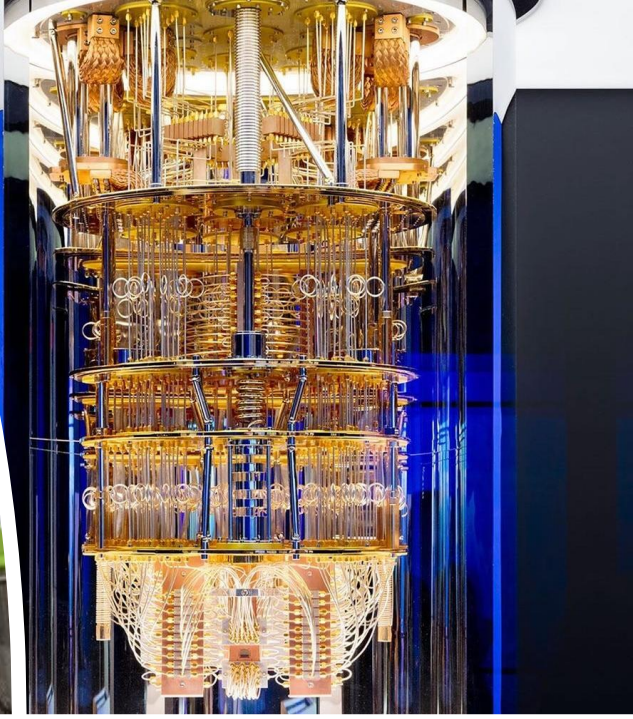
# Quantum Computing Masterclass





**UNamur**

*January 25-26, 2027*

UNIVERSITÉ DE NAMUR

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VLAAMS SUPERCOMPUTER CENTRUM

Vlaanderen is supercomputing

# Objectives

- Gain a fundamental yet comprehensive understanding of Quantum Computing and Quantum Algorithms.
- Develop practical skills through hands-on experience, going beyond theoretical concepts.
- Understand the business value and potential applications of Quantum Computing across business, science, and research.
- Identify the next steps in the Quantum Journey, both personally and organizationally.
- Build a network of people interested in Quantum Computing and its ongoing evolution.

# Topics of Day 1

- Why Quantum Computing?
- Quantum Computing Concepts: Qubits, Quantum Gates, Quantum Circuits
- Quantum Information Theory and Mathematical Equivalencies
- Quantum Computing Systems in the Cloud and On-Premise
- Demonstration: Quantum Computer Characteristics
- Hands-On: Accessing Real Quantum Computers
- Developing Quantum Circuits
- Demonstration: Quantum Circuits
- Hands-On: My First Quantum Circuits executed on a Real Quantum Computer

LUNCH BREAK

- Developing Quantum Applications with Qiskit, the Open-Source SDK for Quantum
- Demonstration: Qiskit
- Hands-On: Setting Up Your Qiskit Environment
- Hands-On: “Hello World” with Qiskit, My First Quantum Program
- Quantum Computing Use Cases across Industry Sectors
- Quantum Ecosystems and Partnerships
- Quantum Computing Research
- A Typical Quantum Journey
- Learning Sources
- Qiskit Advocate Program and Quantum Computing Certification
- A Short Introduction to Quantum-Safe Cryptography

# Topics of Day 2

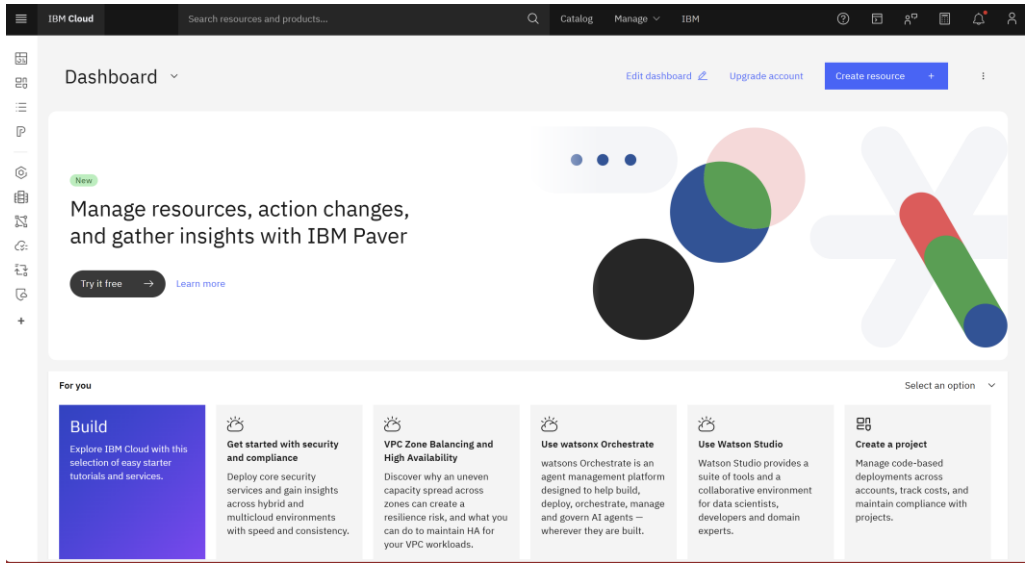
- Recap of Day 1
- An Overview of the “famous” Quantum Algorithms
- The Quantum Teleportation Algorithm
- Hands-On: Quantum Teleportation Algorithm
- “Entanglement in Action” with the CHSH Game
- Hands-On: The CHSH Game
- An Overview of Practical Quantum Algorithms
- Variational Quantum Algorithms

LUNCH BREAK

- The Quantum Approximate Optimization Algorithm (QAOA)
- Hands-On: Solving a Portfolio Optimization Challenge with the QAOA Algorithm (Financial Services)
- Quantum Machine Learning Algorithms (QSVM and QNN)
- Hands-On: Solving a Patient Adherence Challenge with a Quantum Kernel Algorithm (Healthcare)
- Quantum Error Suppression, Error Mitigation and Error Correction
- Hands-On: Applying Error Suppression and Error Mitigation Techniques
- Quantum-Centric Supercomputing as an enabler for High-Performance Computing
- Quantum Computing Quiz

# Prerequisites for the Participants

- Create a free account on https://qbraid.com/lab
- Create and Save a **Cloud Feature Code**
  - IBM SkillsBuild Technology Access
  - All Technologies
  - IBM Cloud Feature Code
- Create Cloud Account Using Feature Code without Credit Card
  - Log in to IBM Cloud – IBM Cloud
  - You should be able to see the screen similar to the one at the right side




- Bring your Laptop with you to the Lectures
- Eagerness to Learn!
- A preparation “Online Vitual Meeting” can be set up in case there are issues or questions

# Logistics

Address
- UNAMUR, Faculté d'Informatique, Rue de Bruxelles 61, 5000 Namur

Room
- 402 - Salle Académique

Dates
- January 25-26, 2027

Hours
- 9:00 – 16:30 hrs.
- Lunch break of 1 hour
- Coffee Breaks in the morning and afternoon of 15 minutes

Language
- English

Materials
- Slides
- Jupyter Notebooks (Python)

Web Site
- https://events.unamur.be/event/463/

Organizer
- Emerick Guillaume, Post-Doc Researcher, Communication deputy EuroCC Belgium
- emerick.guillaume@unamur.be

Instructor
- Eric Michiels, IBM Quantum Technical Ambassador, Qiskit Advocate
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# $\langle 10|Q\rangle$ for your interest in the Quantum Computing Masterclass!






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