Control stack tailored for your qubits

COLOR CENTERS

↔	Frequency range DC-18.5 GHz
	1 ns pulse shaping and resolution
	20 ps time tagging for APDs

![QBLOX]

Hardware for superior analog performance

Gapless playback for predictable and reliable signal output, crucial for phase-coherent operations.

Short, parameterized pulses with the industry's fastest parameter update rate of 4 ns.

Exceptional signal integrity, optimized for high SNR, high SFDR, and low phase noise.

Unrivaled time domain performance through short rise times and low ringing, enabling ultra-fast high-fidelity gates.

On-the-fly parametrization to seamlessly achieve long, complex pulse sequences, eliminating concerns over local waveform memory size.

QBLOX Scheduler

Software enabling instant results

High-speed, large-scale experimentation through FPGA-based multi-dimensional real-time loops.

An extensive applications toolkit with plug-and-play qubit tune-up routines and the base for building advanced measurements.

Tighter integration with Qblox Instruments: Assembly-level software for advanced control and custom compilers.

Designed to be easily integrated with higher-level, automated calibration platforms.

Live Photon Counter Monitoring via an Intuitive GUI: Track your color center signal and rapidly assist in aligning the optical path with real-time control over laser parameters.

Solution for high-fidelit

Single-qubit gates

Drive high-fidelity MW transitions through superior SNR and exceptionally clean analogue signal generation.

Run qubit calibration routine, such as $g^2(\tau)$, ODMR, and coherent measurements in a parameterized fashion

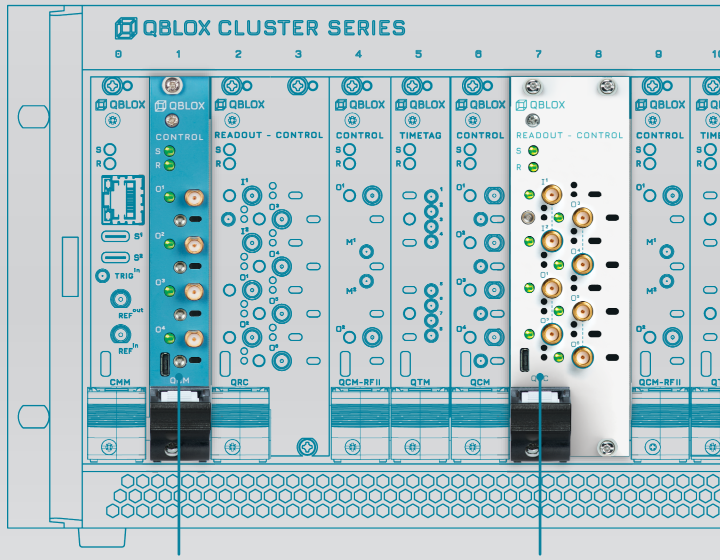
Maximize PL contrast and throughput through multi-tone excitation by multiplexing up to eight frequencies onto a single output channel, enabling simultaneous coverage of all hyperfine splittings.

Benchmark qubit performance via single-qubit randomized benchmarking or gate-set tomography.

QCM-RF II
2 - 18.5 GHz

QCM
0-400MHz

QRC
100 MHz - 10 GHz



Optimal qu

Measure the color center spin state via the high-resolution time tagger, enabling both simple photon counting and advanced time-resolved photoluminescence.

Ultra-low latency feedback based on photon count or time tag enables adaptive and conditional measurements, dynamically adjusting sequences based on real-time quantum state detection.

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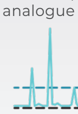


QT

ty quantum operations

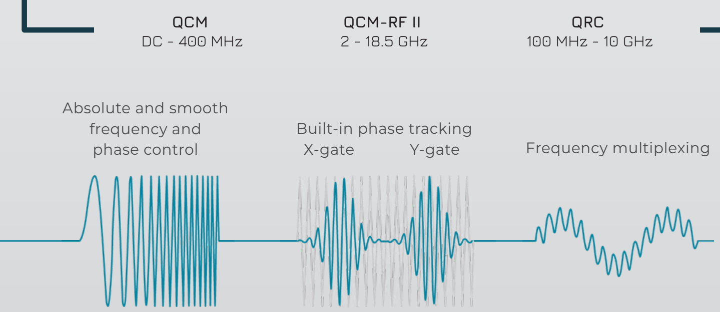
Two-qubit gates

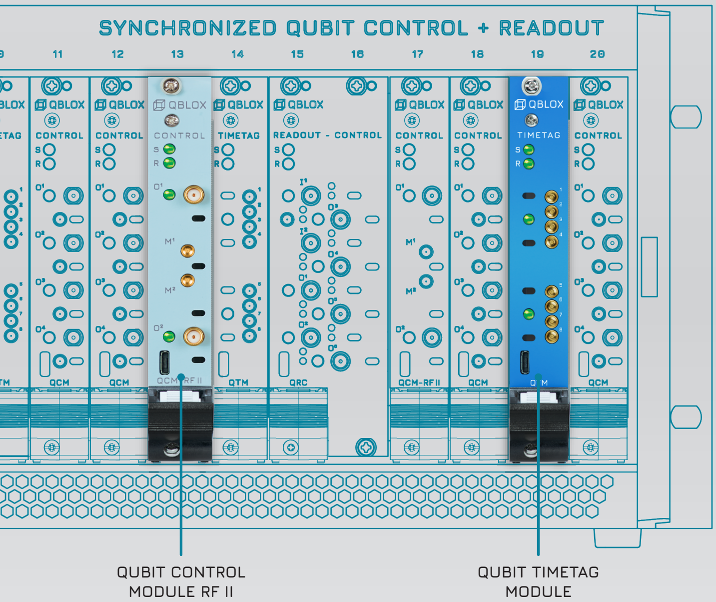
Ensure perfect synchronization and control across your system with phase-coherent operation over multiple channels, enabling seamless multi-qubit gates.

Enables driving multiple qubits via a single antenna by outputting up to 8 tones per output channel.

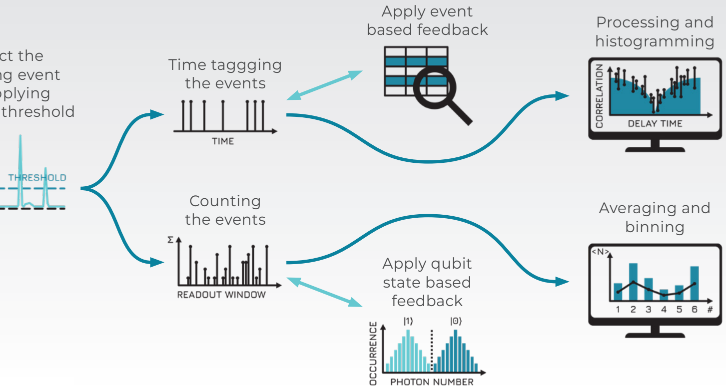
Assess qubit performance by using either two-qubit randomized benchmarking or gate-set tomography.

Facilitates deterministic quantum operations, including heralded entanglement and charge-state control, through the integration of high-speed QTM time-tagging and low-latency feedback loops.





bit readout



TM

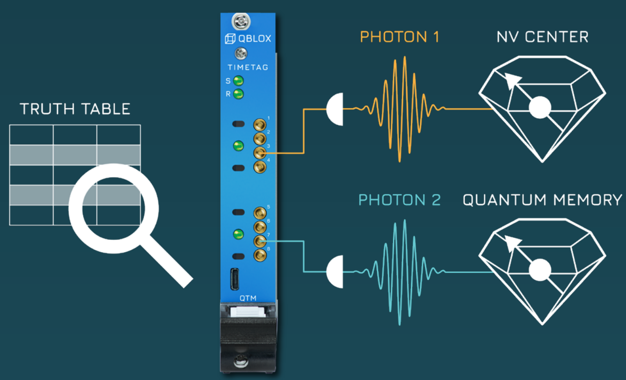
Precision time tagging of photon events

Ultra-High Time Resolution: Capture photon arrival times with 20 ps resolution.

Flexible I/O for Complex Setups: Features 8 highly configurable digital channels that can be dynamically set as inputs or outputs.

Internal truth table: execute high-speed, multi-channel coincidence counting, essential for correlation measurements such as Bell state measurements.

Seamless Integration: Fully integrates into the Cluster architecture, making photon count and time tag data available for ultra-low latency feedback and adaptive real-time control.



SYNQ — Automatic synchronization of all channels less than << 1 ns with ps-level jitter.

LINQ — Built-in scalable feedback infrastructure with all-to-all connectivity under 400 ns for conditional playback and branching.

Scalable Quantum Networks

Phase-Coherent Clusters: Lock multiple independent Qblox Clusters to a shared external reference clock to achieve deterministic, phase-stable control across distant quantum nodes.

Sub-Nanosecond Synchronization: Use SYNQ to align sequencers across Clusters with nanosecond precision, guaranteeing perfectly timed optical pulses, microwave control signals, and time-tagged measurements.

Heralded Photon Event Control: Leverage integrated time-tagging modules combined with the LINQ, unlocking low-latency feedback and deterministic entanglement operations.

Proven customer outcomes

"The QTM's performance is on par with state of the art time taggers available commercially, making it suitable for field deployment of quantum communication links. Two crucial advantages with respect to its competitors are the immediate reconfiguration of hardware, possible through a Python API, and its compatibility with Qblox's Cluster. This will be possible either with the inclusion of RF signal control of quantum memories and sources of entangled photons using Qblox's high-frequency modules, or with orchestration of the setup using Qblox's baseband modules. All with a single cluster."

TNO

Gustavo Castro do Amaral
Quantum Scientist

"We use the Qblox control stack in our lab to improve and simplify our quantum networking setups, to enable my students to get to results faster. By integrating RF and MW signal generation, coincidence detection, and timetagging, the Qblox Cluster allows me to replace 4 pieces of equipment with a single blue box. The Qblox team offers excellent support with very fast response times. This enables us to use the equipment in the best way for our experiments. I am excited to continue working together and push my state-of-the-art research with Qblox's integrated and easy-to-use solution."

QuTech

Ronald Hanson
Professor

"Switching to Qblox for our quantum memory control hardware has significantly improved our workflow. Its clear Python integration and fast compilation allow us to modify experimental parameters in real time. This has enabled us to replace manual optimization with a machine learning algorithm, saving time and making it easier to explore new ideas."

ICFO

Leo Feldmann
PhD Candidate

Scientific article highlights

Successful distribution of polarization-entangled photon pairs was demonstrated across a three-node architecture spanning 150 m of free space and 200 m of optical fiber. High-resolution time-tagging and synchronization from the Qubit Timetag Module (QTM) enabled accurate photon correlation measurements, allowing reliable entanglement verification despite high loss and low signal-to-noise conditions.

Gustavo C. Amaral et al., arXiv:2508.11023 (2025).

Want to accelerate your quantum computing research and development?

Prioritize your qubit research

High fidelity qubit control

Future ready system

Let's build quantum, together!

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