Rapid Tune-up of the Novera QPU. Controlled. Rigetti's Novera QPU x Zurich Instruments' QCCS

Accelerate your quantum research by partnering with two leaders in the field of quantum computing and achieve high-fidelity gate operations thanks to the excellent signal properties from Zurich Instruments and leading QPU design from Rigetti. The Zurich Instruments QCCS offers all the hardware and software needed for quickly tuning up and controlling a QPU. The 9-qubit Novera QPU from Rigetti offers flexible, high-performance quantum computing solutions ideal for testbeds and data centers.

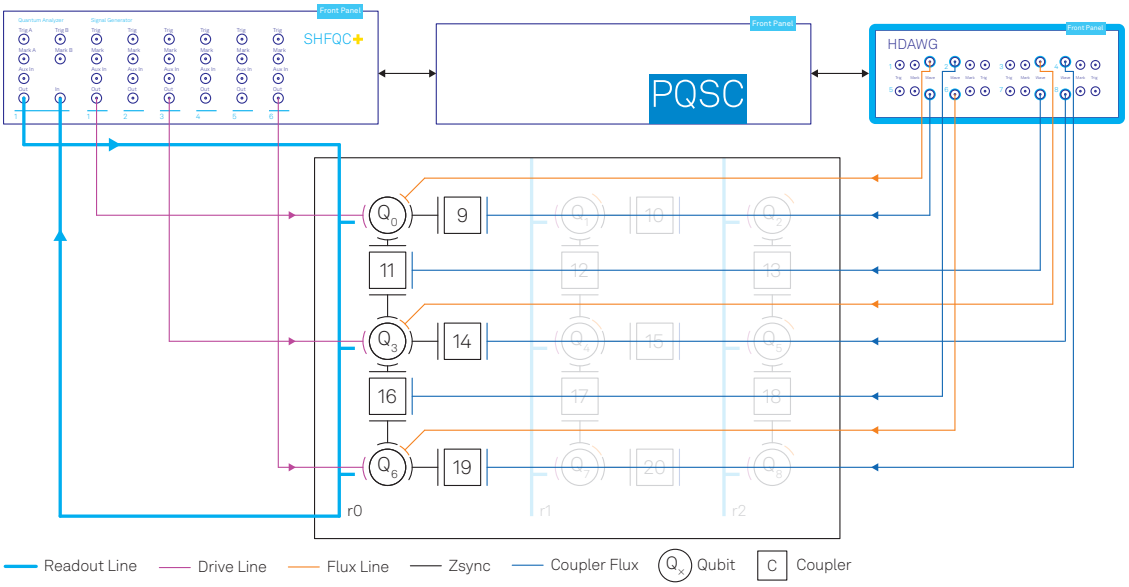

Figure 1. Example setup for control of a single Novera readout line and all relevant couplers. For control of a full Novera QPU we recommend three SHFQC4+s, three HDAWG8s, one PQSCs and one SHFPPC4s (for TWPA operation).

Your Benefits

- Use Zurich Instruments for out-of-the-box control of all elements of the Novera QPU without the need for mixer calibration
- Excellent analog signal properties – low noise, low crosstalk, high vertical resolution – enable high-fidelity gate operations of Novera's high-quality qubits
- Match filtering and superior signal quality for excellent single-shot readout fidelity (Fig. 2)
- Stress-free measurement platform with the Novera QPU: walk into the lab, hook up the control electronics, and start measuring

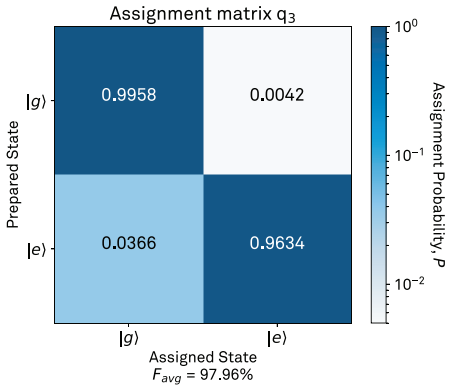

Figure 2. Single-shot readout fidelity of q_3 measured using a 2 µs readout pulse. The fidelity nearly reaches the limit set by the lifetime of the qubit T_1 = 45.9 µs.

iSWAP Made Easy

- Fully characterize a Novera readout line (T_1, T_2, readout fidelity, etc.) in < 15 minutes with our ready-made tune-up workflows
- Intuitive, gate-level design of experiments and fast waveform upload makes even 2-qubit gates like iSWAP (Fig. 3) easy to implement
- Sample-precise alignment between all control, flux, and readout lines thanks to the advanced feature sets of LabOne Q and the control electronics
- The Novera QPU maintains high performance in a variety of system configurations, for whatever your research needs are

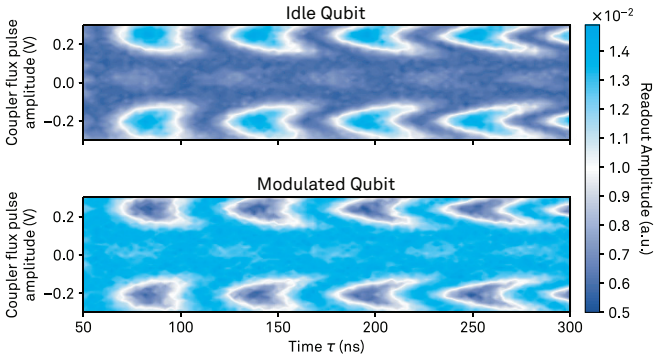

Figure 3. Energy exchange between q_3 (idle) and q_6 (modulated) measured after applying a π pulse to q_6. The iSWAP sequence used to implement the energy exchange is outline in [1]. The flux pulse on q_6 was modulated at 500 MHz.

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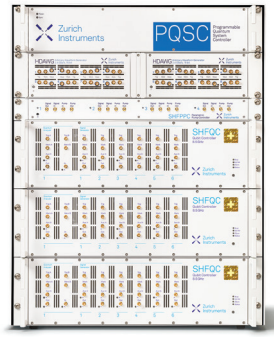
References

1 Parametric-Resonance Entangling Gates with a Tunable Coupler. E. Sete, et al., Phys. Rev. Applied 16, 024050 (2021)

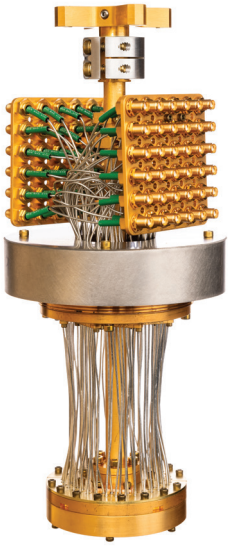
Product Highlights



Zurich Instruments
QCCS System Control

The combination of SHFQC+ Qubit Controller, HDAWG Arbitrary Waveform Generator, and PQSC Programmable Quantum System Controller provide all the control electronics you need for high-fidelity gates with your quantum computer.

All instruments are controlled by LabOne Q, an open-source, Python-based software framework offering both high- and low-level access. Achieve results quickly with extensive code examples, documentation, and support.



Rigetti
Novera QPU

Superior performance on a square lattice of qubits that enables high-fidelity two-qubit operations. Flexible system configuration and 24/7 system access means Novera is ready to help you tackle your biggest quantum computing challenges.

Meet Our Experts

Every member of our Quantum Technology team has a PhD-level background in advanced scientific research, including quantum error correction, quantum sensing, quantum computing, and theory of quantum algorithms.

Transforming the Quantum Ecosystem

Rigetti
On a mission to build the world's most powerful computers

Rigetti Computing is an integrated systems company. We build quantum computers and the superconducting quantum processors that power them. Through our Quantum Cloud Services (QCS®) platform, our machines can be integrated into any public, private or hybrid cloud.

Zurich Instruments
Your Qubits. Controlled.

Zurich Instruments makes cutting-edge instruments for scientists and technologists who work in advanced laboratories and are passionate about phenomena often difficult to measure.

Novera QPU Partner Program
Streamlining your quantum journey

Novera QPU customers can work with Novera QPU partners to build a quantum computer powered by the Novera QPU that satisfies their system requirements and quantum computing research objectives.

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