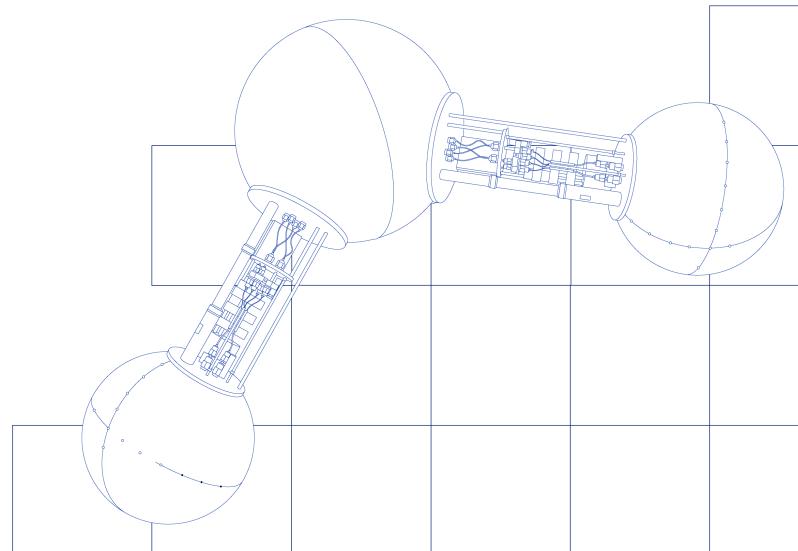


Attendee Guide

Early Access Summer School 2022: Quantum Simulations

June 20 – July 1

#QGSS2022



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IMPORTANT!

Please make sure and use [Google Chrome](#) for headache-free course access.

QUICKLINKS

Key Locations

[Discord Server](#)

[Lab Portal](#) [Live starting June 20]

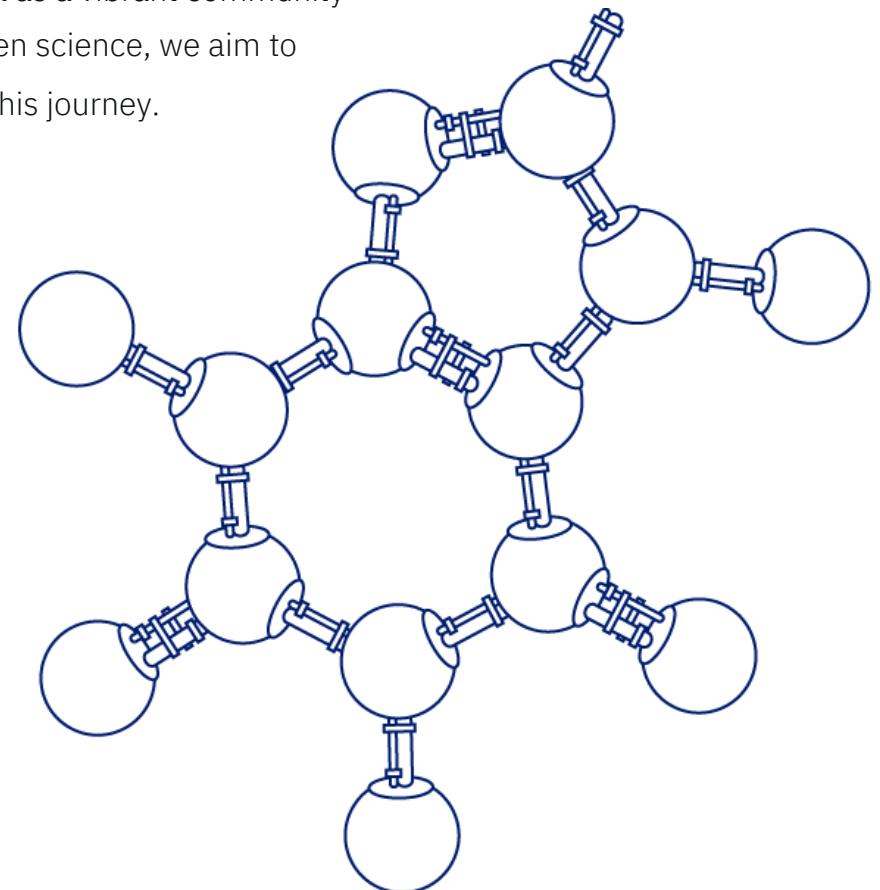
[Verification Form](#)

We appreciate your support in keeping this experience for registered attendees only, and welcome your feedback and suggestions for any improvement. Please do not share the lecture and lab materials outside the attendees of the Qiskit Global Summer School.

About the Summer School

Welcome to the third-annual Qiskit Global Summer School hosted by IBM Quantum, focused on Quantum Simulations. We are excited to have you join us for a 2-week dive into quantum computing through daily lectures and lab sessions, as well as a vibrant community set up for you to meet other students and collaborate together to solve problems. Through education and open science, we aim to build and shape a diverse, equitable, and inclusive quantum workforce. We're thrilled to have you join us on this journey.

Please read through this Attendee Guide to find answers about the structure, setup, agenda, and resources that accompany the Summer School. This is not a passive course - active participation is key to making it a success. Grab a notebook and a pen, and find your favorite chair. The Qiskit Global Summer School is just about here.



We appreciate your support in keeping this experience for registered attendees only, and welcome your feedback and suggestions for any improvement. Please do not share the lecture and lab materials outside the attendees of the Qiskit Global Summer School.

Resources

Pre-Requisites

Minimal prerequisites are required for the Qiskit Global Summer School. If you know how to multiply two matrices, and have some programming experience in Python, you are ready for the Summer School.

You can brush up on Python programming, before attending the lectures by using the Qiskit Textbook. To make the most out of these lectures, you may also consider looking through additional resources in the [Qiskit Global Summer School Syllabus](#).

[\[Qiskit Global Summer School Syllabus \]](#)

Additional Resources

Suggested readings will be [provided in Discord](#) & more resources are available online at [qiskit.org/learn!](#)

Quantum Computing

[\[Read Textbook \]](#)

Quantum Computing for the Quantum Curious
by Hughes C et al

[\[Read Textbook \]](#)

Learn Quantum Computing Using Qiskit
by IBM Quantum

[\[Join Course \]](#)

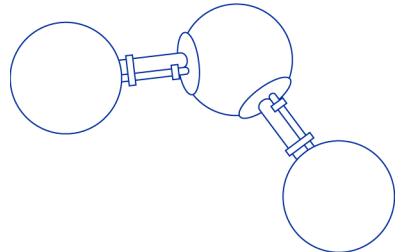
Introduction to Quantum Computing and Quantum Hardware
by IBM Quantum

[\[Buy Textbook \]](#)

Quantum Computation and Quantum Information
by Nielsen & Chuang

Lecturers & Lab Creators

Our expert speakers from around the world include industry leading researchers and developers in Quantum Computing – representing the pioneering work of IBM and IBM Quantum.



Olivia Lanes

**North American Lead, Qiskit &
IBM Quantum Community**



Maria Violaris

IBM Quantum Advocate Intern



Jeffrey Cohn

IBM Quantum Researcher



Zlatko Minev

IBM Quantum Physicist

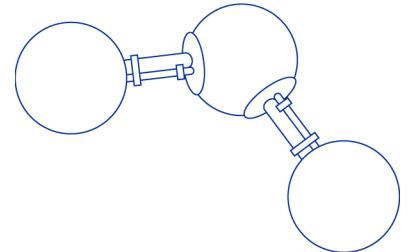


Panos Barkoutsos

IBM Quantum Researcher

Lecturers & Lab Creators

Our expert speakers from around the world include industry leading researchers and developers in Quantum Computing – representing the pioneering work of IBM and IBM Quantum.



Yukio Kawashima
IBM Quantum Researcher



Ieva Liepuoniute
IBM Quantum Researcher



Alexander Miessen
IBM Quantum Researcher



Marcel Pfaffhauser
Workforce Development
Advocate and Educator,
IBM Quantum



Mirko Amico
Software Developer,
Qiskit Research

Qiskit | Global Summer School 2022

Week 1 Schedule

JUNE 20

Monday

9:00 AM EDT

Early Access Summer School Welcome & Kickoff

11:00 AM EDT

History of Quantum Computing and Motivation for Quantum Simulation - Part 1

Speaker: Olivia Lanes

1:00 PM EDT

History of Quantum Computing and Motivation for Quantum Simulation - Part 2

Speaker: Olivia Lanes

3:00 PM EDT

Live Q&A Session with Olivia Lanes

JUNE 21

Tuesday

9:00 AM EDT

Introduction to Linear Algebra, Prerequisite Mathematics, and Circuit Composition - Part 1

Speaker: Maria Violaris

11:00 AM EDT

Introduction to Linear Algebra, Prerequisite Mathematics, and Circuit Composition – Part2

Speaker: Maria Violaris

1:00 PM EDT

Live Q&A Session with Maria Violaris

JUNE 22

Wednesday

9:00 AM EDT

Hamiltonian Time Evolution - Part 1

Speaker: Maria Violaris

11:00 AM EDT

Hamiltonian Time Evolution - Part 2

Speaker: Maria Violaris

1:00 PM EDT

Live Q&A Session with Maria Violaris

2:00 PM EDT

Lab 1: Introduction to Circuit Composition and Cost
Marcel Pfaffhauser

JUNE 23

Thursday

9:00 AM EDT

Simulation Problems - Part 1

Speaker: Jeffrey Cohn

11:00 AM EDT

Simulation Problems - Part 2

Speaker: Jeffrey Cohn

1:00 PM EDT

Live Q&A Session with Jeffrey Cohn

3:00 PM EDT

Lab 2: Advanced Circuits
Mirko Amico

JUNE 24

Friday

9:00 AM EDT

Noisy Real Hardware - Noise in Quantum Computers - Part 1

Speaker: Zlatko Minev

11:00 AM EDT

Noisy Real Hardware - Noise in Quantum Computers - Part 2

Speaker: Zlatko Minev

1:30 PM EDT

Live Q&A Session with Zlatko Minev

Week 2 Schedule

JUNE 27

Monday

9:00 AM EDT

Broad Overview of Quantum Chemistry Simulation and Why it is a Challenge - Part 1
Speaker: Panos Barkoutsos

11:00 AM EDT

Broad Overview of Quantum Chemistry Simulation and Why it is a Challenge - Part 2
Speaker: Panos Barkoutsos

1:00 PM EDT

Live Q&A Session with Panos Barkoutsos

2:30 PM EDT

Lab 3: Quantum Noise
Mirko Amico

JUNE 28

Tuesday

9:00 AM EDT

Methods for Quantum Simulation - Part 1
Speaker: Yukio Kawashima

11:00 AM EDT

Methods for Quantum Simulation - Part 2
Speaker: Yukio Kawashima

1:00 PM EDT

Live Q&A Session with Yukio Kawashima

JUNE 29

Wednesday

9:00 AM EDT

Quantum Static Simulation
Speaker: Ieva Liepuoniute

11:00 AM EDT

Live Q&A Session with Ieva Liepuoniute

JUNE 30

Thursday

9:00 AM EDT

Quantum Dynamics - Part 1
Speaker: Alexander Miessen

11:00 AM EDT

Quantum Dynamics - Part 2
Speaker: Alexander Miessen

JULY 1

Friday

11:00 AM EDT

Commencement

Labs & Lectures

The summer school is made up of a total of 17 lectures, 3 lab sessions & application exercises, in addition to the daily Live Q&A Sessions.

Participation and completion of all labs and lectures are required in order to receive a certificate of completion from the Summer School, with the optional activities available to enhance your Summer School experience.

The schedule is not fixed, aside from final lab submission deadlines, and **all students can participate on the schedule that works best for them.** Lectures and lab sessions will all be recorded and available for live participation and post viewing, as well as the daily Q&A sessions.

Students should anticipate a minimum time commitment of 30 hours for the full Summer School, but we recommend planning on 40 hours of participation, with additional time for discussion and collaboration with other students.

Lectures

Duration: ~60 minutes

- Live Q&A will be hosted each day following the two-part lecture - questions can be asked live or [submitted on Discord](#)
- Be an active audience member - take notes along with the lecturers!

Labs

Duration: ~45 minutes

- [Lab portal](#) will be live on June 20th.
- Demonstrating lecture material with [hands-on exercises](#) on quantum programming using Qiskit
- Pre-recorded session is accompanied by problem set exercise

Lab Access & Information

Labs will be available in the IBM Quantum platform starting June 20.

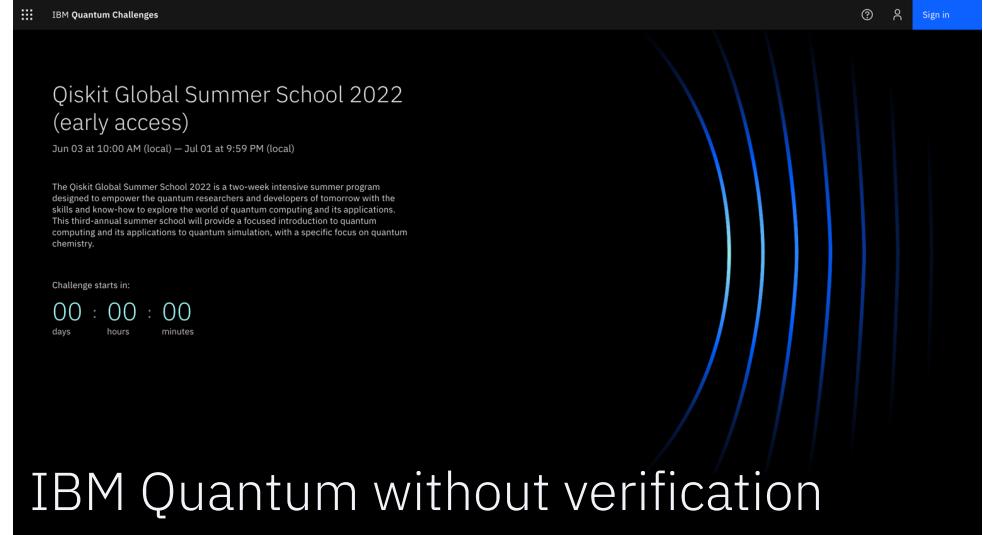
Each lab is made up of eight or more exercises, with an estimated time to complete of 1-2 hours per lab. Exploratory exercises are not graded, but all others count towards your final grade.

To achieve a passing grade, **a minimum score of 75% or more is required (23/31 total exercises).**

Access & Verification

In order to access the labs, [all students must complete this verification form](#). This form will also confirm your status as a student in the Summer School. Within 24 hours, you will have full access to the lab portal and all related Discord channels.

Make sure and log out of your account and re-login, refreshing your browser, once you are verified. This is a required final step in order to have access to lab exercises.

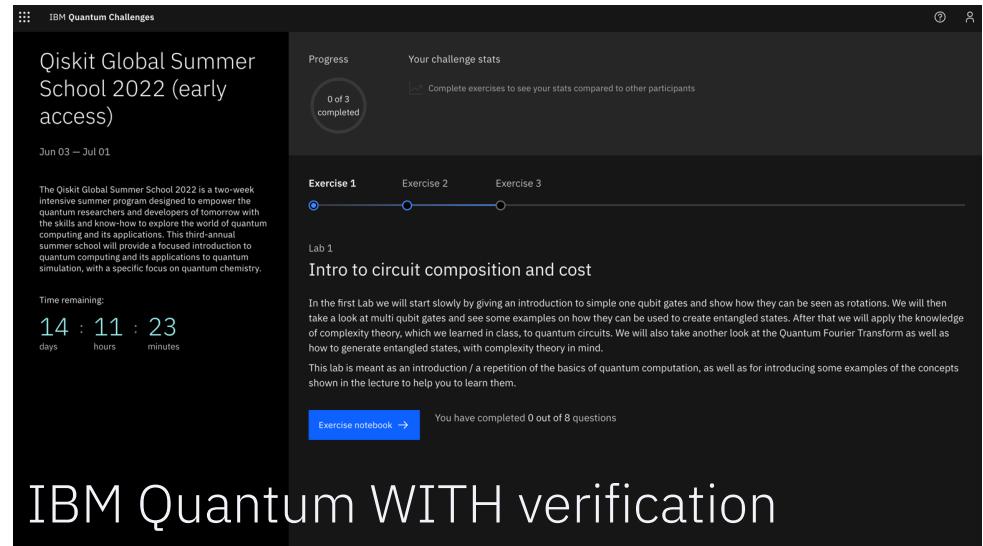


Qiskit Global Summer School 2022 (early access)
Jun 03 at 10:00 AM (local) – Jul 01 at 9:59 PM (local)

The Qiskit Global Summer School 2022 is a two-week intensive summer program designed to empower the quantum researchers and developers of tomorrow with the skills and know-how to explore the world of quantum computing and its applications. This third-annual summer school will provide a focused introduction to quantum computing and its applications to quantum simulation, with a specific focus on quantum chemistry.

Challenge starts in:
00 : 00 : 00
days hours minutes

IBM Quantum without verification



Qiskit Global Summer School 2022 (early access)
Jun 03 – Jul 01

The Qiskit Global Summer School 2022 is a two-week intensive summer program designed to empower the quantum researchers and developers of tomorrow with the skills and know-how to explore the world of quantum computing and its applications. This third-annual summer school will provide a focused introduction to quantum computing and its applications to quantum simulation, with a specific focus on quantum chemistry.

Time remaining:
14 : 11 : 23
days hours minutes

Progress: 0 of 3 completed

Your challenge stats: Complete exercises to see your stats compared to other participants

Exercise 1 Exercise 2 Exercise 3

Lab 1
Intro to circuit composition and cost

In the first Lab we will start slowly by giving an introduction to simple one qubit gates and show how they can be seen as rotations. We will then take a look at multi qubit gates and see some examples on how they can be used to create entangled states. After that we will apply the knowledge of complexity theory, which we learned in class, to quantum circuits. We will also take another look at the Quantum Fourier Transform as well as how to generate entangled states, with complexity theory in mind.

This lab is meant as an introduction / a repetition of the basics of quantum computation, as well as for introducing some examples of the concepts shown in the lecture to help you to learn them.

Exercise notebook → You have completed 0 out of 8 questions

IBM Quantum WITH verification

As you join the Discord and Summer School...

Everyone will need to complete a quick verification step prior to getting full access to the Summer School Discord and lab exercises. It just takes three simple steps, and a dash of patience!

STEP 1

[\[Join Discord \]](#)

STEP 2 (as needed)

[\[Create IBM Quantum Account \]](#)

STEP 3

[\[Submit Verification \]](#)

And that's it!!!

Verification may take up to 24 hours – make sure and submit your information immediately upon joining the Discord server! Let us know in [#verification-support](#) if you run into any issues or require support.

Certificates

Lab work will be assigned throughout the Summer School as Jupyter notebook exercises. The notebooks must be completed and submitted following the Summer School **no later than Wednesday, July 6th (11:59 PM EDT)** with a **cumulative average score of 75% or higher** in order to receive a certificate.

IMPORTANT NOTE! You have the option to submit your notebook multiple times - only the highest score will contribute to your cumulative average.

Support & Collaboration

A channel will be available that will be filled with IBMers and mentors to answer questions throughout the weekdays of the Summer School course. Students are also strongly recommended to set up or join a “study group” to foster group-work and building connections throughout the school.

Labs will not be reviewed during the lecture(s), so take the time to sit down and review your work. For the best experience, work with your study group to view lab session content & application exercise.

Pass/Fail Certification

You cannot reduce your score by submitting multiple times - only the highest score is kept. All lab work exercises must be completed and received no later than 11:59 PM EDT on Wednesday, July 6th.

Students must achieve cumulative/average 75% across notebook submissions to get a certificate.

Discord will be used for all Summer School event communications, updates, study groups, lab work, Q&A, and more.

Study Groups will form and collaborate in the text/video channel places, and mentors will be able to see active groups and join to provide lab guidance and support. Students will be enabled to “raise their hand” to get support in their group - notifying mentors direct!

CORE Channels

#welcome
Get started here for first steps when you join the server.

#announcements
Follow this channel for all live announcements and updates.

#conduct-guidelines
Review the IBM Quantum Community Code of Conduct and other guidelines - thank you for supporting an inclusive and welcoming community throughout the course!

ESSENTIAL Commands

!schedule
Get the schedule for the course.

!gethelp
Get helpful tips for when you need help but aren't sure where to go.

!raisehand
Let our mentors and support know directly for insights in ongoing conversations.

!channels
Get a list of easily-linked server channels and resources.

IBM Quantum Community Code of Conduct

In our collective mission to continue to promote and encourage an inclusive and welcoming global quantum community, The IBM Quantum Community Code of Conduct is available for download and review [here](#).

We appreciate everyone's support in this mission, and ask that any observed code of conduct violations or inappropriate behavior are reported [here](#).

[\[Read Code of Conduct \]](#)

Live Moderation & Incident Reporting

In Discord, you can also submit anonymous Code of Conduct violations or offensive/inappropriate content using this command in any channel (we recommend #sandbox!):

/report [message]

This will send a report to the admins. It will also display a confirmation message that the report was sent which will be visible only to you.

Make sure to include a link to the reported message (Select the message you are reporting and "Copy Message Link" for admins to review.

FAQ

Will the lectures and labs be recorded? Is live-participation required?

Yes, all lectures, labs, and Q&As will be recorded! You can join live, or watch the content on-demand.

Will the Summer School content be available later in the year?

As in past years, all Summer School content and materials will be re-packaged and provided as a textbook module in the Qiskit Textbook to use in classrooms even after the Summer School concludes.

How many students are in the Summer School?

There are 5k students at the Qiskit Global Summer School.

Can my friend/student/colleague be added to the Summer School or Discord?

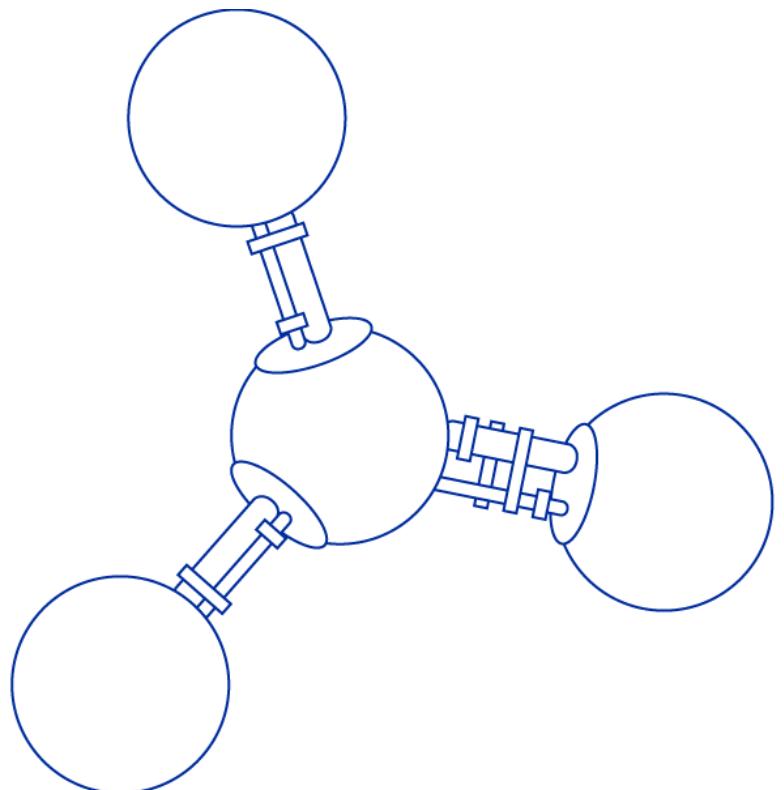
No.

Can I download/share this content?

Not yet - the team will share all of this (and more!) as an update to the Qiskit Textbook later this year.

IMPORTANT!

Please make sure and use [Google Chrome](#) for headache-free course access.



We are here to help!
Please follow these
guidelines to ensure
the most timely and
efficient support, and
don't hesitate to ask
any questions!

- Reach out in designated channel(s)
- Allow 1 business day for support
- Avoid multiple requests/spam
- Avoid Direct Message or emails
- Avoid submitting same request in multiple locations

Discord

#general-support

For any general support questions or support requests.

E-mail

qiskit.events@us.ibm.com

Requests involving personal or sensitive information may have longer reply times.

Let's Get Started!

1

[Join the Discord](#)

2

[Verify Yourself](#)

3

[Join Kickoff](#)