

# QuREKA-lab

## QuREKA Lab

QuREKA Lab is a **dedicated quantum algorithm development environment** established by creating a Quantum Server.

- **Server-Based Environment:** You can access the lab by clicking the **[Open]** button in the Quantum Server list. It provides a development interface powered by JupyterLab.
- **Customized Specifications:** The development environment is configured precisely according to the hardware specifications (CPU, RAM, GPU, and Storage) you selected during the Quantum Server creation step.
- **Consistent Development Experience:** Based on high-performance computing resources allocated according to your subscription plan, you can reliably perform complex quantum simulations and algorithm designs.

- [Notebook](#)
- [Quantum Composer](#)

# Notebook

QuREKA Lab provides a powerful Python development environment based on JupyterLab, supporting an efficient workflow through dedicated extensions and AI-powered tools optimized for quantum algorithm development.

## 1. Jupyter Notebook Environment

- **Python-Based Development:** Utilize standard Python libraries and quantum computing frameworks within a JupyterLab-based environment.
- **Instant Start:** Create new Jupyter Notebook files and begin development immediately.
- **Sample Files Provided: Sample Notebooks** containing example code for major quantum algorithms are provided by default to assist with learning and practice.

## 2. Dedicated Extensions and Support Tools

QuREKA Lab places optimized tools in the left and right sidebars for development convenience.

- **AI Assistant (Left Panel):** Provides **AI-powered assistance** for quantum algorithm development and coding. You can easily access the conversational assistant from the left sidebar to receive support for complex implementation processes.

 AI 

- **Right Panel Extensions:**

- **Task (Job Monitoring):** Monitor the real-time status and success/failure of your submitted quantum jobs.



- **Resource (Resource Information):** View a list of available QPUs and simulators along with their detailed specifications.



- **Workspace (Workspace Information):** Check current workspace details and your real-time credit balance.



# Quantum Composer

Quantum Composer is a **GUI-based quantum circuit design tool** utilizing drag-and-drop functionality. It allows users to intuitively construct circuits without complex coding and view simulation results in real-time.

 [Quantum Composer Screenshot.png](#)

## Key Features

- **Intuitive Design:** Build circuits by placing gates and efficiently manage logical structures using slicers and barriers.
- **Real-time Simulation:** Instantly updates output states and histograms for up to 16 qubits using GPU acceleration upon any design modification.
- **Visual Analysis:** Provides a clear understanding of qubit phase changes and dynamic state flows through graphics and animations.
- **Multi-Environment Support:** Convert designed circuits into over 10 different quantum languages, such as Qiskit and Cirq, or directly submit them to actual QPU and simulator resources.