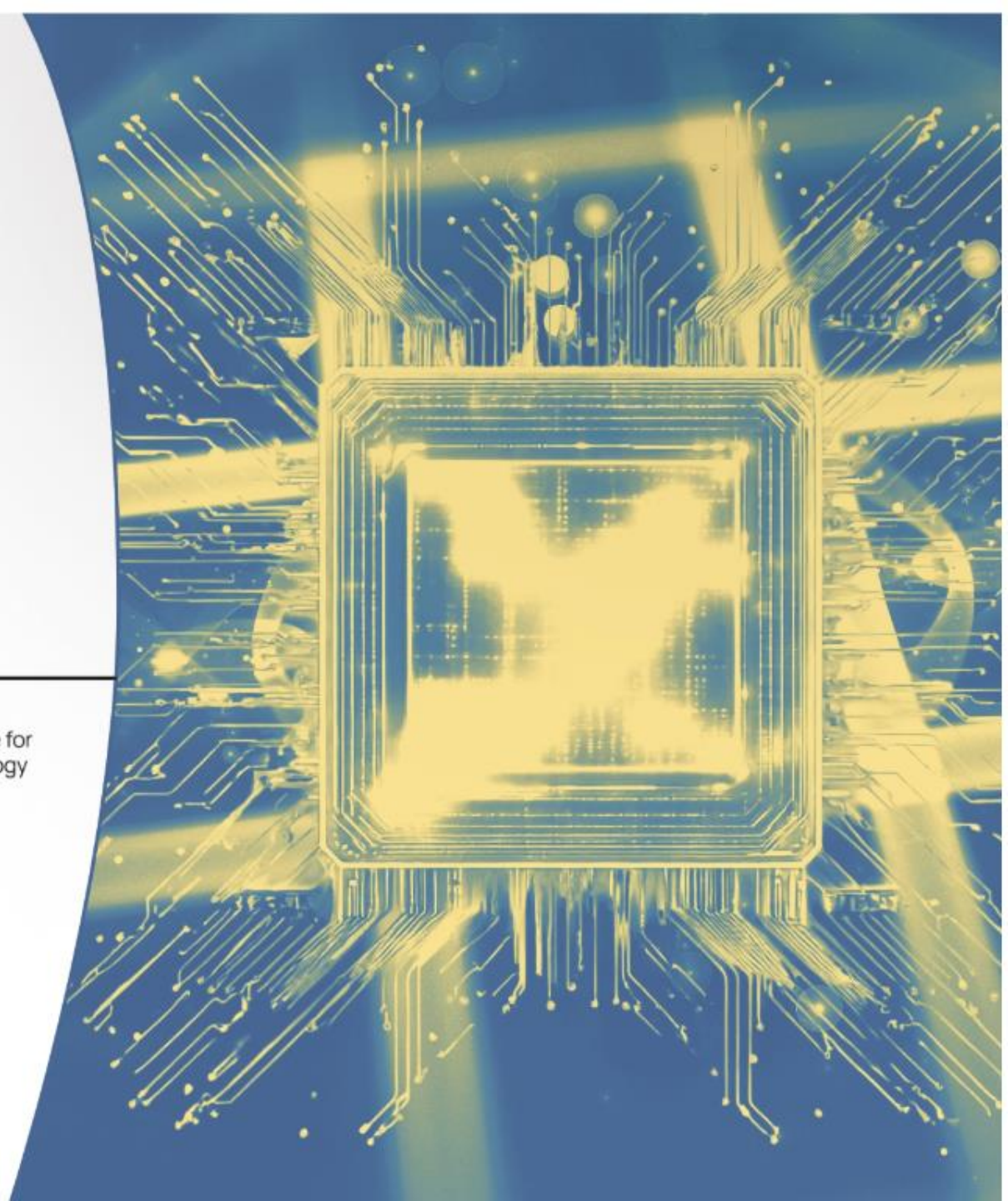


QUANTUM AUTUMN SCHOOL 2025



WACQT | Wallenberg Centre for
Quantum Technology



Welcome to RISE!

Our mission is to strive for sustainable growth in Sweden by **strengthening the competitiveness and capacity for renewal of Swedish industry**, as well as promoting the **innovative development of society as a whole**.

The logo for RISE, consisting of the word "RISE" in a bold, black, sans-serif font. The letters are stacked vertically, with "RI" on the top line and "SE" on the bottom line. The "I" and "E" have a small square dot above them.



*ENCCS empowers Swedish industry and the public sector achieve their business targets by leveraging **HPC, HPDA and QC** efficiently and effectively.*



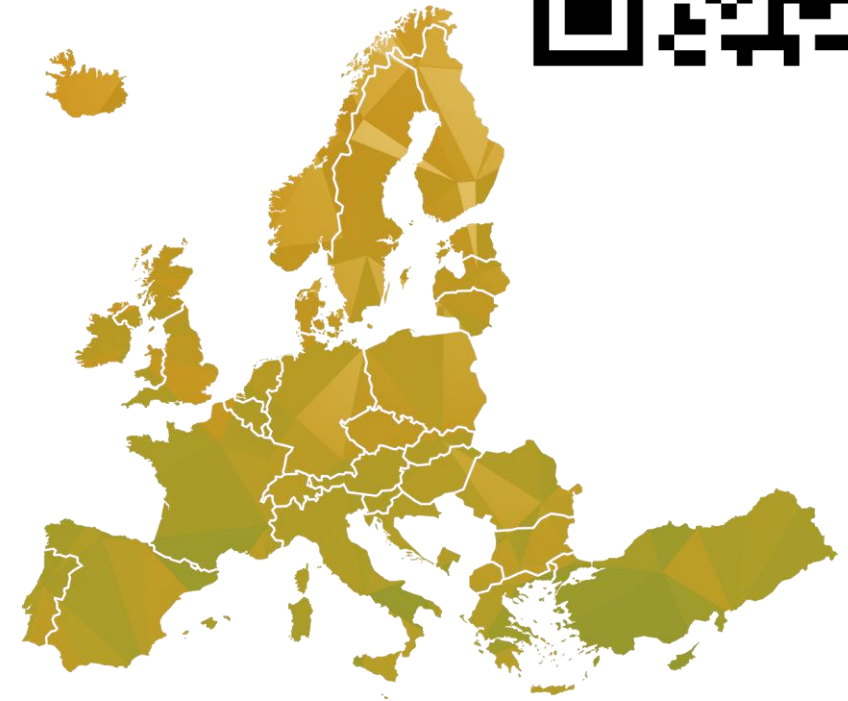
HPC access



Training



Support



Countries with an equivalent National Competence Centre.



EuroHPC
Joint Undertaking

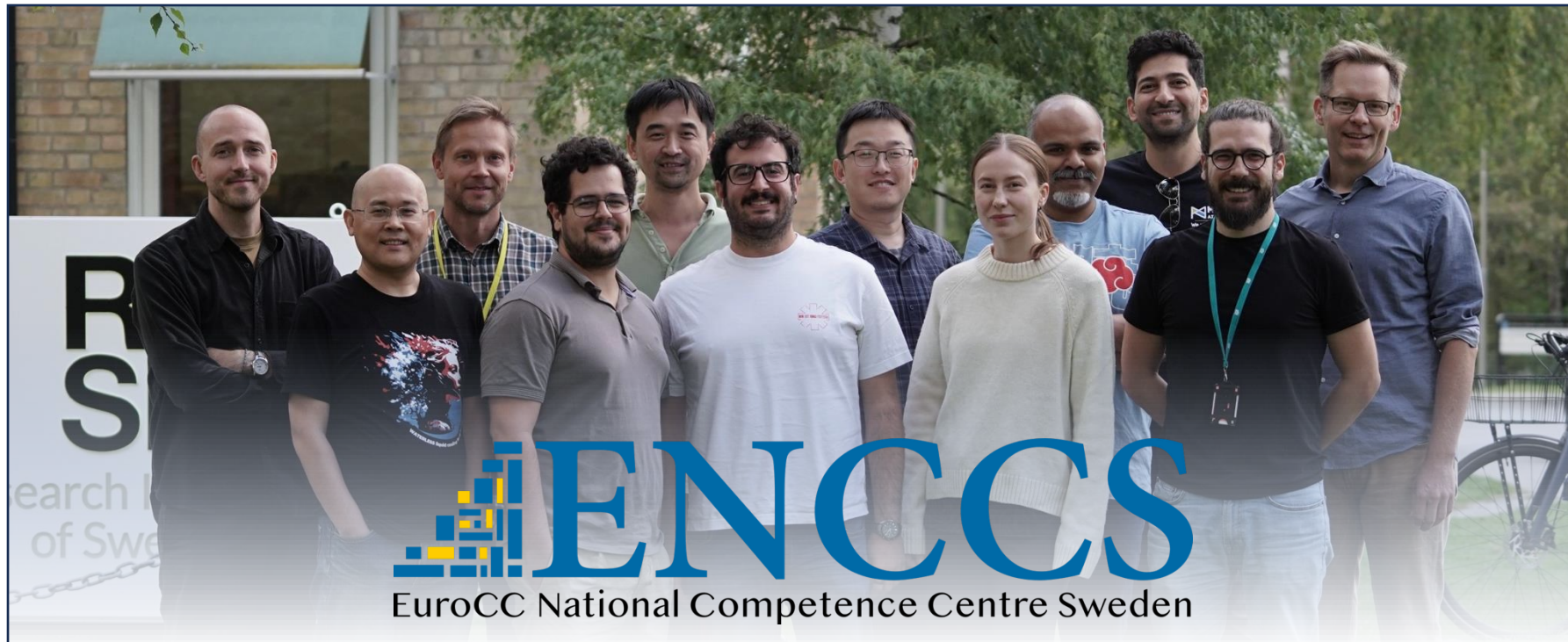
li.u LINKÖPING
UNIVERSITY

**RI
SE**

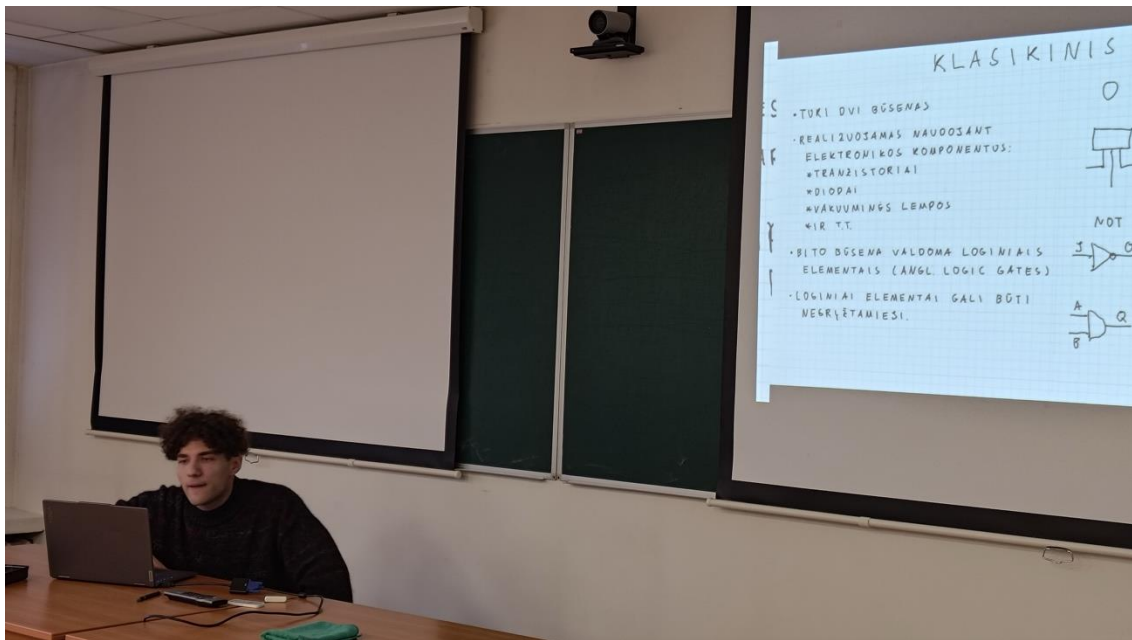


Swedish
Research
Council

VINNOVA
Sweden's Innovation Agency



We have diverse academic and professional backgrounds (physics, chemistry, AI, computer science), and **extensive experience in and passion for supercomputing.**



EuroHPC JU ecosystem



"Develop, deploy, extend and maintain in the EU a world-leading federated, secure and hyper-connected supercomputing, quantum computing, service and data infrastructure ecosystem"

- **Infrastructure:** Secure, hyper-connected network of supercomputers, quantum computers, and data infrastructures.
- **Federation:** Integrating EuroHPC resources across the EU to provide seamless access
- **Technology:** Creating cutting-edge European hardware components and software stacks
- **Applications:** Supporting the development and optimisation of software applications
- **Usage and Skills:** Investing in education, training, and national competence centres
- **International Cooperation:** Collaborating with global partners
- **AI Factories:** Environments tailored for AI innovation.

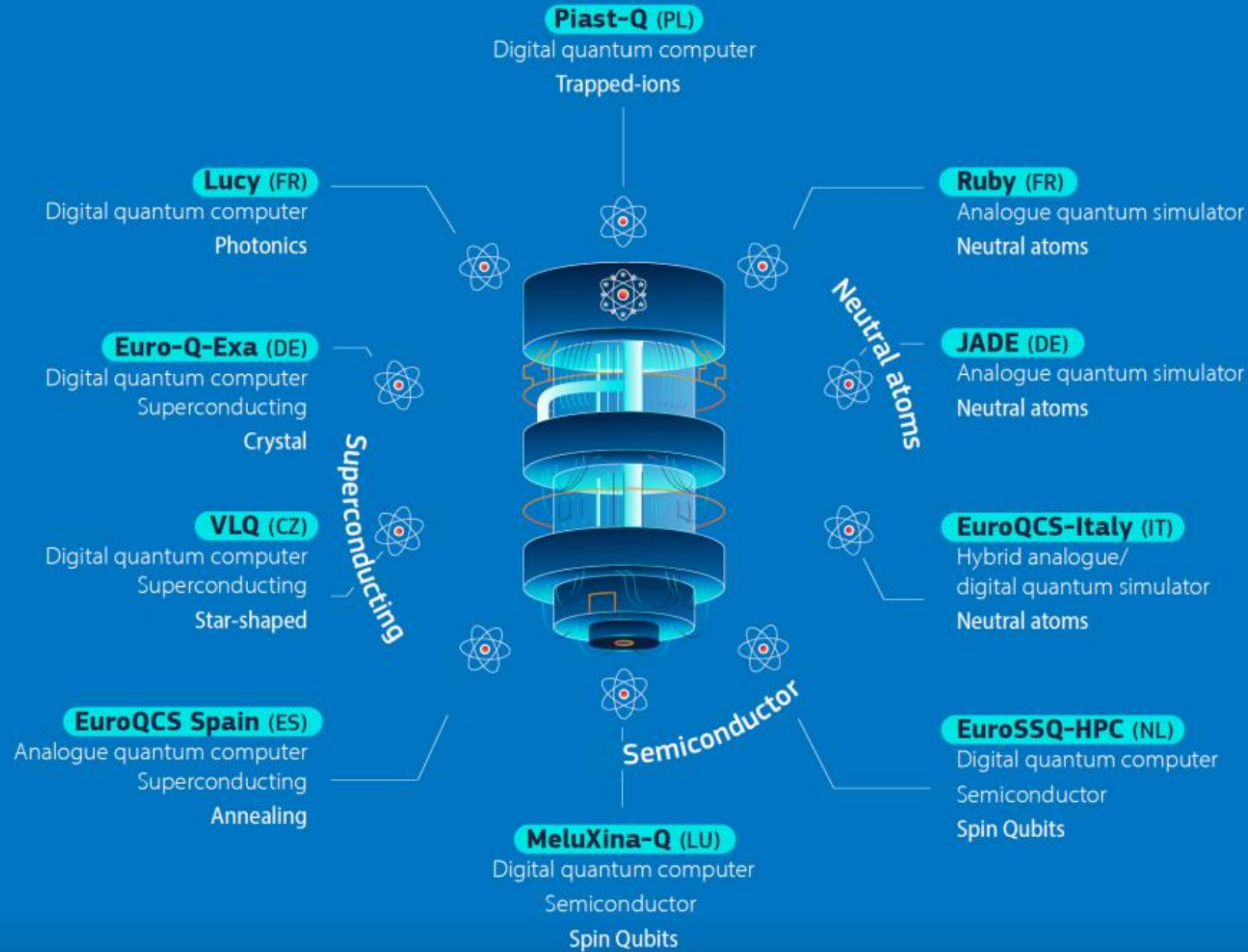
EuroHPC JU Quantum-Centric Supercomputing

EuroHPC Supercomputers

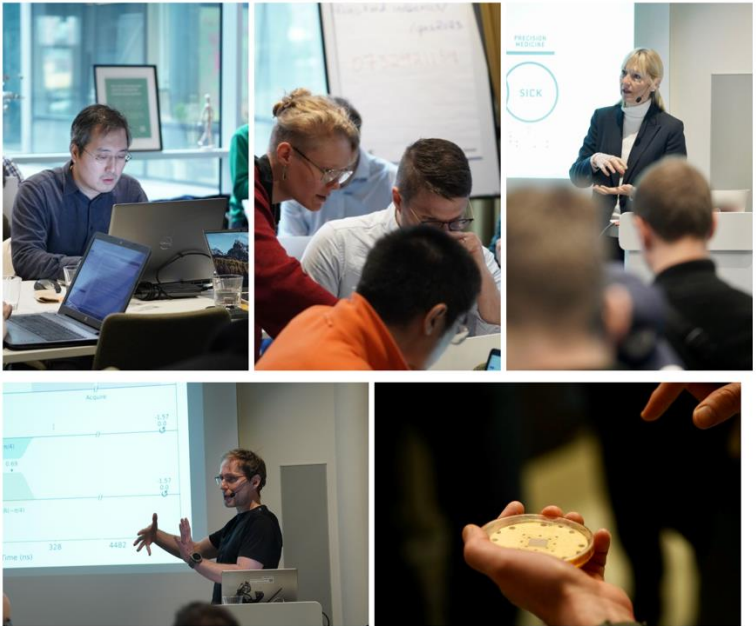
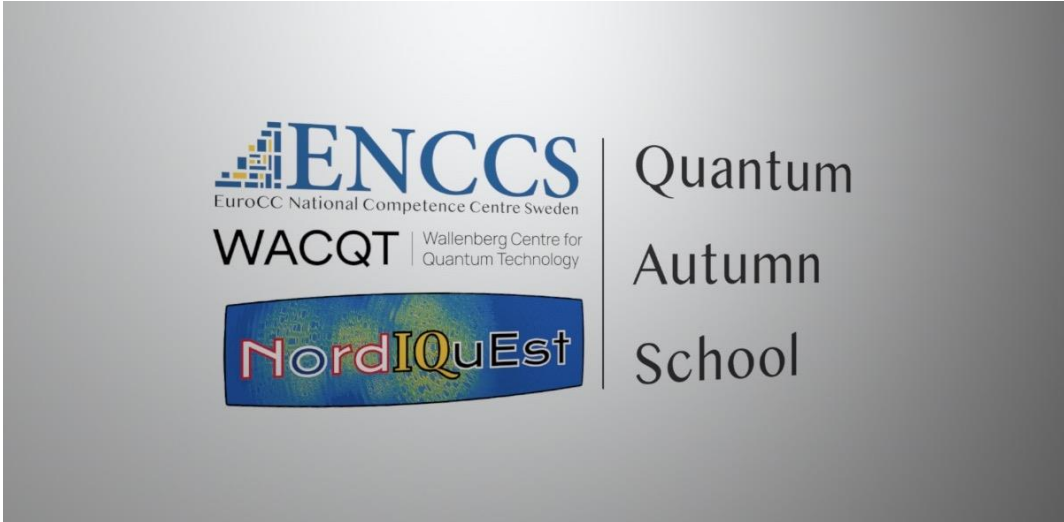


EuroHPC
Joint Undertaking

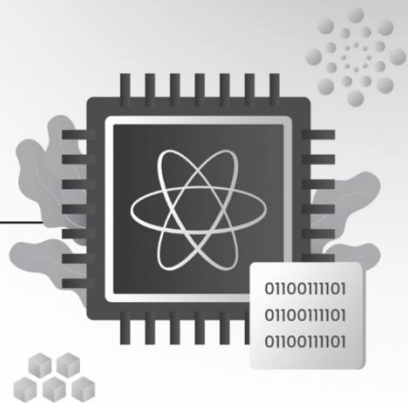




Quantum training at ENCCS: Quantum Autumn School 2023, 2024, 2025



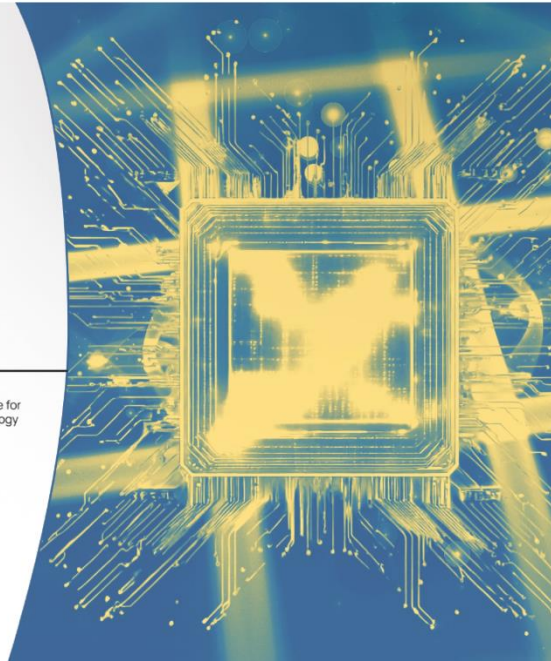
QUANTUM AUTUMN SCHOOL 2024



QUANTUM AUTUMN SCHOOL 2025



WACQT | Wallenberg Centre for
Quantum Technology



- 5 days In-person in Stockholm + online
- 5-day intensive quantum computing program
- Organized by ENCCS with EuroCC Denmark & Lithuania, partial support by WACQT
- Target audience:
 - industry professionals, researchers, students
 - beginner to intermediate quantum computing level
- Speakers from academia and industry
- Key features:
 - Hands-on access to real European quantum hardware (IQM devices)
 - Mix of lectures, tutorials, and networking opportunities
 - Focus on quantum algorithms understanding, usecases, HPC-QC integration and European quantum ecosystem
- ENCCS's flagship event for quantum computing training

QAS 2025 program

- The school website <https://enccs.github.io/qas2025>
- Preparatory materials and so <https://enccs.github.io/qas2025/day0/>
- Starter notebook for Qrisp SDK with IQM access <https://enccs.github.io/qas2025/notebooks/getting-started/qrisp-starter-tutorial/> including binder launcher
- IQM resonance special signup link for the school (with credits): <https://resonance.meetiqm.com/sign-up/qas2025>
- A Nextcloud markdown Q&A pages, where everyone can post questions/answers <https://bit.ly/4hFXlrQ>
- IQM school in Dec 2-4 signup link: <https://resonance.meetiqm.com/sign-up/quantumschool>
- The program is suitable for beginner and intermediate audience
- The program gets easier towards the end of the week!


Quantum Autumn School 2025					
Date: Nov 3-7, 2025		organisers: ENCCS, NCC Denmark, NCC Lithuania			
	Monday 3rd	Tuesday 4th	Wednesday 5th	Thursday 6th	Friday 7th
slot 1	arrival and coffee 8:30-9:20 Welcome! QAS2025 Introduction Karin Elgammal (ENCCS/RISE, SE) MIMER AI Factory Thor Wikfeldt (MIMER/RISE, SE)	coffee/sandwich 8:30-9:00 Introduction to variational quantum algorithms: VQE, QAOA and beyond (IQPE, ..., SQD) Juan de Gracia Triviño (ENCCS/RISE, SE)	coffee/sandwich 8:30-9:00 Variational Algorithms; Designing use cases for near term quantum algorithms Panagiotis Barkoutsos (IonQ)	coffee/sandwich 8:30-9:00 Scaling up ion trap quantum computers and quantum technologies; the case of IonQ Panagiotis Barkoutsos (IonQ)	coffee/sandwich 8:30-9:00 Quantum Neural Networks Stefano Markidis (KTH, SE)
slot 2	Introduction to the European Hybrid classical/quantum HPC+AI+QC ecosystem. LUMI-Q Quantum Flagship Mikael Johansson (GSC, FI)	Interactive tutorial: experiments with quantum gates, circuits and algorithms (qrisp simulation) Juan de Gracia Triviño (ENCCS/RISE, SE)	Controlling a quantum computer using pulses Stefan Seegerer (IQM)	Atomistic simulations on quantum accelerated supercomputing Karin Elgammal, Marc Maudner (ENCCS/RISE, SE) (forenoon, DE)	hands-on QNNs using pennylane/classification (tutorial) Stefano Markidis (KTH, SE)
slot 3	coffee break 10:40-11:00 Overview of the HPC/QC software stack, from ready-made Q-libraries for common tasks to circuit level assembly and hardware-level coding Miroslav Dobcsiek	coffee break 10:40-11:00 Opportunities for extending quantum computing through subspace, embedding and classical molecular dynamics techniques Thomas M. Bickley (UCL, UK)	coffee break 10:40-11:00 LUMI-Q/VLQ presentation Miroslav Dobcsiek	coffee break 10:40-11:00 Accelerated Quantum Supercomputing using NVIDIA CUDA-Q Esperanza Cuenca-Gómez (NVIDIA)	coffee break 10:40-11:00 Quantum Reservoir computing Ruben Pariente Bassa (SINTEF, NO)
	Lunch	Lunch	Lunch	Lunch	Lunch
slot 4	Quantum gates, circuits and algorithms Juan de Gracia Triviño (ENCCS/RISE, SE)	Getting started with algorithm development on actual quantum hardware using IQM Resonance Stefan Seegerer (IQM)	How to use quantum computers for biomolecular free energies Matthias Christandl (København U, DK)	Quantum error-correction (QEC) Mats Granath (Göteborg University)	closing The end
slot 5	Quantum gates and circuits Giulia Ferrini (MC2, Chalmers, WACQT, SE)	Developing quantum algorithms with qrisp, the next generation of quantum algorithm development Stefan Seegerer (IQM)	Pre-panel discussion Göran Wendin (RISE, SE)	Quantum kernel estimation with application to disability insurance Björn Löfdahl (SEB)	
	coffee break	coffee break	coffee break	coffee break	
slot 6	Quantum Information Theory introduction, building quantum algorithm, QFT, ... Stefano Markidis (KTH, SE)	QAOA - theory Ruben Pariente Bassa (SINTEF, NO)	Towards 2045: Do we still only talk about Quantum superiority? Panel discussion Göran Wendin (RISE, SE)	Interactive tutorial: Quantum error-correction (QEC) hands-on Moritz Lange (Göteborg University)	
slot 7	From qubits 2000 to Nobel Prize 2025 Göran Wendin (RISE, SE)		PechaKucha presentations (in-person only)	Interactive tutorial: Quantum kernel estimation with application to disability insurance Björn Löfdahl (SEB)	
	Reception, mingling		Buffé dinner		

Acknowledgment

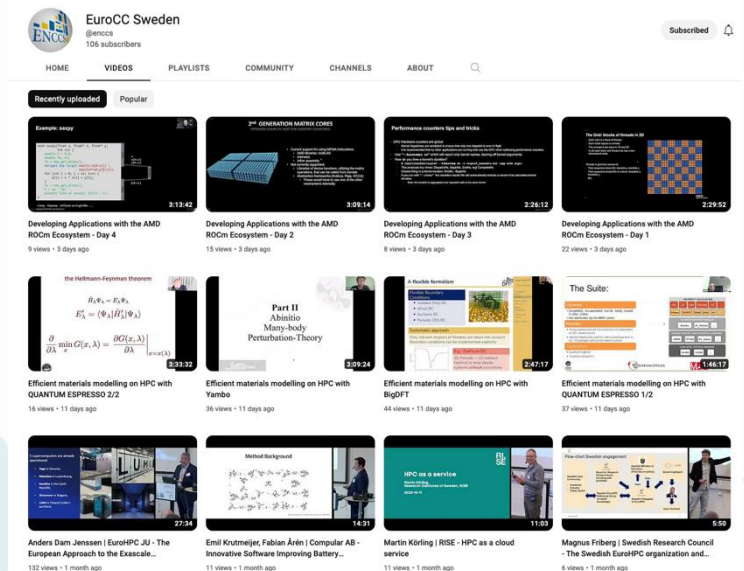
- I want to deeply thank:
- All the speakers who volunteered their time and budgets to make this happen for you (let's be kind to them!)
- WACQT for sponsoring our mingle on Monday and dinner on Wednesday
- CASTIEL2 for lunches, coffee breaks, breakfast
- All the organizers including ENCCS, RISE, NCC Denmark, NCC Lithuania
 - Apostolos Vasileiadis
 - Ashwin Mohanan
 - Emma Wållberg
 - Gergely István Barsi
 - Göran Wendin
 - Juan de Gracia Triviño
 - Stepas Toliautas
 - Thor Wikfeldt
 - Yonglei Wang

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Training material

 <p>High-performance Data Analytics with Python</p> <p>COURSE MATERIAL</p>	 <p>Julia for High Performance Scientific Computing</p> <p>COURSE MATERIAL</p> <p>VIDEO RECORDING</p>	 <p>SYCL Workshop</p> <p>COURSE MATERIAL</p> <p>VIDEO RECORDING</p>	 <p>A.I. as a Tool for Change</p> <p>VIDEO RECORDING</p>
 <p>Graph Neural Networks and Transformer Workshop</p> <p>COURSE MATERIAL</p> <p>VIDEO RECORDING</p>	 <p>Upscaling A.I. with Containers</p> <p>COURSE MATERIAL</p>	 <p>OpenFoam Workshop</p> <p>COURSE MATERIAL</p>	 <p>OpenACC Workshop</p> <p>COURSE MATERIAL</p>
 <p>Intermediate CUDA Workshop</p> <p>COURSE MATERIAL</p>	 <p>Intermediate MPI Workshop</p> <p>COURSE MATERIAL</p>	 <p>OpenMP for GPU Offloading Workshop</p> <p>COURSE MATERIAL</p>	 <p>NEK5000 Workshop</p> <p>COURSE MATERIAL</p>

- Public and open source
- Based on Sphinx documentation generator
- Web traffic monitoring
- Recordings on YouTube



EuroHPC Training

18/03/2025
CZECH REPUBLIC

ONLINE

Fundamental Quantum Computing Algorithms and Their Implementation in Qiskit

18 – 19 March 2025
ONLINE

FUNDAMENTAL QUANTUM COMPUTING ALGORITHMS AND THEIR IMPLEMENTATION IN QISKIT

AnnotationQuantum computers operate on principles fundamentally distinct from classical computing. This course explains these differences by...

READ MORE

12/03/2025
GERMANY

IN PERSON

HYBRID HPC QUANTUM COMPUTING AT LRZ

This is an on-site course at LRZ in Garching near Munich. There will be no possibility to join online remotely via video conference. Participants are...

READ MORE

13/02/2025
CZECH REPUBLIC

MIXED

QUANTUM COMPUTING SEMINAR: SAOOVQE – QUANTUM CHEMISTRY MEETS QUANTUM COMPUTING

AnnotationThe development of hybrid quantum-classical algorithms has revolutionized quantum chemistry simulations, and in this talk, I will introduce...

READ MORE

20/01/2025
LITHUANIA

IN PERSON

3RD EUROCC VILNIUS WORKSHOP ON USING HPC

Workshop for using HPC. Beginner training for accessing HPC resources: EuroHPC supercomputers, quantum computers, supercomputer "VU HPC" Saulėtkis...

READ MORE

06/12/2024
CZECH REPUBLIC

MIXED

WORKSHOP ON QUANTUM COMPUTING: QUANTUM MACHINE LEARNING

AnnotationThe workshop will consist of 5 talks. The tutor's names, annotations, and titles are specified below.Benefits for attendees, what will they...

READ MORE

02/12/2024
SWEDEN

MIXED

QUANTUM AUTUMN SCHOOL 2024 (HYBRID)

ENCCS joins forces again this year with NordiQuEst, to deliver a three-day quantum autumn school in early December 2024! The quantum autumn school...

READ MORE

- HPC in Europe portal <https://hpc-portal.eu>
- Training events on topics HPC, AI and QC
- Offerings from EuroCC and CoEs (& QECs)

EuroHPC Virtual Training Academy - EVITA

EVITA will enhance HPC+ education by creating a structured Competence and Qualification Framework, offering high-quality training modules through a cascade funding mechanism and an innovative online platform with guided learning pathways and certification. EVITA will build a connected community of learners, educators, and industry professionals, ensuring a skilled workforce for emerging challenges.



PODCAST



NEW EPISODE EVERY 2 WEEKS



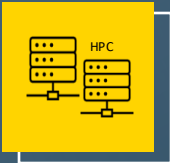
Practical information

- **Use NextCloud for questions**
 - Our experts will answer there
 - Let us know if there are any issues
 - Avoid using Zoom chat, we may miss the question
- **For on-site participants**
 - Emergency exists
 - Wardrobe
 - **Scan your badge to log out each day at the reception**
 - Log in again the next day by scanning your badge
 - Please raise your hand and **ask for a mic** so that you can be heard
 - Don't keep the doors open after 18:00 for more than 10 seconds **!**
- **For on-line participants**
 - Ask questions on NextCloud and we will answer it as soon as possible
- **WhatsApp group**
 - Social interaction between participants
 - We are not the moderators

ENCCS is Sweden's national competence centre for supercomputing hosted at LiU and RISE.

ENCCS empowers Swedish industry and the public sector achieve their business targets by leveraging HPC, AI, HPDA and QC efficiently and effectively.

We are ENCCS



Free HPC Access

Apply for free supercomputing time in Europe's largest machines (EuroHPC JU)



HPC Training workshops

Follow the ENCCS training schedule with workshops on GPU programming, Python for HPC, Best Practices and more



Hands-on support

Get help from our HPC experts to get started and make the most out of those supercomputers



Software support

Boost your business with our PoCs enabling your code to efficiently utilise multiple CPUs or GPUs with the help of our experts