QUIX QUANTUM

Photonic Quantum Computing

Highest requirements on Integrated Photonics

Dr.-Ing. Stefan Hengesbach

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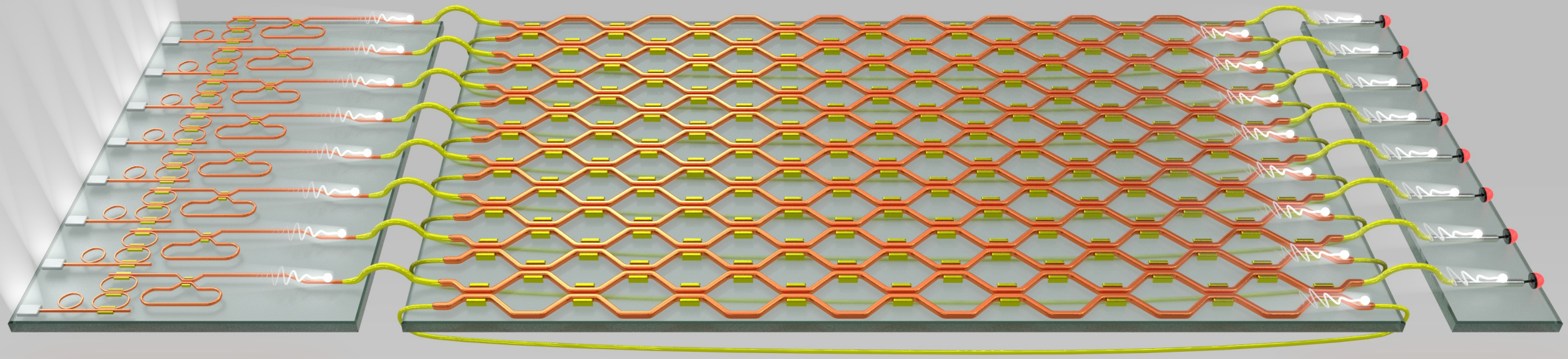
Design of a photonic quantum computer



Squeezed light generators

OR

Quantum Dots
(Single photons)

OR

Down conversion
(Single photons)

Processor

Feedback loops

Detectors SNSPD

AND

Photo diodes

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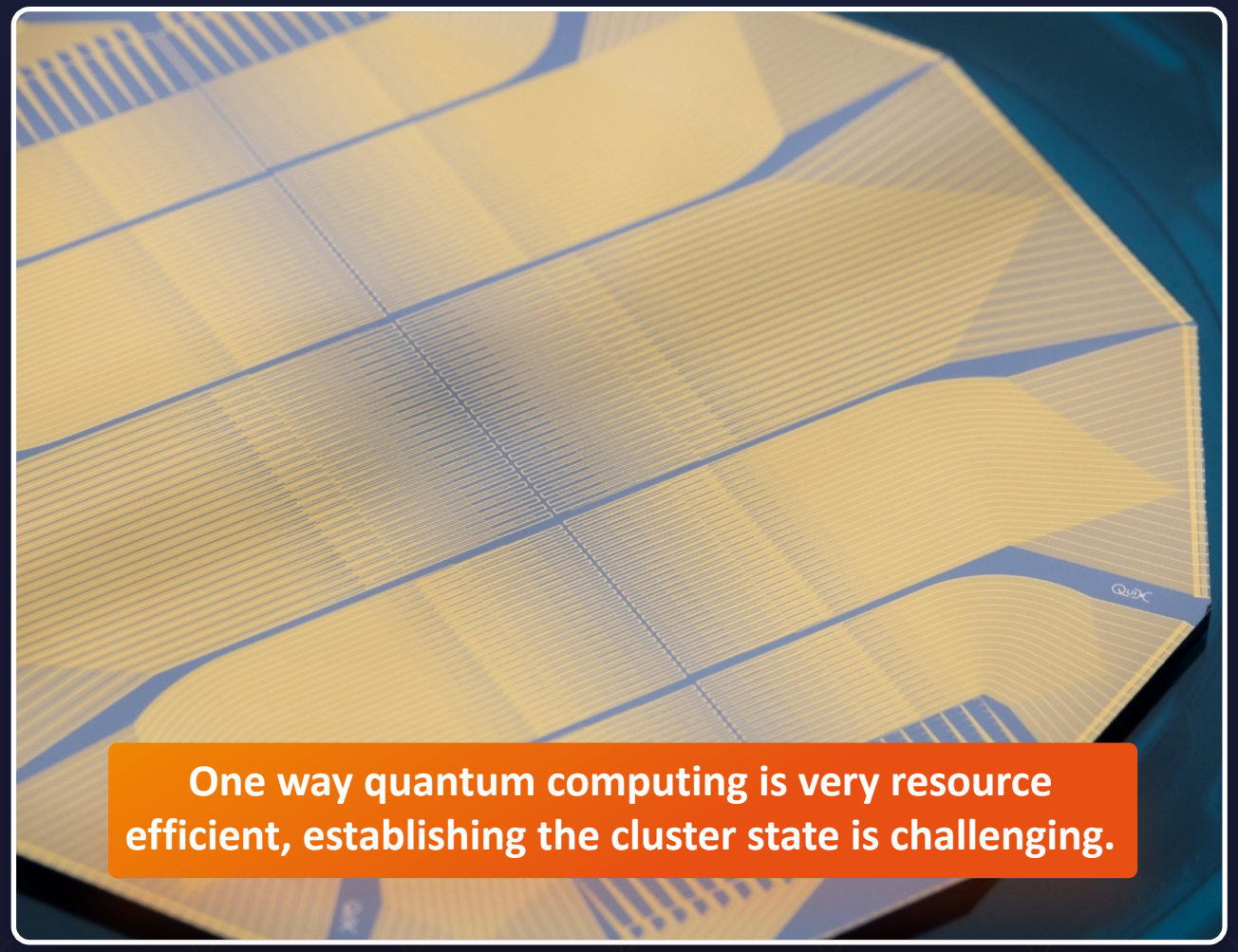
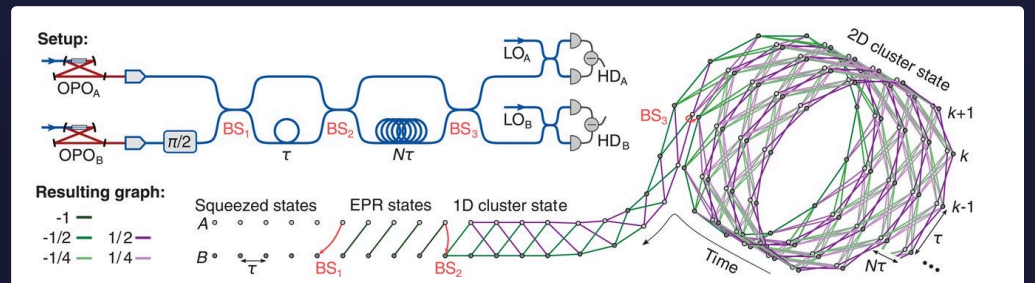
Measurement-Based Quantum Computing





Mikkel V. Larsen et al. „Deterministic generation of a two-dimensional cluster state.*Science***366**,369 372(2019). DOI:10.1126/science.aay4354

Workings of measurement based quantum computing:

1. Create a large entangled network of (photonic) qubits
2. Apply only single-qubit gates
3. Measure the qubits in selected basis

   Feedforward
4. Depending on measurement outcome change basis and measure another qubit

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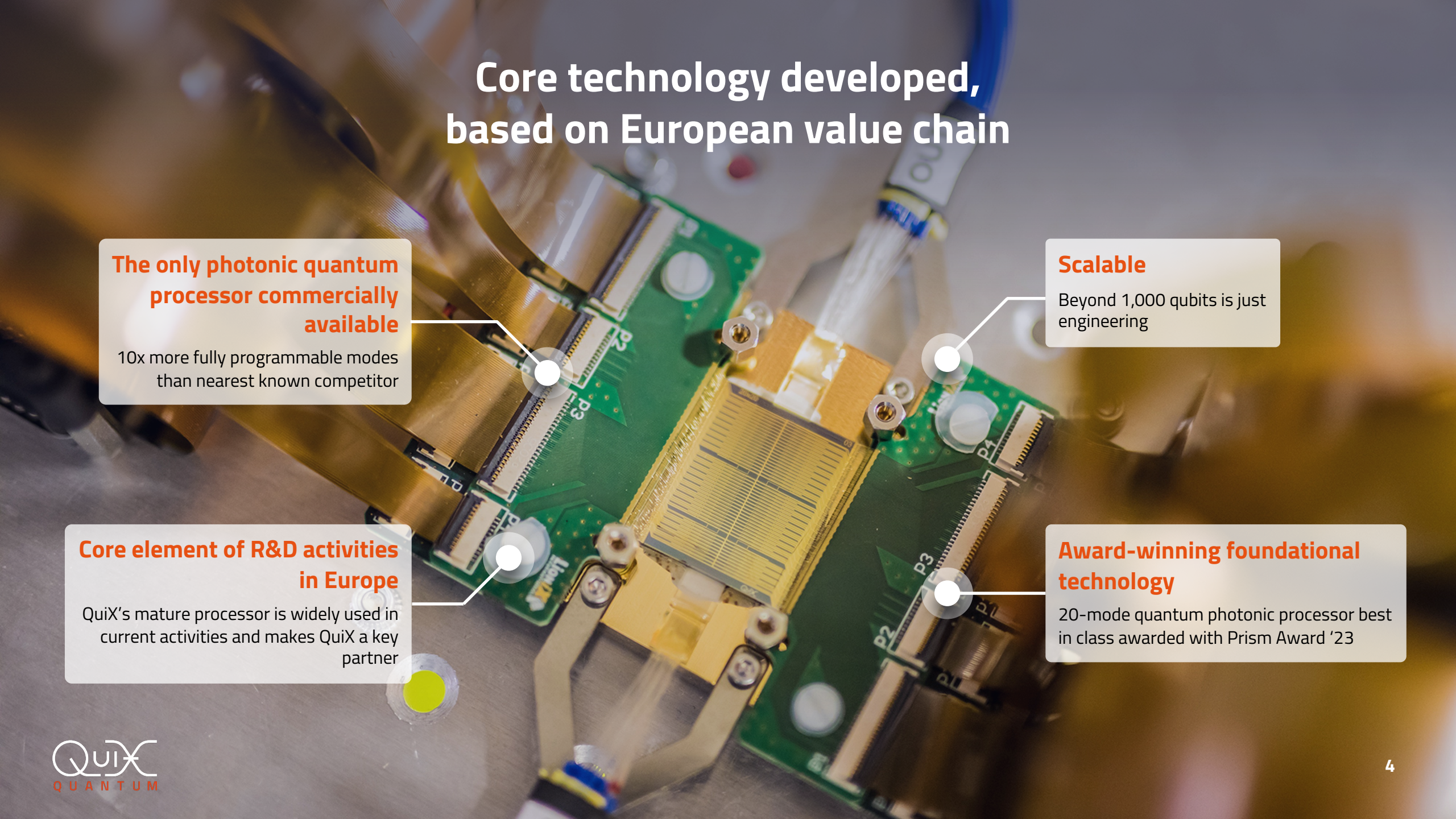
Core technology developed, based on European value chain



The only photonic quantum processor commercially available

10x more fully programmable modes than nearest known competitor

Scalable

Beyond 1,000 qubits is just engineering

Core element of R&D activities in Europe

QuiX's mature processor is widely used in current activities and makes QuiX a key partner

Award-winning foundational technology

20-mode quantum photonic processor best in class awarded with Prism Award '23

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Product Portfolio

	Processors	SP Quantum Computers	Universal Quantum Computers
Solutions for	R&D, quantum computing	Optimization, simulation	All industry sectors
Customers	Researchers, QC companies	Healthcare, finance, logistics	Full industry
Cloud access	No	Yes	Yes

- QuiX Quantum sells hardware and also cloud access as a service.
- QuiX Quantum sells OEM processors as well as full Quantum Computing systems.

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Photonics outperform existing quantum technologies

		Photonics	Superconductors	Ion Traps	Quantum Dots	Cold Atoms
Qubit Quality	Gate fidelity	**99.9%**	**99.9%**	**99.9%**	**99%**	**99%**
	Lifetime Qubit	∞	1 ms	50s	1 to 10 s	100 ns
Main Specifications	Temperature	Room temperature	Near OK	NA	Near OK	NA
	Integration	All-to-All	Nearest Neighbors	All-to-All	Nearest Neighbors	Nearest Neighbors
	Scalability	Horizontal	Horizontal	NA	NA	Horizontal
	Notable players	XANADU, PsiQuantum, ORCA, QUIX QUANTUM	IBM, IQM, Google	IONQ, Honeywell	Silicon Quantum Computing, intel	PASQAL, ColdQuanta

EPIC
EUROPEAN PHOTONICS INDUSTRY CONSORTIUM

What EPIC can do for us:

- Assembly and Packaging, especially fiber coupling
- Use cases for Quantum Photonic Processors and Computers
- High speed electronics esp. for electro-optic modulation
- SNSPDs and cryogenic cooling
- High speed and ultra-low loss modulators for PIC integration
- High quality components like fibers and connectors
- Inspection of PICs

+

What we can offer EPIC:

- QaaS: Quantum Computing as a service
- Components, such as the world leading quantum photonic processors for loan, sale or in-kind contribution to projects
- Activities in standardization of software stack
- On the roadmap: universal Quantum Processor and Universal Quantum Computer

Sales and strategic collaborations team:
Collaborations, tenders, projects, sales: sales@quixquantum.com

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Photonics has unique advantages for universal quantum computing

Low loss photonic chips

Sufficient transmission has been demonstrated. All relevant building blocks are developed.

Fast and low loss Phase shifters

There are several ways to implement phase shifters in crystals and in passive waveguides.

Beam sources

- Currently there are competing approaches
- Single Photons vs. Squeezed light

Control electronics & Detectors

- Multiple manufacturers
- Good progress through continuous engineering

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