

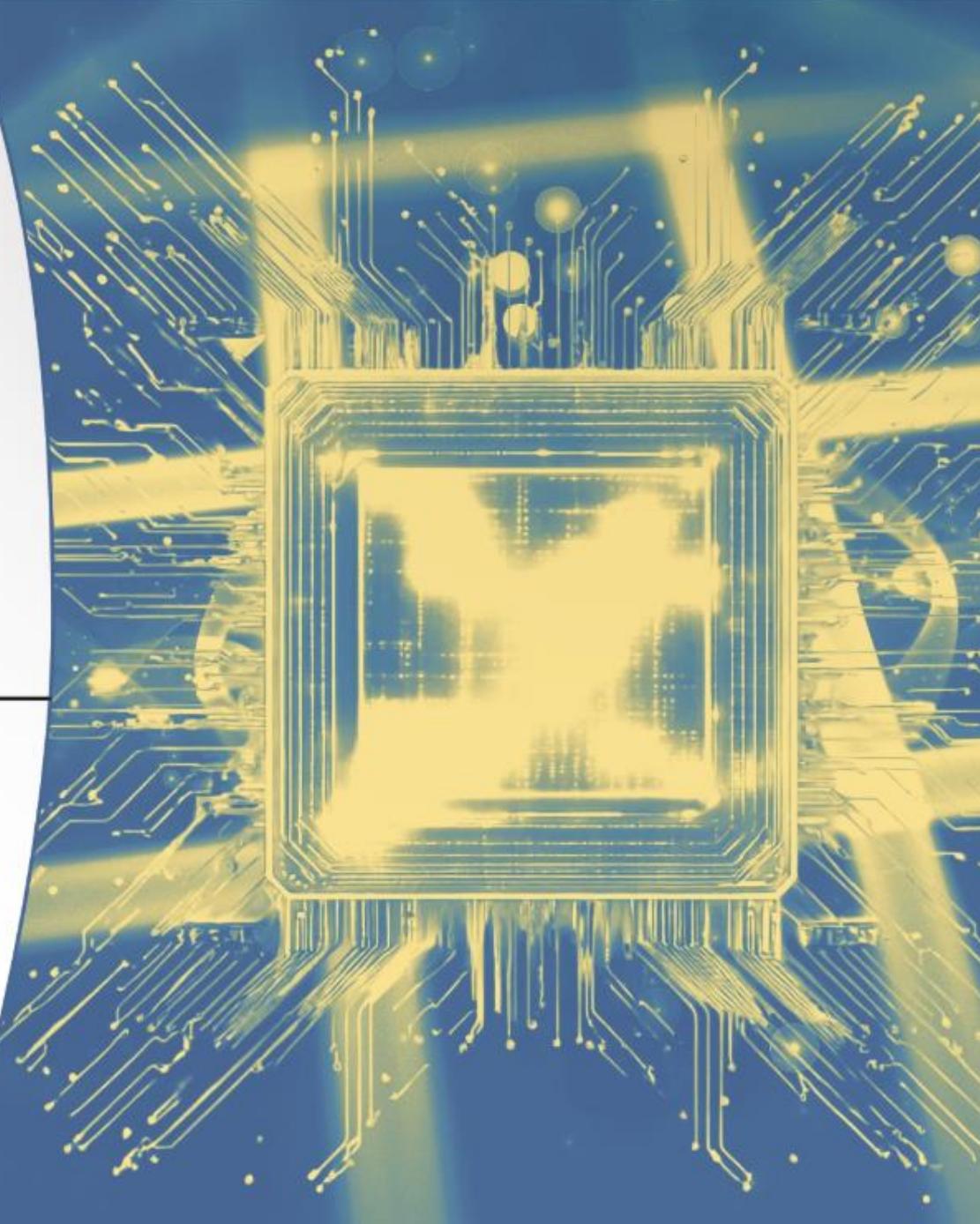
# QUANTUM AUTUMN SCHOOL 2025



EuroCC National Competence Centre Sweden



**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.





**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.



LINKÖPING  
UNIVERSITY



EuroHPC  
Joint Undertaking



Swedish  
Research  
Council

**VINNOVA**  
Sweden's Innovation Agency





EuroHPC  
Joint Undertaking

LiU LINKÖPING  
UNIVERSITY

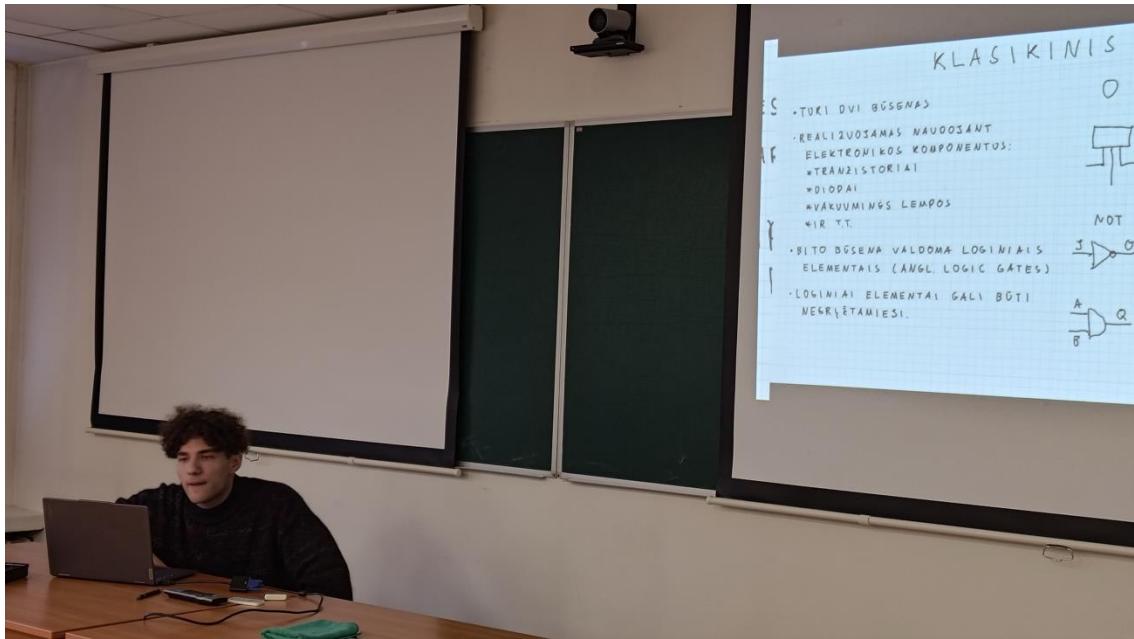
RI.  
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Swedish  
Research  
Council

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.**



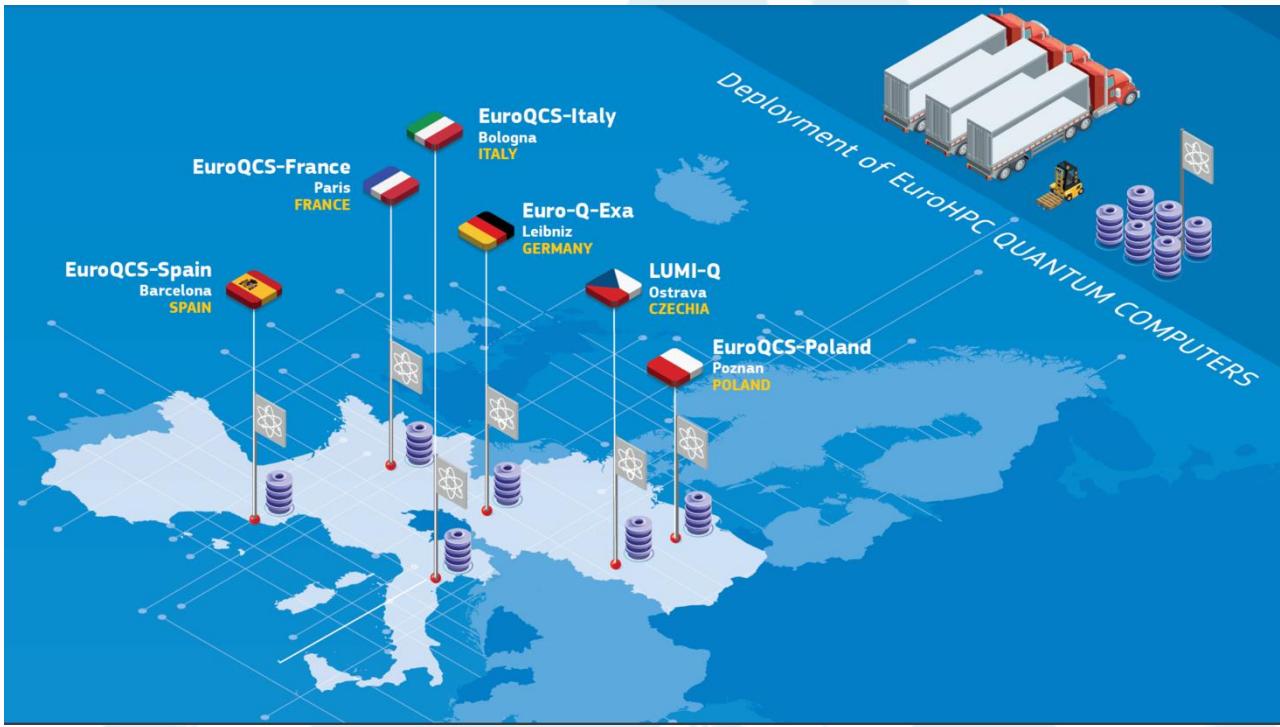
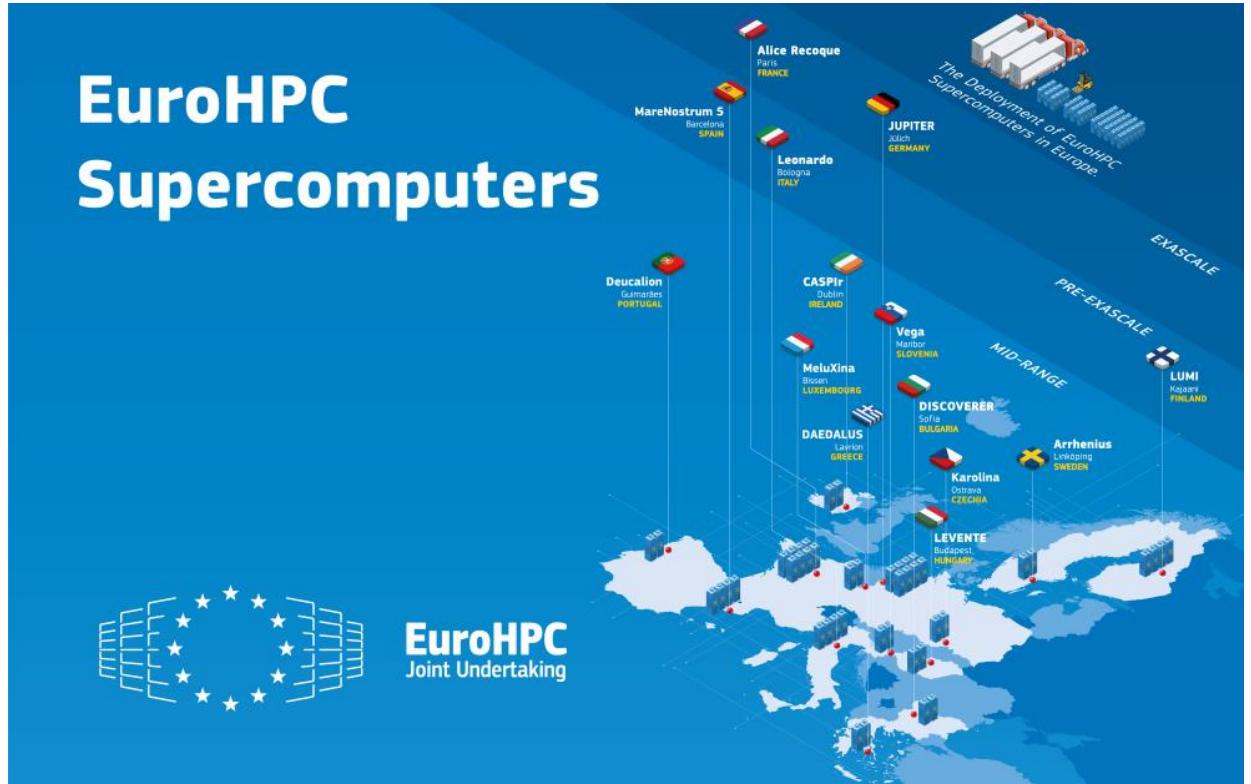
# EuroHPC JU ecosystem



*"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



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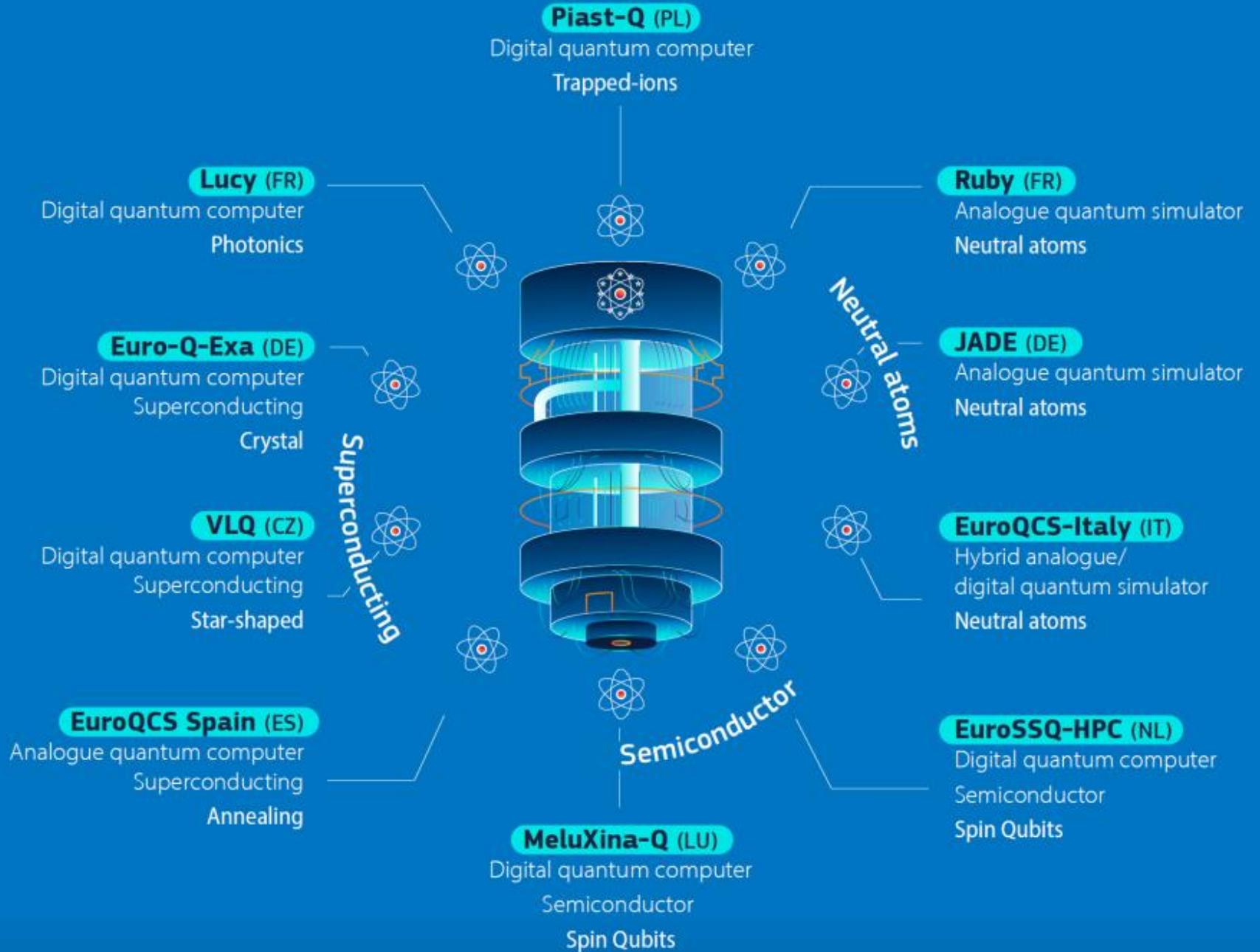


EuroHPC  
Joint Undertaking

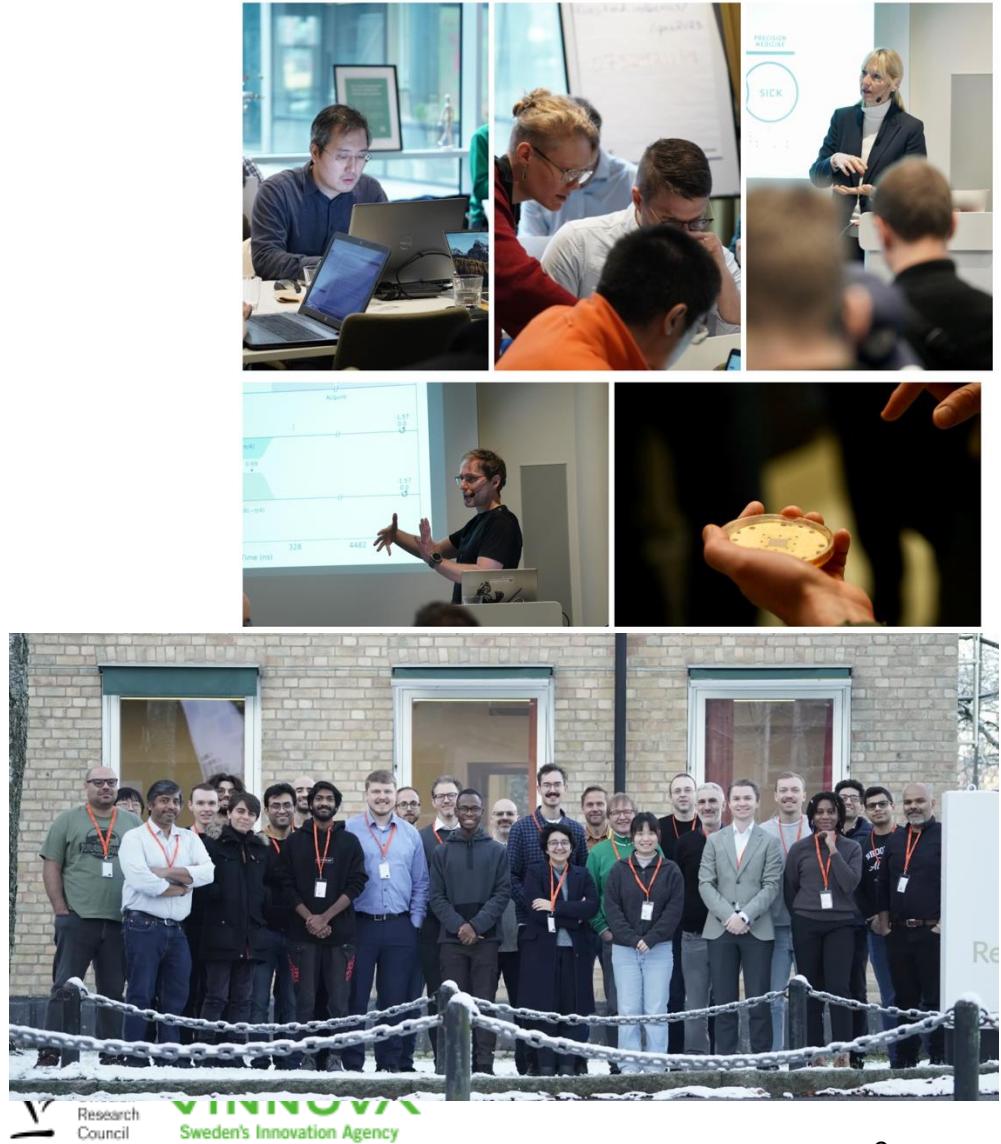
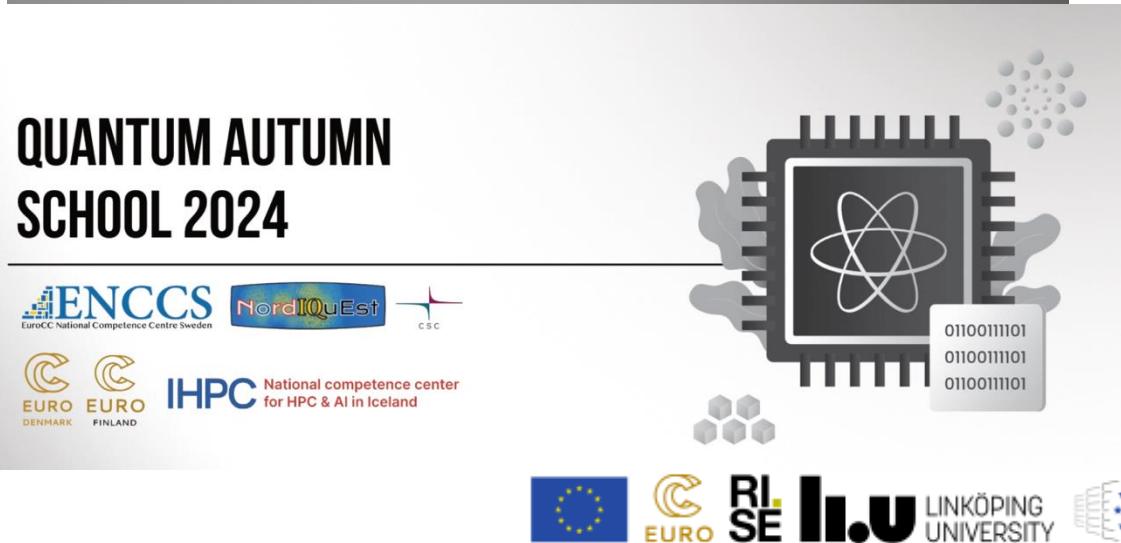


Swedish  
Research  
Council





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



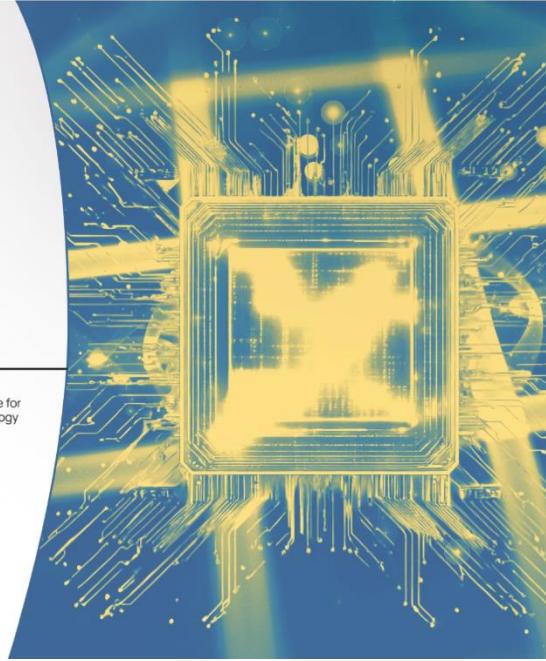
# QUANTUM AUTUMN SCHOOL 2025

**ENCCS**  
EuroCC National Competence Centre Sweden

**EURO**  
EUropean Center for HPC



**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/quantschool>
- 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		
slot 1	Monday 3rd 9:00-10:00 arrival and coffee 8:30-9:20	Karim Elgammal (ENCCS/RISE, SE)	Tuesday 4th coffee/sandwich 8:30-9:00 Introduction to variational quantum algorithms: VQE, QAOA and beyond (QPE, ..., SQD)	Panagiotis Barkoutsos (IonQ)
slot 2	10:00-11:00 Welcome QAS2025 Introduction MIMER AI Factory Thor Witfeldt (MIMER/RISE, SE)	Juan de Gracia Trivino (ENCCS/RISE, SE)	Interactive tutorial: experiments with quantum gates, circuits and algorithms (qrisp simulation)	Controlling a quantum computer using pulses
slot 3	11:00-12:00 Introduction to the European Hybrid classical/quantum HPC+AI+QC ecosystem. LUMI-Q Quantum Flagship Mikael Johansson (CSC, FI)	Juan de Gracia Trivino (ENCCS/RISE, SE)	coffee break 10:40-11:00	coffee break 10:40-11:00
slot 4	12:00-13:00 Overview of the HPC/QC stack from ready-made Q-libraries for common tasks to circuit level assembly and hardware-level coding Miroslav Dobsicek	Miroslav Dobsicek	Lunch	Lunch
slot 5	13:00-14:00 Quantum gates, circuits and algorithms Juan de Gracia Trivino (ENCCS/RISE, SE)	Juan de Gracia Trivino (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 Christandi (København U, DK)
slot 6	14:00-15:00 Quantum gates and circuits Giulia Ferrini (MC2, Chalmers, WACQT, SE)	Giulia Ferrini (MC2, Chalmers, WACQT, SE)	Developing quantum algorithms with qrisp, the next generation of quantum algorithm development Stefan Seegerer (IQM)	Quantum error-correction (QEC) Mats Granath (Göteborg University)
slot 7	15:00-15:30 coffee break		coffee break	coffee break
	15:30-16:30 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)
	16:30-17:30 From qubits 2000 to Nobel Prize 2025 Göran Wendin (RISE, SE)		PechaKucha presentations (in-person only)	coffee break
	18:00-20:00 Reception, mingling			Buffé dinner
				closing
				The end

# 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 Wendum
      - Juan de Gracia Triviño
      - Stepas Toliautas
      - Thor Wikfeldt
      - Yonglei Wang



# Training material



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



# EuroHPC Training

The grid displays six training events:

- 18/03/2025, CZECH REPUBLIC, ONLINE:** "Fundamental Quantum Computing Algorithms and Their Implementation in Qiskit". Annotation: Quantum 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". Annotation: The workshop will consist of 5 talks. The tutor's names, annotations, and titles are specified below. Benefits for attendees, what will they... [READ MORE](#)
- 13/02/2025, CZECH REPUBLIC, MIXED:** "QUANTUM COMPUTING SEMINAR: SAOOVQE – QUANTUM CHEMISTRY MEETS QUANTUM COMPUTING". Annotation: The 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". Annotation: Workshop for using HPC. Beginner training for accessing HPC resources: EuroHPC supercomputers, quantum computers, supercomputer "VU HPC" Saulėtekis... [READ MORE](#)
- 06/12/2024, CZECH REPUBLIC, MIXED:** "WORKSHOP ON QUANTUM COMPUTING: QUANTUM MACHINE LEARNING". Annotation: The 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)". Annotation: 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



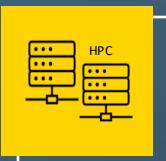
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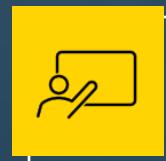
## We are ENCCS

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### 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