

MEMBERSHIP BENEFITS

IBM Quantum Network Overview

IBM Quantum Network

A collaborative community of more than 170 [Clients and Partners](#) and over [400,000 users](#) that have...

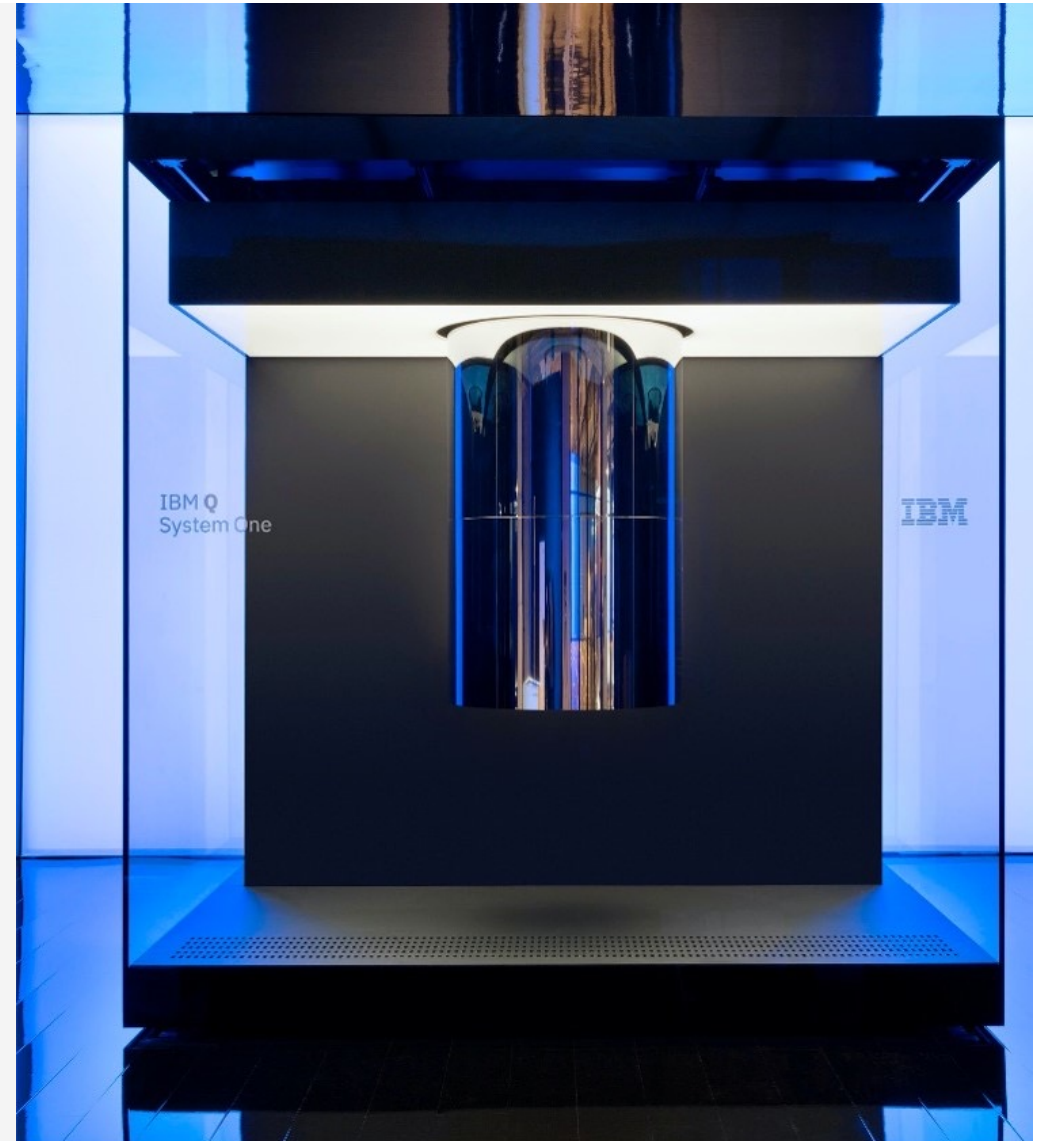
Run over [1.4 trillion quantum circuits](#)

[4 Billion](#) quantum circuits running per day

[30+](#) application development projects

[400+](#) contributors to Qiskit

[1400+](#) scientific papers



Drivers/Benefits Summary



Education & Workforce Development

- IBM Quantum Insider
- IBM Quantum Network Colloquium
- Teach the Researcher Events
- Qiskit open-source community events



Eminence

- IBM Quantum Networking Events
- Joint Marketing Opportunities

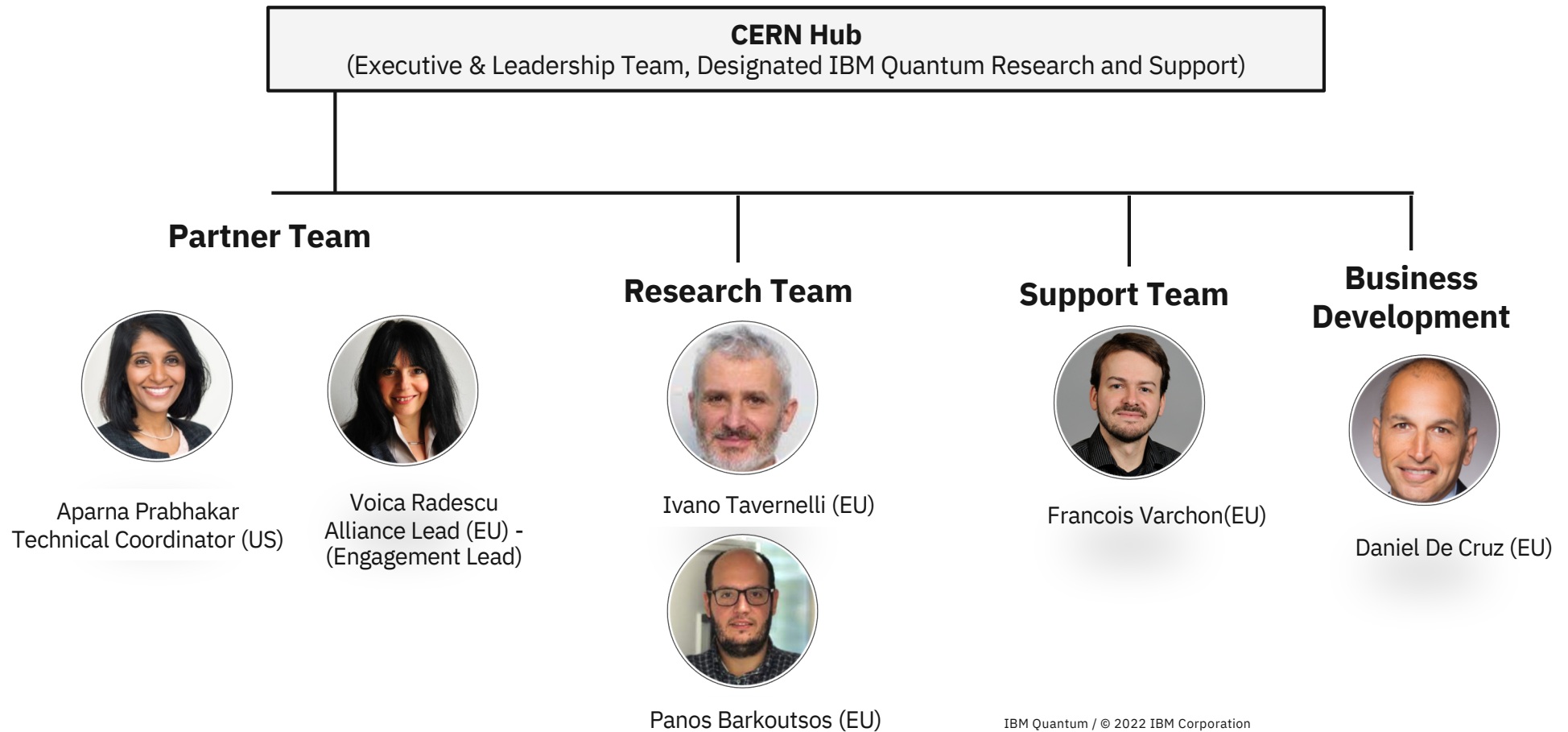


Applied Projects & Research

- Premium System Access Plan
- Dedicated Engagement Manager
- Research projects with IBM ZRL
- Dedicated Support

Our team is committed to your success in the
IBM Quantum Network

IBM **Quantum**



Dedicated Engagement Manager

Primary point of contact at IBM Quantum to help Deliver successful IBM-CERN partnership.

Facilitate relationships between CERN and IBM.

Coordinate communication across teams.

Ensure access to the right resources and partner benefits.

Project management and enablement for both applied and fundamental research.

Dedicated Support ibmq@us.ibm.com

Answer your technical questions

Remotely guide you through On-boarding process

Guide you through IBM Quantum Administration Dashboard (IBM Admin)

Support Qiskit version release

Provide feedback and suggested efficiencies in Qiskit, and Act as a channel between you and the developers

Notify you of changes within Qiskit or IBM Quantum

Keep you up to date with scheduled device maintenance

Access to Zurich Research team

Engage and facilitate topical research project discussions

Participate in periodic research monitoring meetings.

Project feasibility discussions

Premium Access Plan

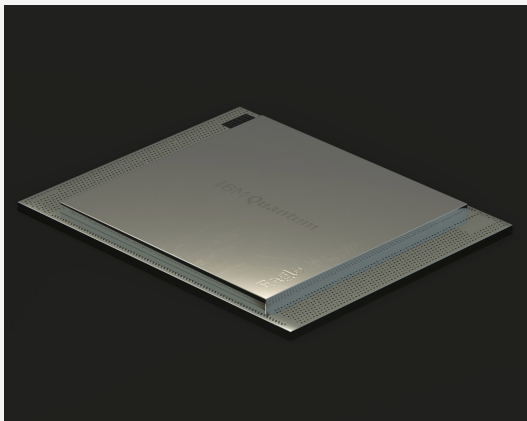
Drive collaboration towards promising applications on larger systems with industrial partners

Flagship systems targeting **quantum advantage**

Best error rates (qubits, measurements and gates)

Full breadth of system access, e.g. **pulse, reservations**

Allotted time on systems based on access agreement:
significant system share



IBM Quantum

Quantum Systems CERN (May 2022)

IBM Quantum

Premium Core Systems

27 Qubits

Montreal (QV128) *
Cairo (QV64)
Hanoi (QV64)
Toronto(QV32) *
Kolkata(QV128)

Premium Exploratory Systems

127 Qubits

Washington (QV64)

65 Qubits
Brooklyn (QV32) *

27 Qubits

Mumbai (QV128)
Auckland (QV64)

Advanced Systems

16 Qubits

Guadalupe (QV32)

7 Qubits

Perth (QV32)
Lagos (QV32)
Jakarta (QV16)

+ 7 open systems (5Q) *

+ 5 Simulators

CERN allocation: **0.25 queue slot**

-> system share (e.g. 1.25 % time on system = 2.1 hours/week = 8.4 hours/4 weeks)

System reservation : (16 hours * #queue slot)/month = 4 hours/month on Kolkata & Toronto *
+ 8 hours/month on Perth, Lagos, Jakarta

* retirements on June 5th

IBM Cloud quantum services

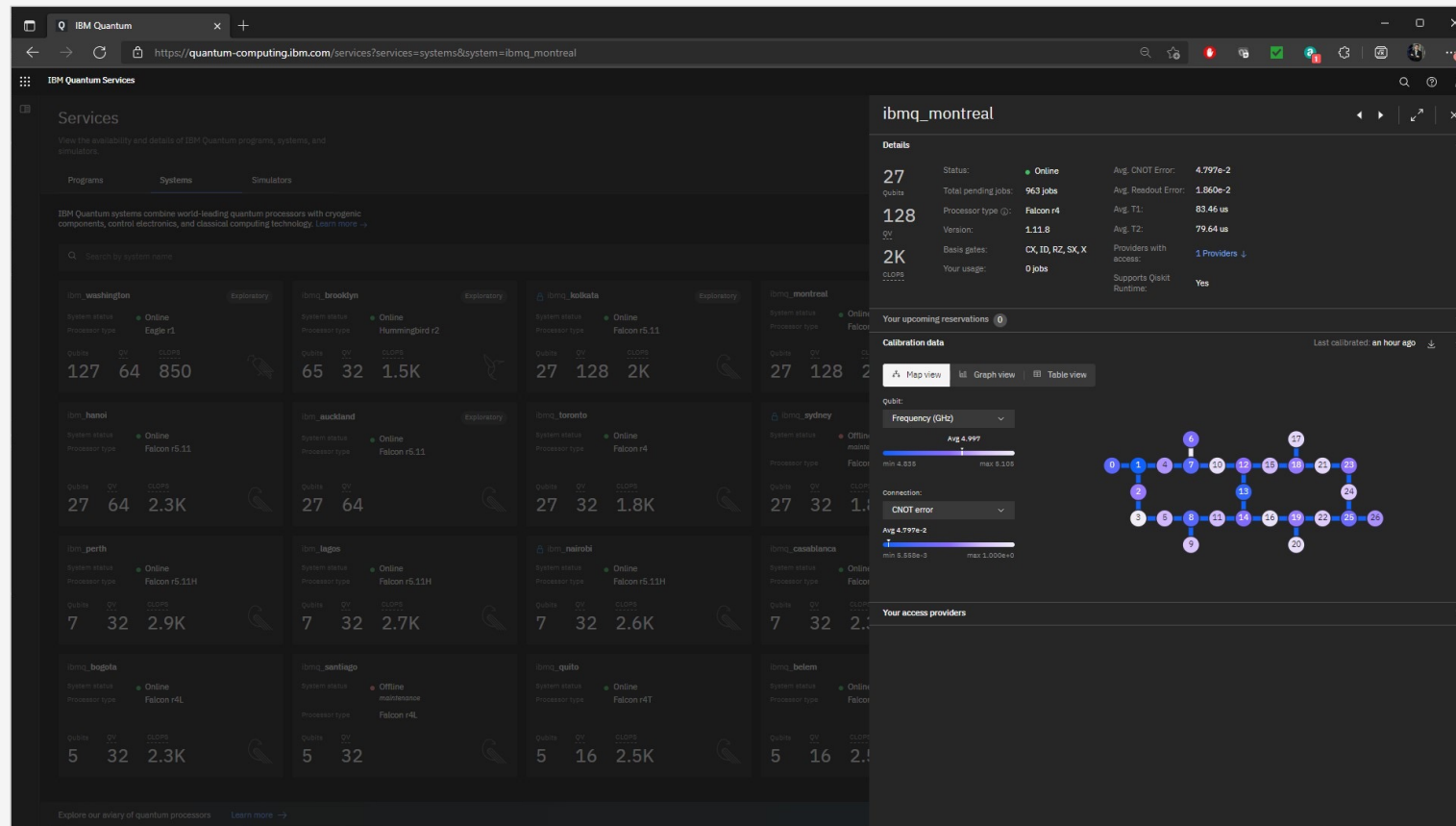
IBM Quantum

The screenshot displays the IBM Quantum Services web interface. The browser address bar shows the URL <https://quantum-computing.ibm.com/services?services=systems>. The page title is "Services" with a subtitle "View the availability and details of IBM Quantum programs, systems, and simulators." Below this, there are tabs for "Programs", "Systems" (selected), and "Simulators". A search bar is present with the text "Search by system name". The main content area displays a grid of 24 quantum systems, each with a card showing its name, status, processor type, and qubit counts. The systems are arranged in a 4x6 grid. The first row includes: ibmq_washington (Online, Eagle v1, 127 qubits), ibmq_brooklyn (Online, Hummingbird v2, 65 qubits), ibmq_kolkata (Online, Falcon v5.11, 27 qubits), ibmq_montreal (Online, Falcon v4, 27 qubits), ibmq_mumbai (Online, Falcon v5.1, 27 qubits), and ibmq_cairo (Online, Falcon v5.11, 27 qubits). The second row includes: ibmq_hanoi (Online, Falcon v5.11, 27 qubits), ibmq_auckland (Online, Falcon v5.11, 27 qubits), ibmq_toronto (Online, Falcon v4, 27 qubits), ibmq_sydney (Offline maintenance, Falcon v4, 27 qubits), ibmq_peekskill (Offline, backend being configured, 27 qubits), and ibmq_guadalupe (Online, Falcon v4P, 16 qubits). The third row includes: ibmq_perth (Online, Falcon v5.11H, 7 qubits), ibmq_lagos (Online, Falcon v5.11H, 7 qubits), ibmq_nairobi (Online, Falcon v5.11H, 7 qubits), ibmq_casablanca (Online, Falcon v4H, 7 qubits), ibmq_jakarta (Online, Falcon v5.11H, 7 qubits), and ibmq_manila (Online, Falcon v5.11L, 5 qubits). The fourth row includes: ibmq_bogota (Online, Falcon v4L, 5 qubits), ibmq_santiago (Offline maintenance, Falcon v4L, 5 qubits), ibmq_quito (Online, Falcon v4T, 5 qubits), ibmq_belem (Online, Falcon v4T, 5 qubits), ibmq_lima (Online, Falcon v4T, 5 qubits), and ibmq_armonk (Online, Canary v1.2, 1 qubit). Each card also features a "Qubit" count, a "QV" (Qubits Virtual) count, and a "CLOPS" (Circuit Level Operations Per Second) value. A "Learn more" link is visible at the bottom of the page.

System Name	Status	Processor Type	Qubits	QV	CLOPS
ibmq_washington	Online	Eagle v1	127	64	850
ibmq_brooklyn	Online	Hummingbird v2	65	32	1.5K
ibmq_kolkata	Online	Falcon v5.11	27	128	2K
ibmq_montreal	Online	Falcon v4	27	128	2K
ibmq_mumbai	Online	Falcon v5.1	27	128	1.8K
ibmq_cairo	Online	Falcon v5.11	27	64	2.4K
ibmq_hanoi	Online	Falcon v5.11	27	64	2.3K
ibmq_auckland	Online	Falcon v5.11	27	64	
ibmq_toronto	Online	Falcon v4	27	32	1.8K
ibmq_sydney	Offline maintenance	Falcon v4	27	32	1.8K
ibmq_peekskill	Offline	The backend is being configured	27		
ibmq_guadalupe	Online	Falcon v4P	16	32	2.4K
ibmq_perth	Online	Falcon v5.11H	7	32	2.9K
ibmq_lagos	Online	Falcon v5.11H	7	32	2.7K
ibmq_nairobi	Online	Falcon v5.11H	7	32	2.6K
ibmq_casablanca	Online	Falcon v4H	7	32	2.3K
ibmq_jakarta	Online	Falcon v5.11H	7	16	2.4K
ibmq_manila	Online	Falcon v5.11L	5	32	2.8K
ibmq_bogota	Online	Falcon v4L	5	32	2.3K
ibmq_santiago	Offline maintenance	Falcon v4L	5	32	
ibmq_quito	Online	Falcon v4T	5	16	2.5K
ibmq_belem	Online	Falcon v4T	5	16	2.5K
ibmq_lima	Online	Falcon v4T	5	8	2.7K
ibmq_armonk	Online	Canary v1.2	1	1	

IBM Cloud quantum services

IBM Quantum



Partner Onboarding

Specialized onboarding experience designed February 2022

For Admin, Technical Users

System Onboarding

Dedicated session for new hub, group, or project admins to review hub dashboard, analytics, and how to add new members

For Admin, Technical Users

Support

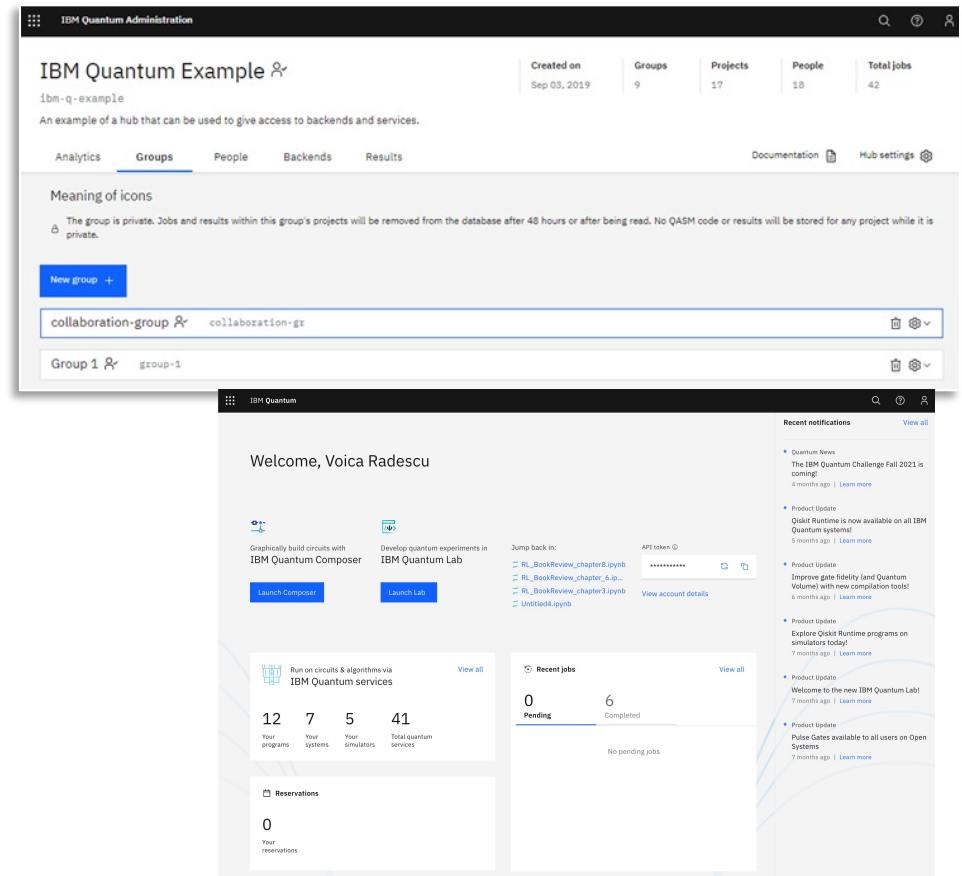
Dedicated support team for technical Q&A, and navigating IBM Quantum Systems

For Technical Users

Technical Enablement

Curated onboarding experience and live webinars to get started, build a community, and apply Qiskit to research

IBM Quantum



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IBM Quantum


IBM Quantum Support

France



François Varchon
Team Leader



Patrick Mensac


Aziz Ngoueya


Léna Pérennès

New York


Matthew Stypulkoski


Winona Murphy

IBM Quantum

Dedicated Support at ibmq@us.ibm.com

- **Answer** your technical questions (**Email**, StackExchange, Slack)
- **Remotely guide you** through On-boarding process
- **Guide you through** IBM Quantum Administration Dashboard (IBM Admin)
- **Support** Qiskit version release
- **Provide feedback** and suggested efficiencies in Qiskit, and **Act as a channel** between you and the developers
- **Notify you** of changes within Qiskit or IBM Quantum
- **Keep you up to date** with scheduled device maintenance and downtime

IBM Quantum / © 2022 IBM Corporation

IBM Quantum Insider (Content Management System)

Goal

Access to curated content to explain the newest advances – and their commercial and technological impacts:

- Colloquiums, workshops, “Teach-the-Researcher” courses

Speaker

Leading researcher in the field of quantum information science (IBM or IBM Quantum Network Member)

Target Audience

Any member in the network

Users have to sign-up directly

(link available [here](#))

Welcome to IBM Quantum Insider

Curated insights to explain the newest advances – and their commercial and technological impacts

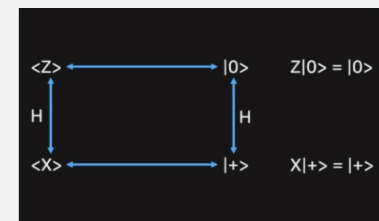
Content Catalog

Explore IBM Quantum Network exclusive training, webinars, and resources.



IBM Quantum Network Open House

Join industry focused breakout sessions showcasing use cases of quantum computing.



Quantum Error Correction

Quantum error correction is crucial in designing scalable quantum computers and fault-tolerant quantum algorithms. This course covers the fundamentals of quantum error correction, from stabilizer



IBM Quantum Network Colloquium

Goal

Learn about the latest developments at IBM Quantum and research advances made by the IBM Quantum Network, followed by Q&A with the researchers.

Speaker

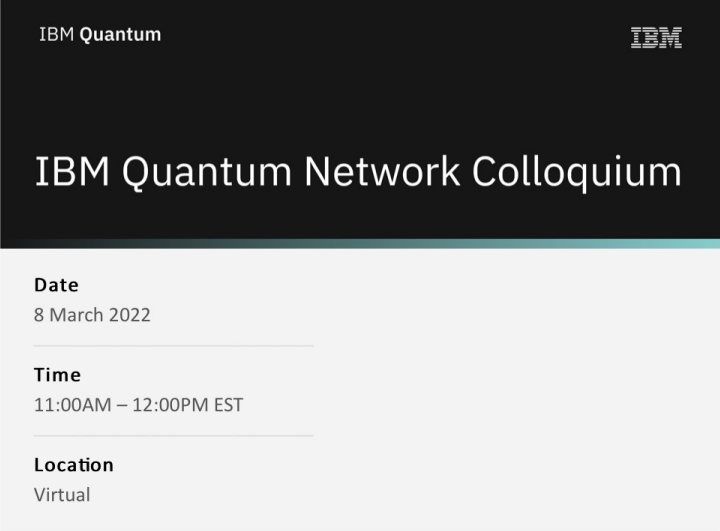
Leading researcher in the field of quantum information science (IBM or IBM Quantum Network Member)

Target Audience

Any technical researcher in the Network

(link available [here](#))

IBM Quantum

A dark-themed event card for the IBM Quantum Network Colloquium. The top section is dark blue with the IBM Quantum logo on the left and the IBM logo on the right. Below this, the title "IBM Quantum Network Colloquium" is centered in white. The bottom section is light gray and contains event details: Date (8 March 2022), Time (11:00AM – 12:00PM EST), and Location (Virtual).

IBM Quantum

IBM

IBM Quantum Network Colloquium

Date
8 March 2022

Time
11:00AM – 12:00PM EST

Location
Virtual

IBM Quantum Prototypes

Dr. Jennifer Glick of IBM and her teammates will introduce the IBM Quantum Prototypes program – a way for IBM Quantum Network members to advance the state of the art in quantum computing. You will learn how to get involved in the program and get a high-level understanding of the latest prototypes in development: including quantum kernel training and entanglement forging. As usual, there will be a live questions & answers session.

The colloquium will be recorded and made available as soon as possible.

Teach the Researcher Event

Goal

Multi-day deep dive courses to enable research. Topics include: VQE, Quantum Machine Learning, Quantum Error Correction, Quant Hardware.

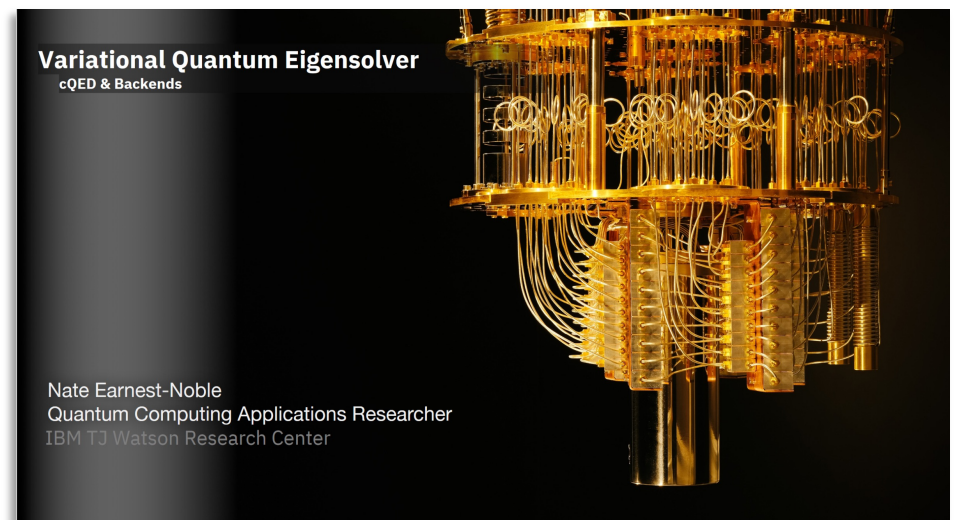
Speaker

Leading researcher in the field of quantum information science (IBM or IBM Quantum Network Member)

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IBM Quantum



Qiskit open-source community events

Goal

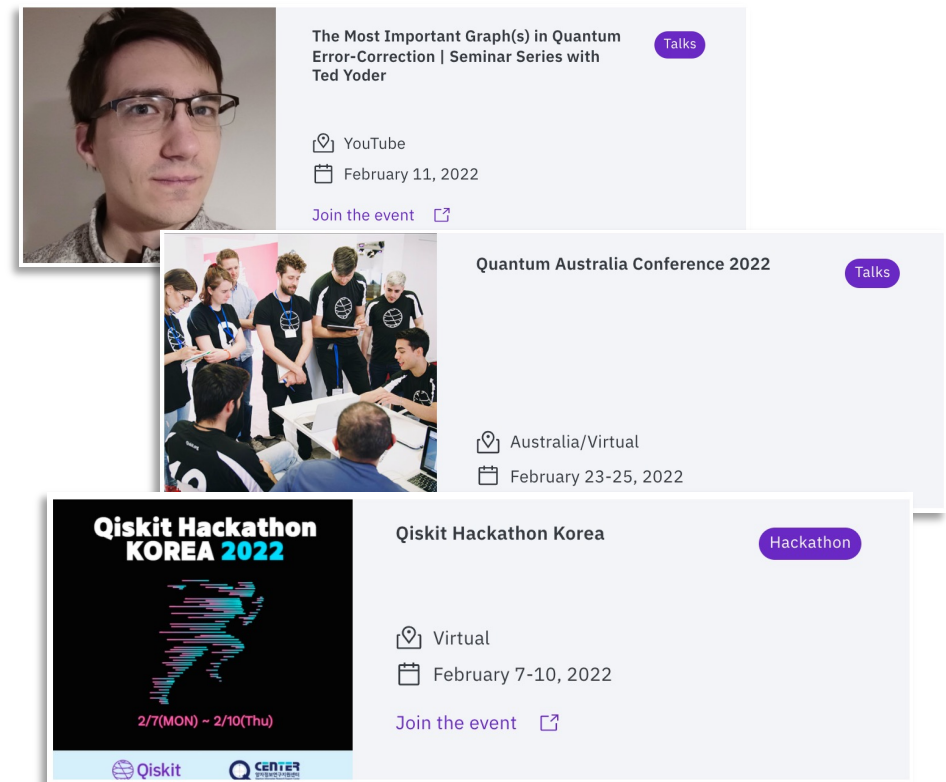
Hackathons, conferences, and talks hosted by the global quantum computing community. Often designed to increase engagement in target geographies.

Most events are open and free, IBM Quantum Network members will have early access to events that are invite-only.

Target Audience

Open to the **global** quantum computing community

IBM Quantum



The image displays three overlapping event cards from the Qiskit community. The top card features a portrait of Ted Yoder and details a talk titled 'The Most Important Graph(s) in Quantum Error-Correction | Seminar Series with Ted Yoder' on February 11, 2022. The middle card shows a group of people at a conference and details the 'Quantum Australia Conference 2022' held in Australia/Virtual from February 23-25, 2022. The bottom card features a graphic for 'Qiskit Hackathon KOREA 2022' and details a virtual hackathon held from February 7-10, 2022. Each card includes a 'Join the event' link and a category tag (Talks or Hackathon).

The Most Important Graph(s) in Quantum Error-Correction | Seminar Series with Ted Yoder Talks

YouTube
February 11, 2022
[Join the event](#)

Quantum Australia Conference 2022 Talks

Australia/Virtual
February 23-25, 2022

Qiskit Hackathon KOREA 2022 Hackathon

Virtual
February 7-10, 2022
[Join the event](#)

Qiskit Demo Days

Qiskit Demo Days are recorded, biweekly, open (by invitation), and public (the recording) meetings with fellow Qiskit developers where we share coming features and bugfixes, get feedback about them, and sync about release dates.

<https://github.com/qiskit-community/feedback/wiki/Qiskit-DemoDays>

```
from qiskit import QuantumCircuit, execute
from qiskit import Aer, IBMQ
from qiskit.providers.aer.noise import NoiseModel

# Choose a real device to simulate from IBMQ provider
provider = IBMQ.load_account()
backend = provider.get_backend('ibmq_vigo')
coupling_map = backend.configuration().coupling_map

# Generate an Aer noise model for device
noise_model = NoiseModel.from_backend(backend)
basis_gates = noise_model.basis_gates

# Generate 3-qubit GHZ state
num_qubits = 3
circ = QuantumCircuit(3, 3)
circ.h(0)
circ.cx(0, 1)
circ.cx(1, 2)
circ.measure([0, 1, 2], [0, 1, 2])

# Perform noisy simulation
backend = Aer.get_backend('qasm_simulator')
job = execute(circ, backend,
              coupling_map=coupling_map,
              noise_model=noise_model,
              basis_gates=basis_gates)
result = job.result()

print(result.get_counts(0))
```

New open course by IBM Quantum and Qiskit Advocates

<https://qiskit.org/textbook-beta/course/machine-learning-course/>



Browse all content



← Home

Quantum machine learning

This course contains around eight hours of content, and is aimed at self-learners who are comfortable with undergraduate-level mathematics and quantum computing fundamentals. This course will take you through key concepts in quantum machine learning, such as parameterized quantum circuits, training these circuits, and applying them to basic problems. By the end of the course, you'll understand the state of the field, and you'll be familiar with recent developments in both supervised and unsupervised learning such as quantum kernels and general adversarial networks. This course finishes with a project that you can use to showcase what you've learnt. This course was created by IBM Quantum with the help of Qiskit Advocates through the Qiskit Advocate Mentoring Program.

IBM Quantum Networking Events

[For advanced users in the partner ecosystem](#)

Partner Event (Bi-annual)

Multiday event for partners to network and share research updates

[For advanced users in the partner ecosystem](#)

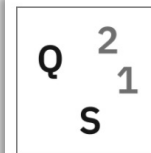
Superuser Session (Bi-annual)

Invite-only advanced enablement session for high usage users

[For the quantum computing community](#)

Quantum Summit (Annual)

Exclusive opportunity to meet the brightest minds in quantum computing from across the field and to hear industry-defining announcements



About Quantum Summit

The IBM Quantum Summit 2021 is our flagship invite-only event for the quantum computing community. The Quantum Summit is an exclusive opportunity to meet the brightest minds in quantum computing from across the field and to hear the industry-defining announcements on this emerging technology.

The theme of this year's Summit is New Dimensions. Quantum computing is unlocking the potential of large-dimensional mathematics for the 21st century – much like classical computing unlocked the potential of algorithmic mathematics in the 20th century. At this year's Summit, we will lay out our vision for what this emerging paradigm might look like.

Speakers



Joint Marketing Opportunities

Goal

Highlight use cases on IBM Quantum's dedicated webpages to show the (future) business value of QC.

Audience

- [IBM Research](#) for a technical or research audience
- [Qiskit Medium](#) for the Qiskit community on technical and open-source topics
- [IBM Quantum Case Studies](#) for business executives focused on path to Quantum Advantage

Prerequisites

A new and interesting story, supported by technical work.
Exciting use case, strong research results.

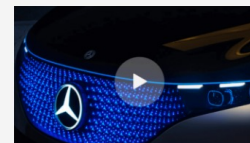
IBM Quantum Case Studies

Learn why companies and institutions are partnering with IBM for quantum computing innovation.

Watch Exxon case study

Case studies

Learn about our IBM Quantum Network partners who are exploring how quantum can advance industry applications

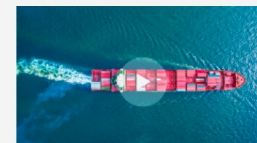


Daimler-Benz

Crafting the future of electric vehicles

Daimler envisions a new generation of electric vehicles through quantum battery technology.

See the story →

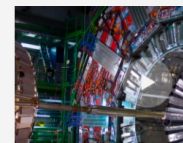


ExxonMobil

Taming the monster of maritime logistics

ExxonMobil strives to move the world's cleanest-burning fuel across the globe which is a puzzle that demands a quantum solution.

See the story →



CERN

The quest to understand what universe together

CERN is Searching for Higgs ev origins of the universe.

See the story →



Mitsubishi Chemical, JSR, Keio University

Redefining luminescence

IBM partners with JSR, Mitsubishi Chemical, and Keio University to explore new forms of light with quantum computing.

See the story →



Mitsubishi Chemical

In quantum pursuit of game-changing power sources

Mitsubishi Chemical is applying quantum computing to help develop lithium oxygen batteries with greater energy density.

See the story →

The three key metrics for measuring quantum computing performance



Scale

Measured by **number of qubits** which indicates the amount of information we can encode in the quantum system.

High coherence, high reliability, lower cost


2020	2021	2022
65 qubits	127 qubits	433 qubits



Quality

Measured by **Quantum Volume** which indicates quality of circuits and how faithfully circuits are implemented in hardware.

Need low operation errors, meaning large Quantum Volume

2020	Today	2022
32 QV	256 QV	1024 QV 



Speed

Measured by **CLOPS (Circuit Layer Operations Per Second)** which indicates how many circuits can run on hardware in a given time.

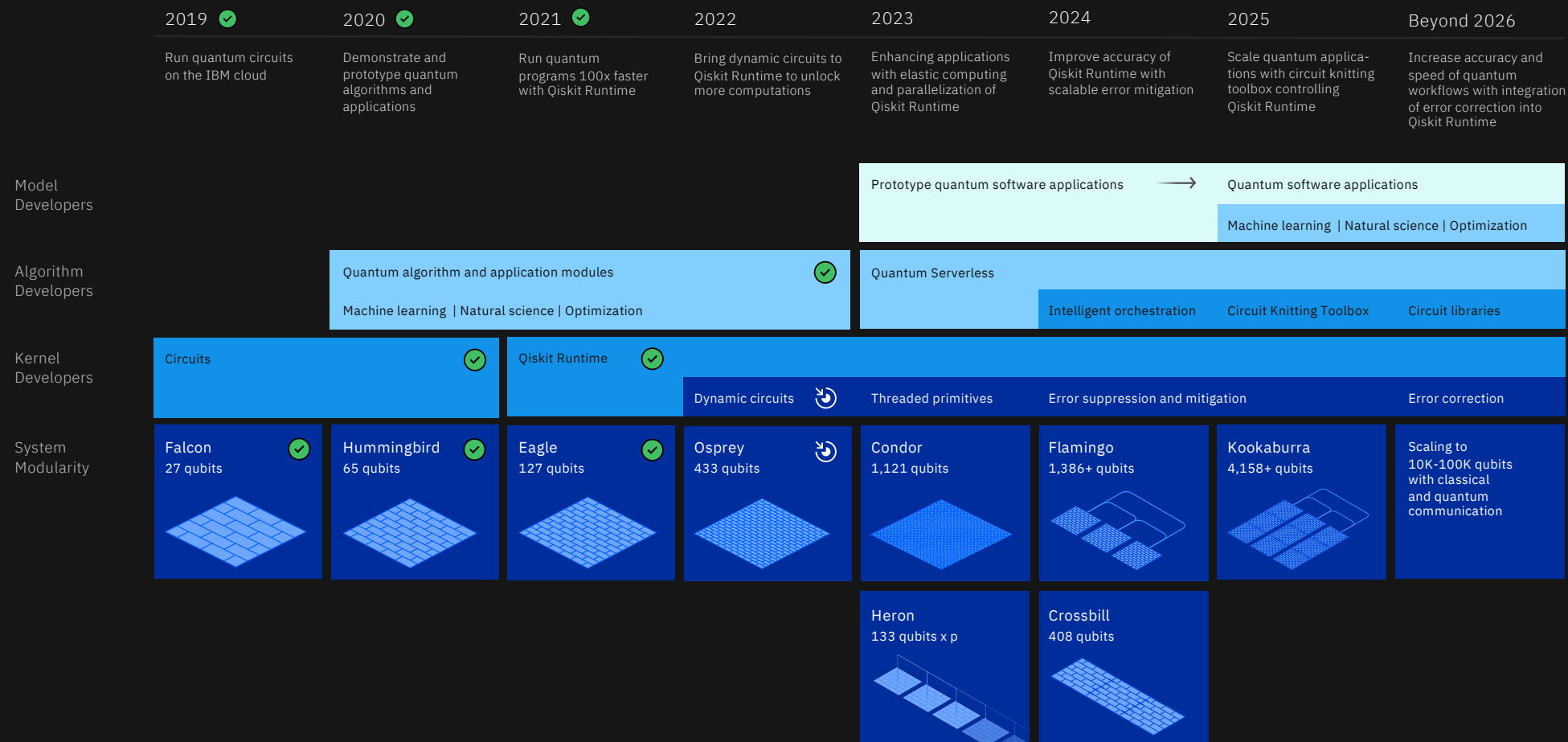
Seamless synchronization of quantum and classical circuits increases execution rate

2020	Today	2022
200 (Inferred)	1.4K CLOPS	10K CLOPS

Development Roadmap

Executed by IBM ✓
On target ↻

IBM Quantum





Resources: Self-learning

IBM Quantum

[IBM Quantum Tools](#)

Cloud applications for programming real quantum hardware and quantum circuit simulators

- [IBM Quantum for Developers](#)
- [IBM Quantum Composer](#)
- [IBM Quantum Lab](#)

[Qiskit.org](#)

Open-source quantum computing software development

- Documentation, Tutorials, Events, Education
- [Qiskit Metal](#) – quantum device design
- [OpenQASM 3.0](#)

[Learn Quantum Computation using Qiskit](#)

Interactive online advanced text on quantum algorithms and computation based on Qiskit

[Qiskit YouTube Channel](#)

- [Qiskit Foundations](#) – Coding with Qiskit Season 1
- [Qiskit Algorithms](#) – Coding with Qiskit Season 2
- [Qiskit Live](#) – livestream of public lecture series
- [SuperPosition series](#) – explores how individuals became Qiskit developers
- [1 Minute Qiskit](#) – Qiskit tips and tricks