrial cross-border links via submarine cables connecting Tallinn, Helsinki, Åland islands and Stockholm
- Integration of Nordic quantum networks with the EuroQCI's Space Segment via an Optical Ground Station (OGS) in Stockholm, demonstrating the Eagle-1 satellite's capabilities in the Nordic environment
- Partners : **RISE Research institutes of Sweden** (Co-ordinator), CSC – IT Center for Science Ltd (Finland), Aktsiaselts Metrosert, Ericsson, RIKS (State Infocommunication Foundation), Stockholm University, Suomen Erillisver
- Project runs till 2029
- Co-funded by EU and National entities



Content courtesy : T.Gibbons

Strategiska forskningsområden (SFO)

Strategic Research Areas recommended for funding by Swedish Research Council — a decision by the Swedish government is expected soon

Quantum Sensing, Communication and Computing

Chalmers · Lund · KTH

2027	2028
30 MSEK	60 MSEK

Quantum Photonics and Quantum Materials

SU · LiU · UU

2027	2028
20 MSEK	40 MSEK

All six WACQT universities sit inside these two SFOs — the academic backbone for what comes next

Excellence cluster planning grants

Granted planning grants Vinnova:

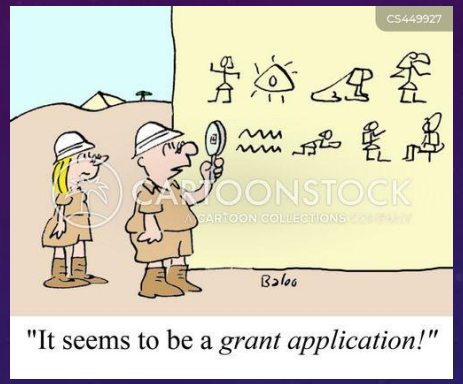
- Peter Samuelsson, Lund:
  "Kvantsensorteknologi från forskning och tillämpningar till marknad och samhälle"
- Mårten Skogh, Chalmers Next Labs :
  "Vinnova Excellence Cluster on Quantum Computing for Disruptive Technologies — QuiteCute"
- Linda Johansson Rise + Mikael Rönnholm, Volvo AB:
  "Quantum Era Nordic - a Nordic Industry Powerhouse"
- Laia Ginés, Rise + Mohammad Bourenanne, SU:
  "Quantum-Secure Sweden: Ett nationellt excellenskluster inom kvantkommunikation"

Granted planning grants VR:

- Anton Frisk Kockum, Chalmers:
  "High-quality quantum computers"
- Martin Leijnse, Lund:
  "Q-SMaC – Quantum Sensing, Metrology, and Control"

Content courtesy : G.Johansson

Excellence cluster



- Call managed by Swedish Research Council (VR) evaluated also by Sweden's Innovation Agency (Vinnova)
- Large clusters are expected spanning from basic research to innovation.
- 100 (VR)+75 (Vinnova) MSEK/year is maximum to apply for.
- Chalmers is coordinating a large cluster application on quantum technology.

Timeline

1 Apr 2026
Call open

11 Jun 2026
Call closes

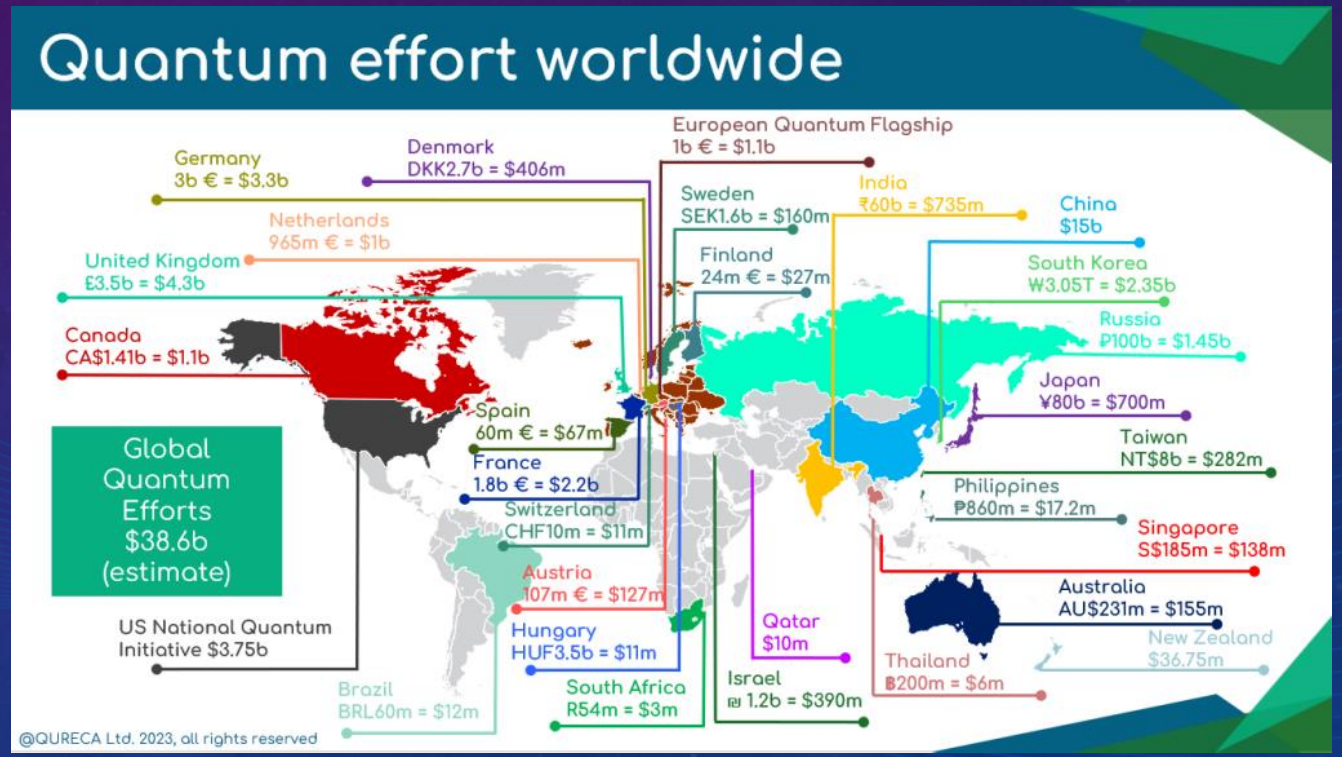
End Nov 2026
Decision

End 2026
Kick-off for new clusters

Content courtesy : G.Johansson

Swedish centre for Quantum Technology

- Potentially together with National strategy
- Chalmers rektor proposed to coordinate a Swedish Centre for Quantum Technology
- Initial discussions with Lund and KTH, now including all SFO universities
- Natural national entry point
- Facilitate coordination between WACQT, SFOs and possible Excellence Cluster.



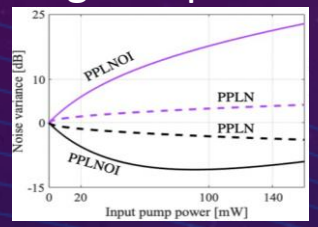
Content courtesy : G.Johansson

Personal research outlook

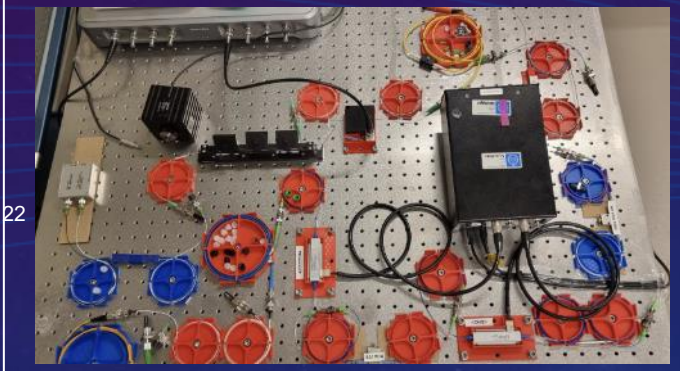
Research flavour

GWD general commissioning (modelling, control systems, squeezers)

Theoretical analysis of waveguide platforms

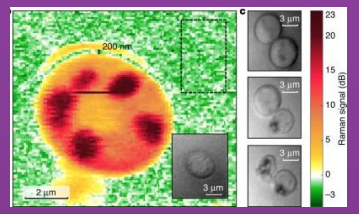


Squeezed light infrastructure



≃ 4 dB squeezing limited by losses in output, detectors and beam splitter

SQuiCS



Opto-Bio-Nano theme

+ 4 Master students, 4 Bachelor students

Quantum Communication activities

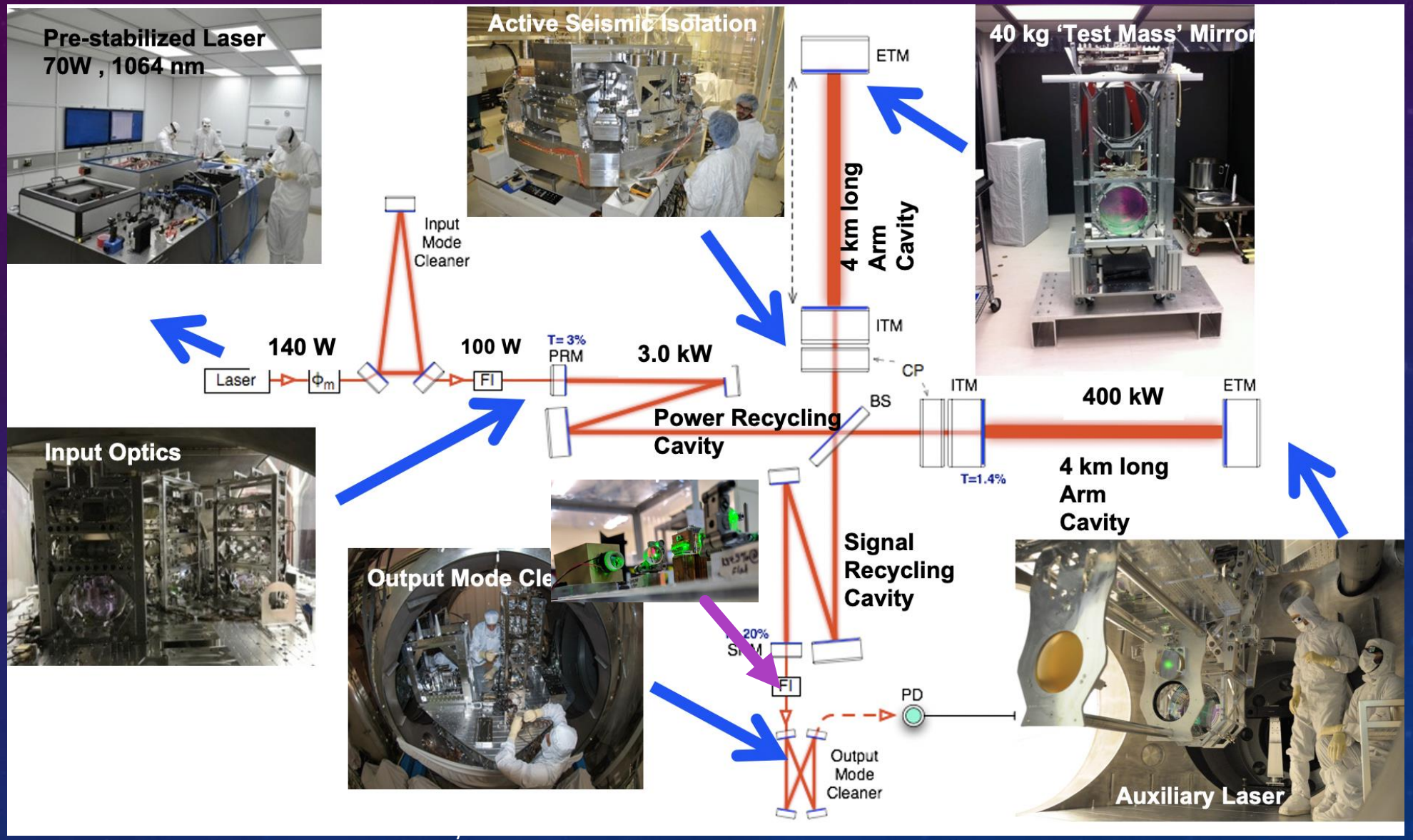
- Twin field QKD implementation in the NQCIS infrastructure (in collaboration with NQCIS)
- Frequency non degenerate squeezed light for quantum communication
- Multipartite entanglement source for quantum communication

Quantum Sensing activities

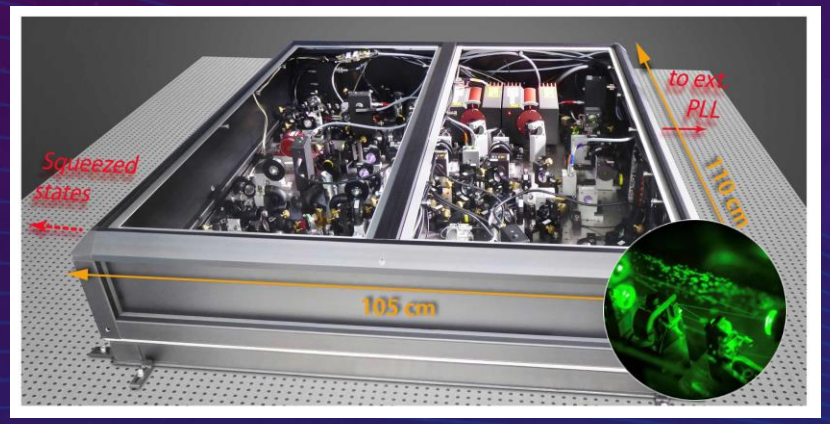
- Degenerate fiberised waveguide based squeezed light source
- SU11 interferometry for enhanced biosensing
- Squeezing assisted spectroscopy (Bright and Vacuum squeezing)
- Wavelength tunable squeezers

22

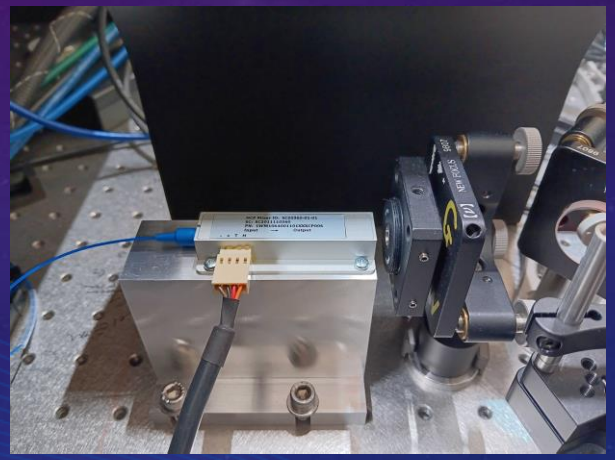
Quantum sensing using gravitational wave detectors



Evolution of squeezed light sources

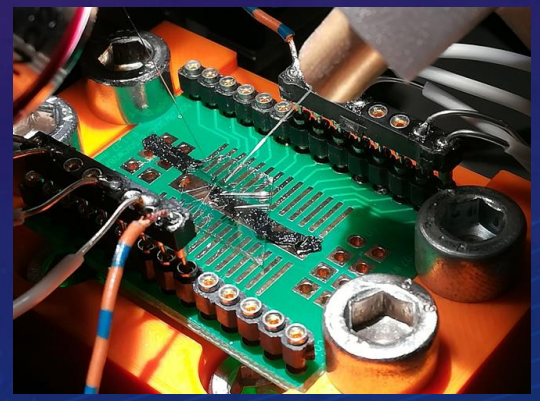


1980's



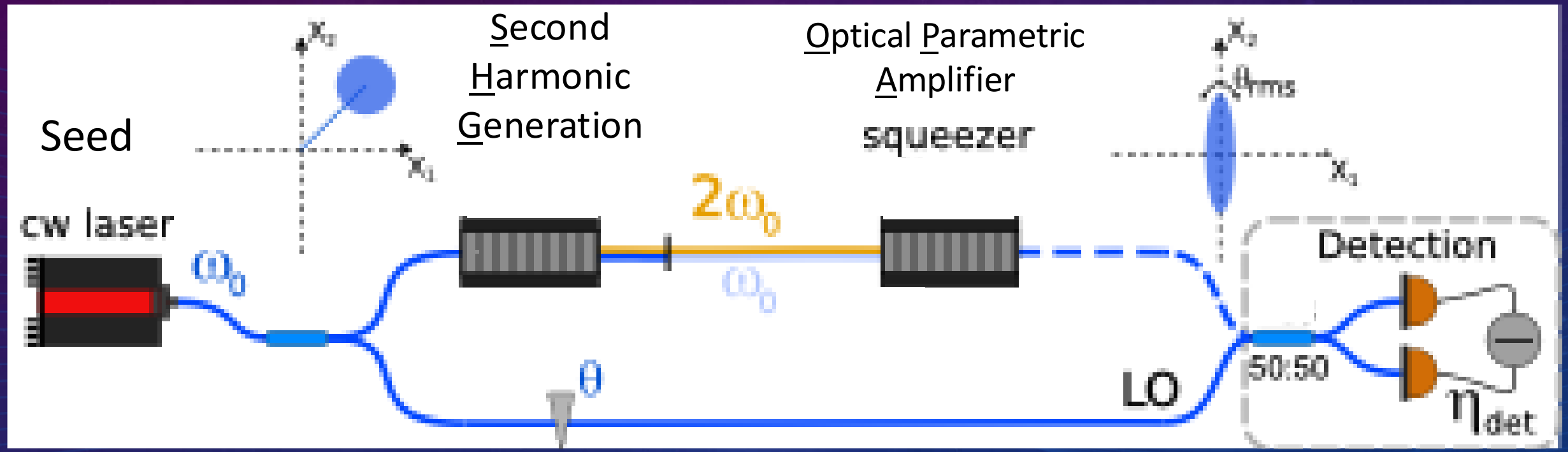
Now

Now-ish



PC : A.Prencipe, K.Gallo

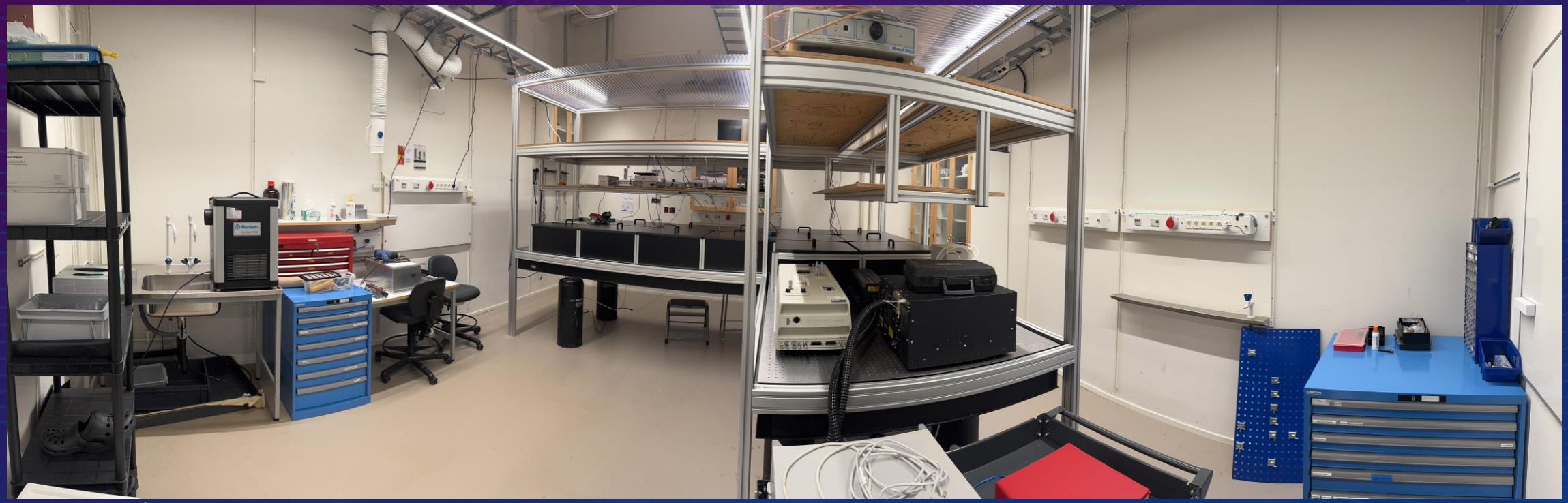
Anatomy of a waveguide squeezed light source



Slide courtesy : D.Voigt, E.Svanberg
Theoretical paper - https://arxiv.org/abs/2603.26243

SQUICS_

Optical squeezed light lab



PC – A.Segendorf

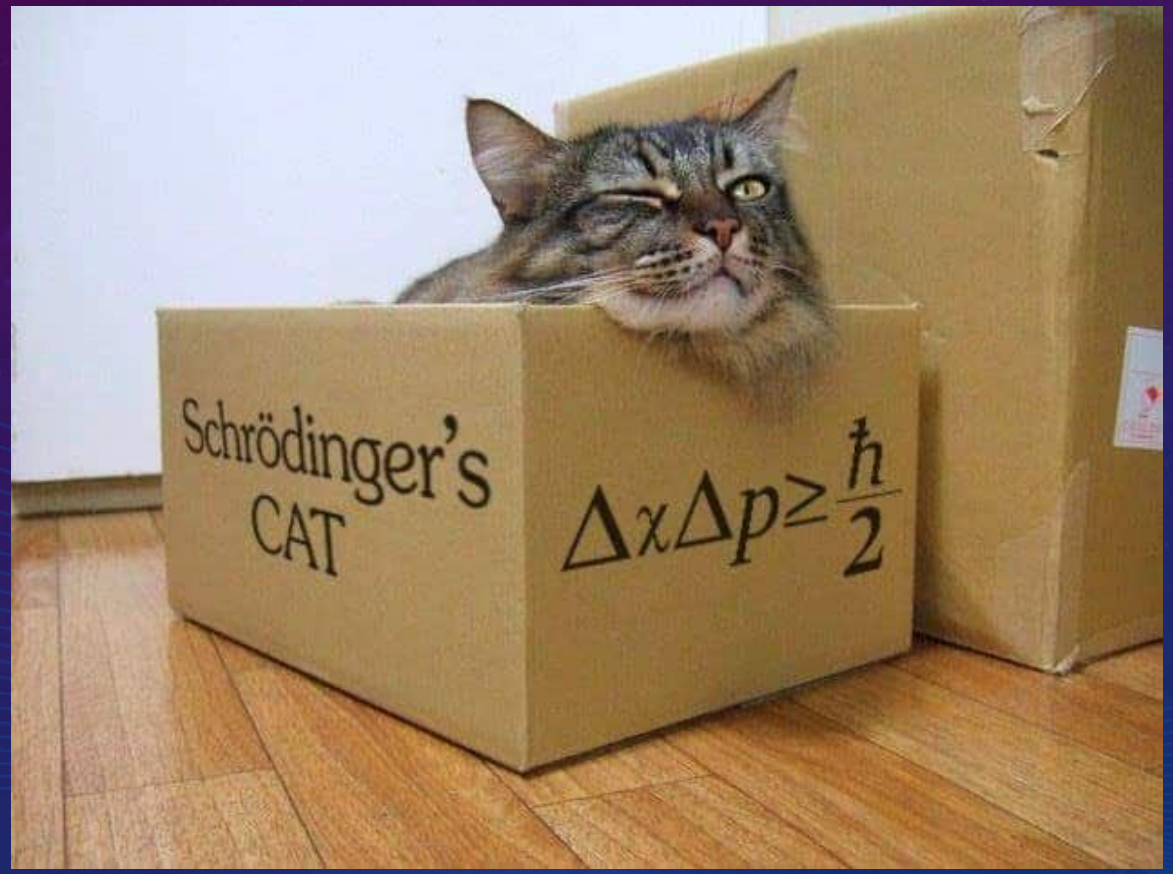
0.3 dB → 0.5 dB → 2.54 dB → 4.0 dB squeezing, 10 dB anti squeezing (phase controlled)

Lots of noise hunting and phase noise mitigation on the horizon

Summary

WACQT	KAW started WACQT in 2018, build competence, hardware, talent and industry network, collaborate with other Wallenberg centers (WACQT/WISE projects)
NQCIS	Secure quantum communication infrastructure and EuroQCI connection
SFOs	Long-term public research capacity across six universities
Excellence Cluster	Large-scale bridge from basic research to innovation
National Centre	One front door and coordination layer for Sweden, Nordics and Europe

Thank you!



Questions?