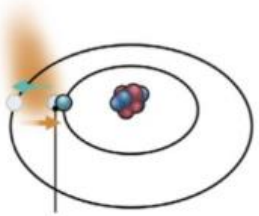
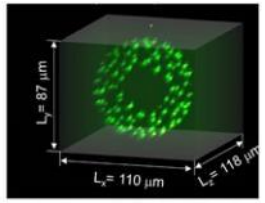
From Quantum Dots to Quantum Computers

Photonic Qubits

- Superconducting qubits

- Atomic and ionic qubits

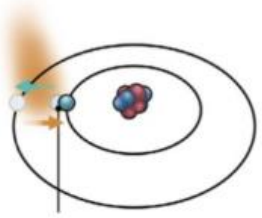


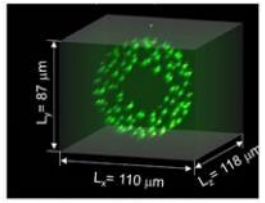


Photonic Qubits

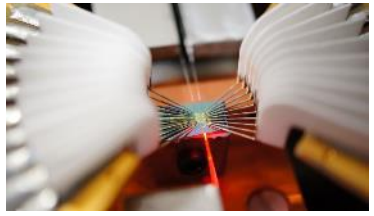
- Superconducting qubits

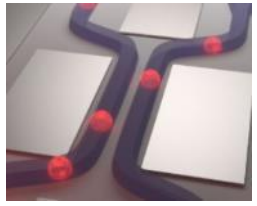
- Atomic and ionic qubits

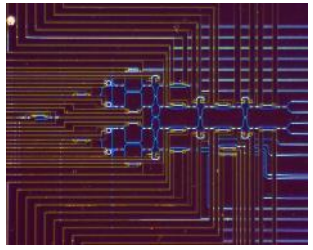




- Photonic qubits



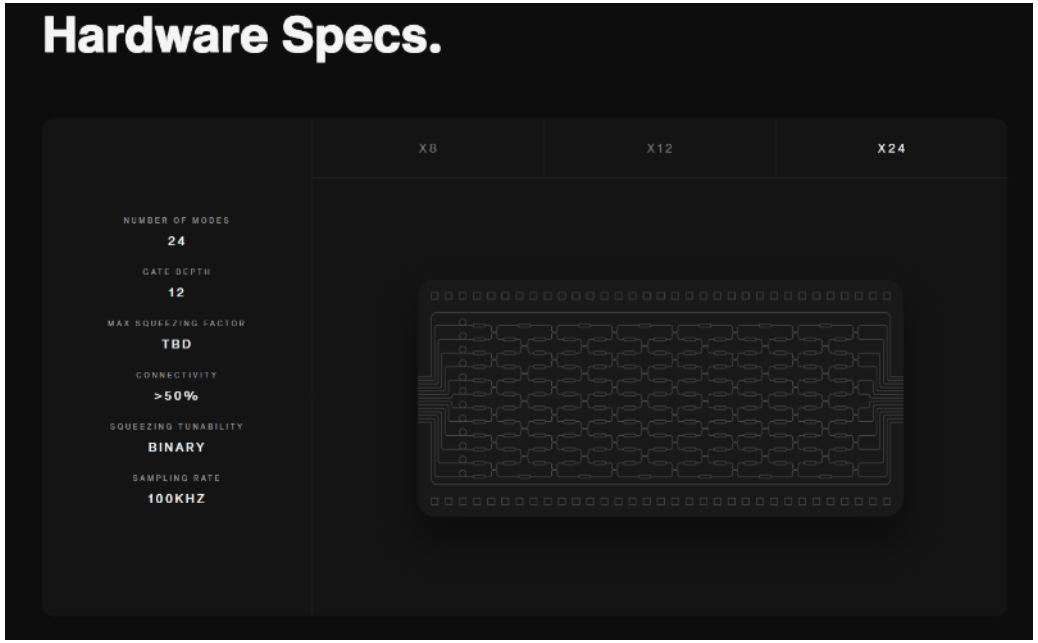


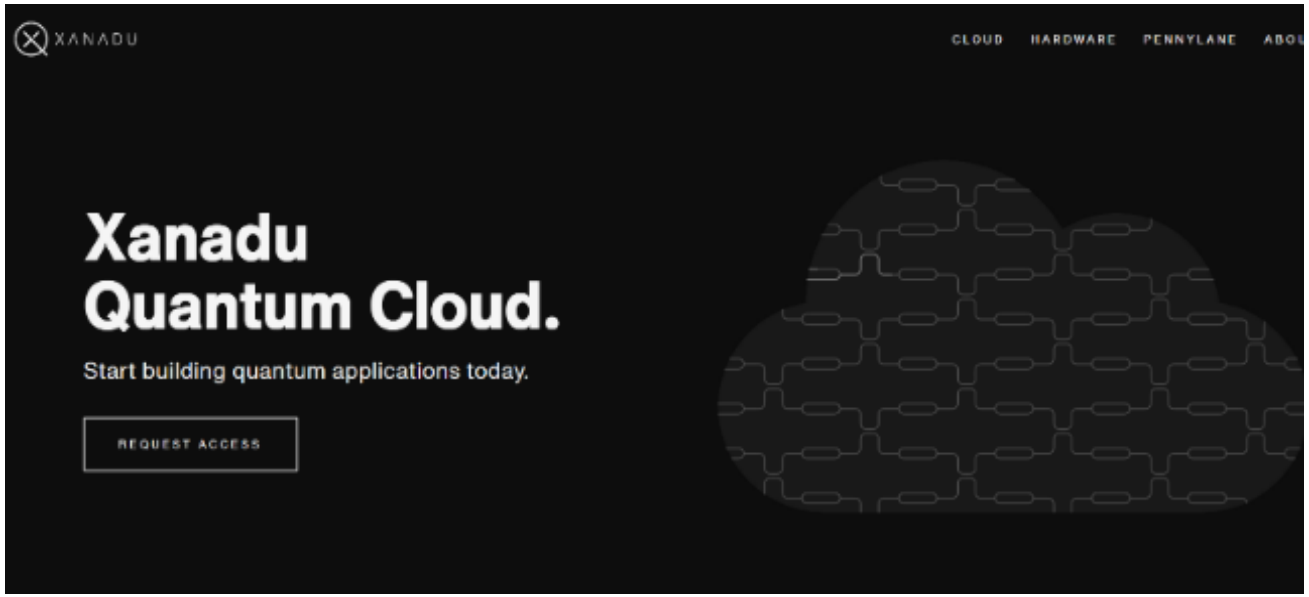


Quantum Cloud based on Photonic Platform

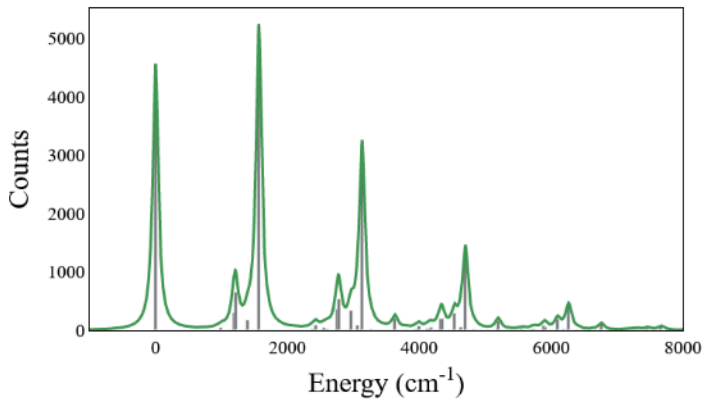
Graph Analytics
Classification
Vibronic Spectra

Qubits made from squeezed lights





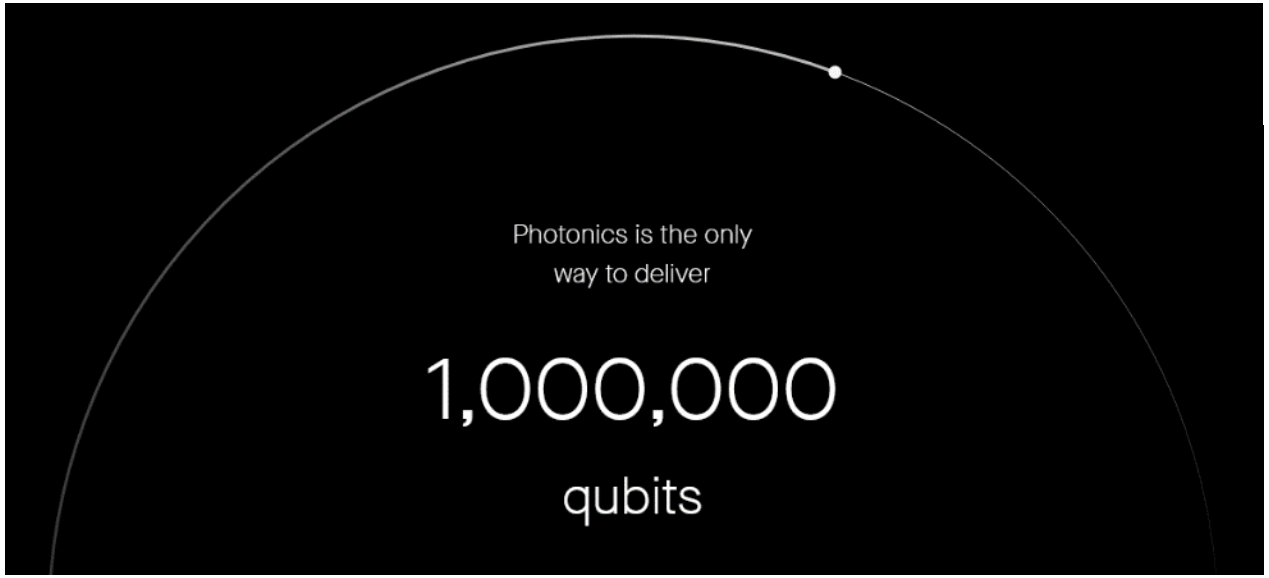

```
e = qchem.vibronic.energies(formic, w, wp)
plot.spectrum(e, xmin=-1000, xmax=8000)
```



PsiQ / Bristol strategy

Measurement based Quantum Computing (MBQC)

Longer-term strategy



Error protected qubits in a silicon photonic chip

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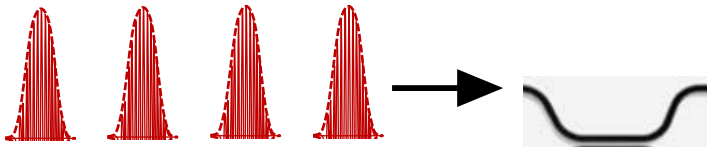
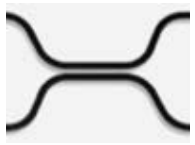
(Dated: September 18, 2020)

Single Photons

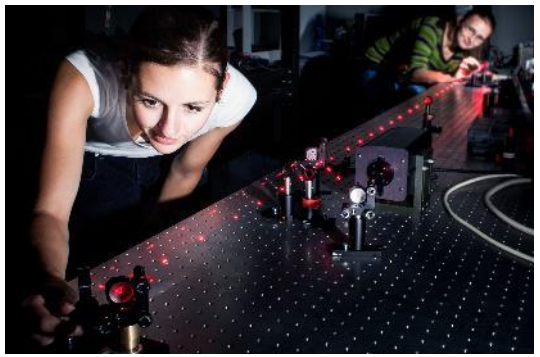




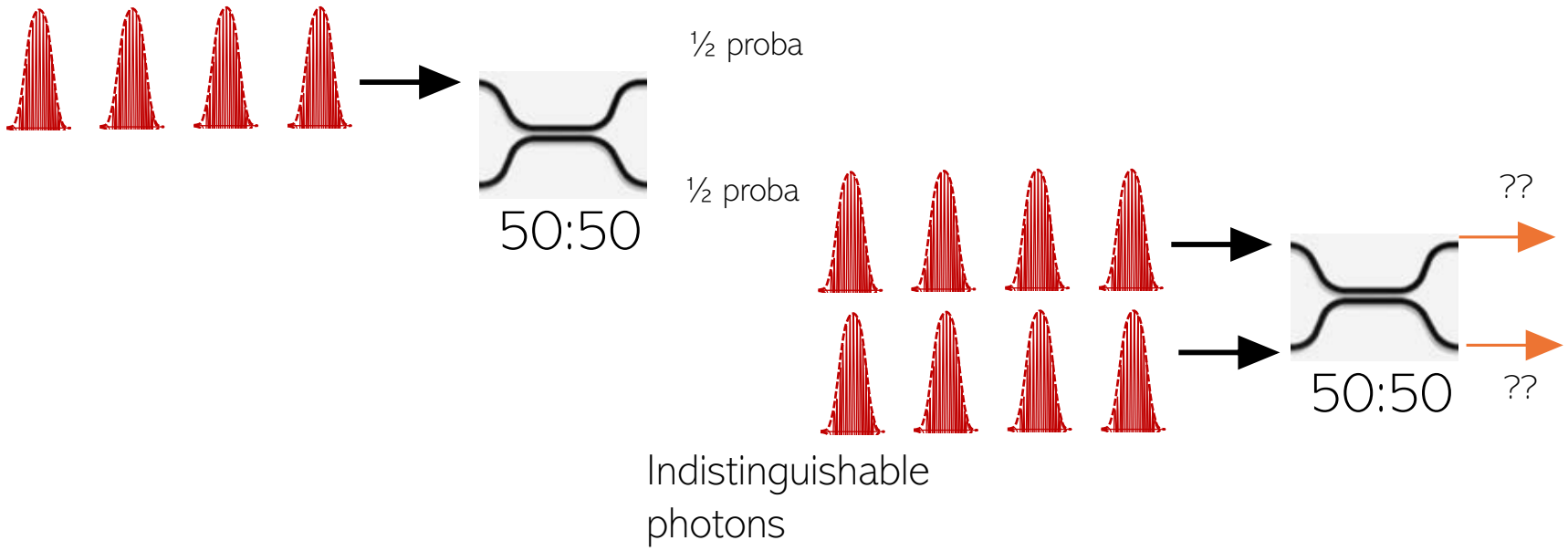
50:50

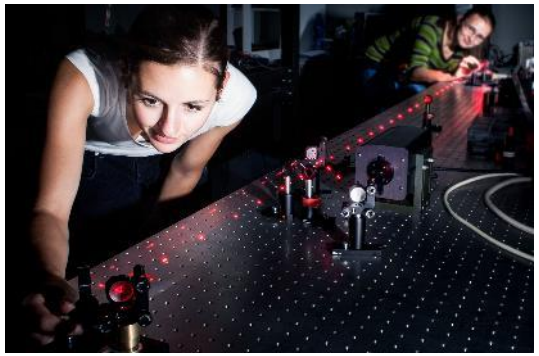
½ proba

½ proba

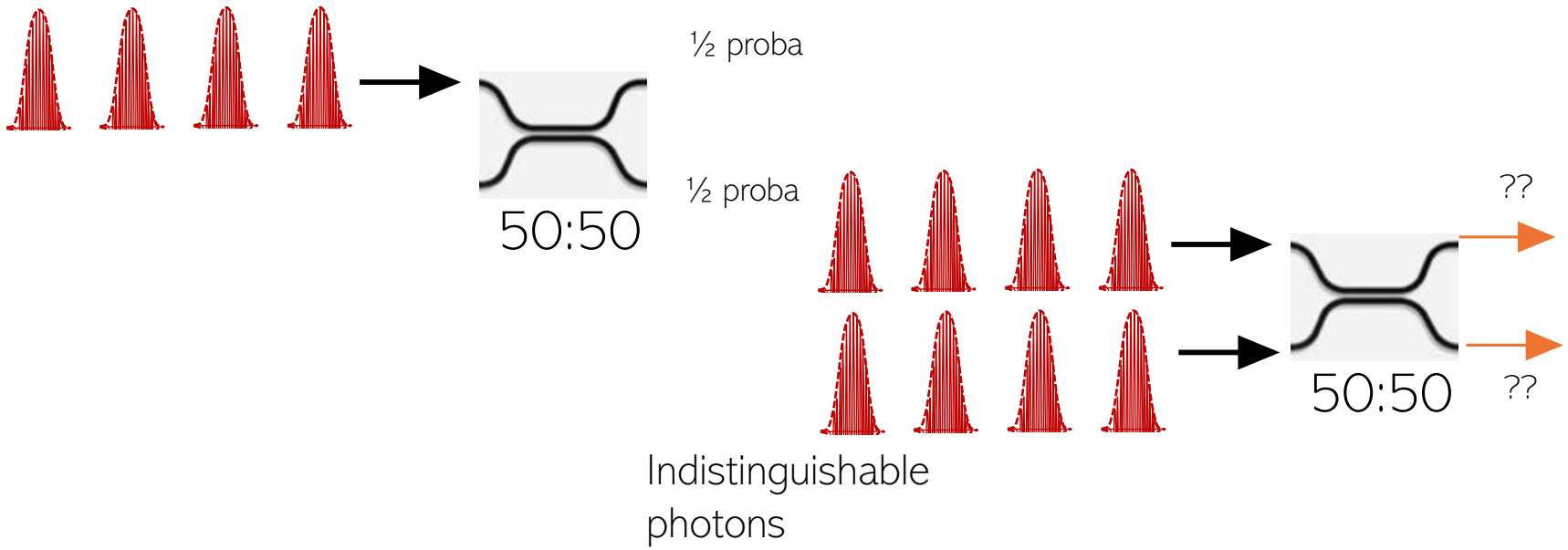


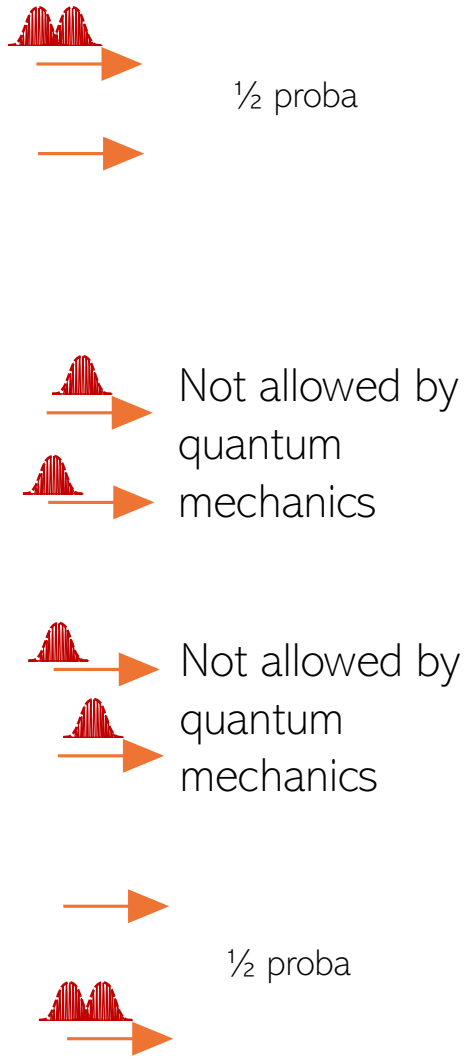
Single and Indistinguishable Photons

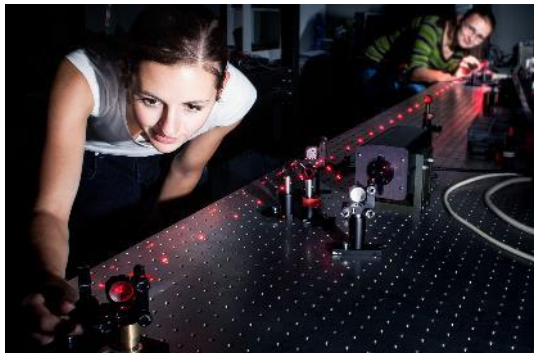




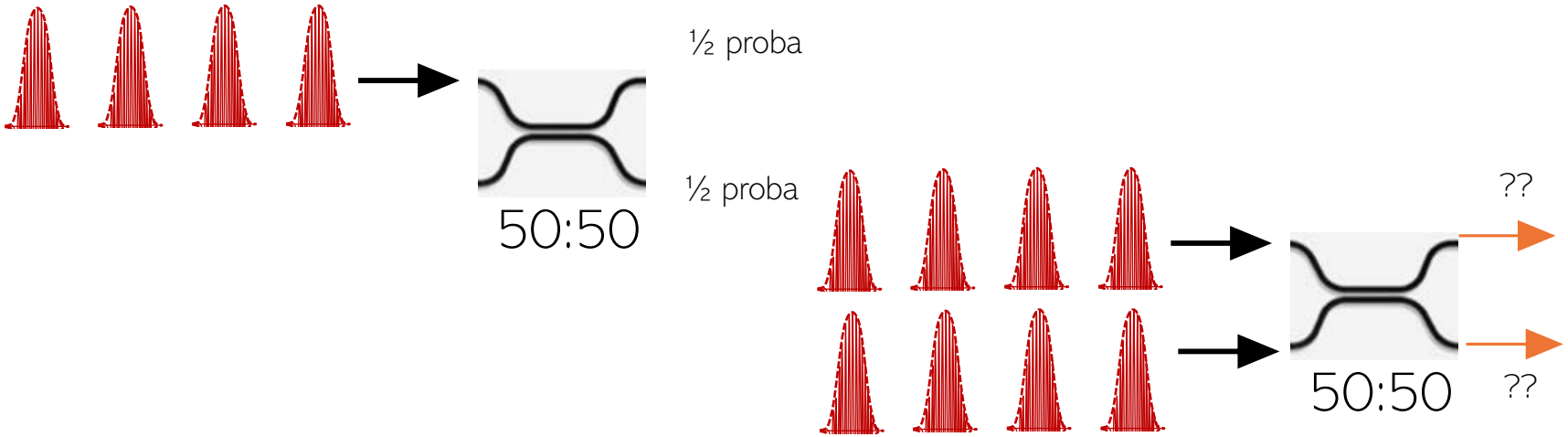
Single Photons



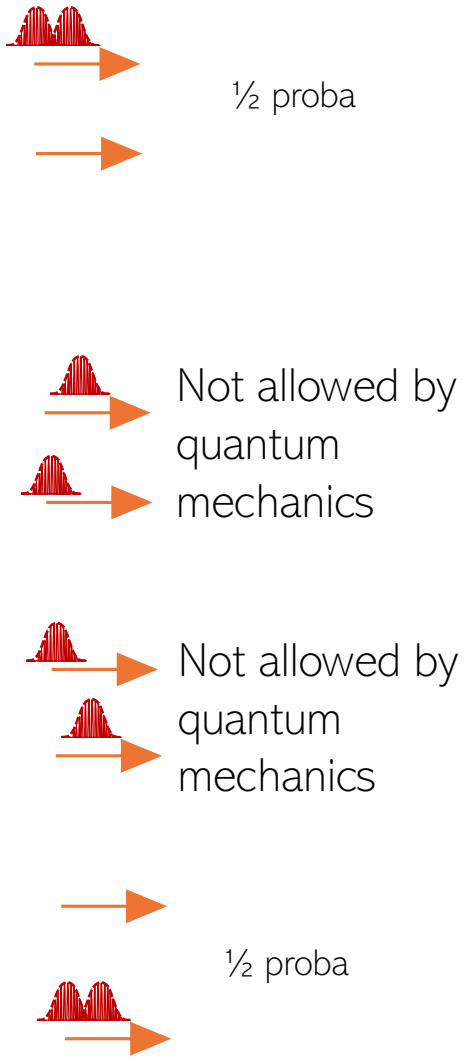




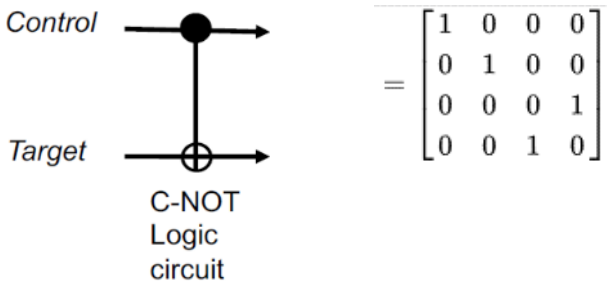
Single Photons



Indistinguishable photons

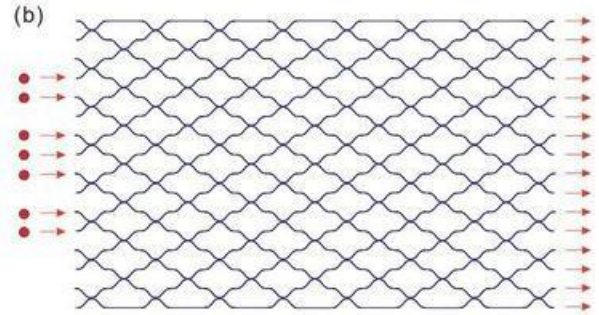


Building block for Quantum CNOT Logic Gate



$$= \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

Building block for Boson Samplers

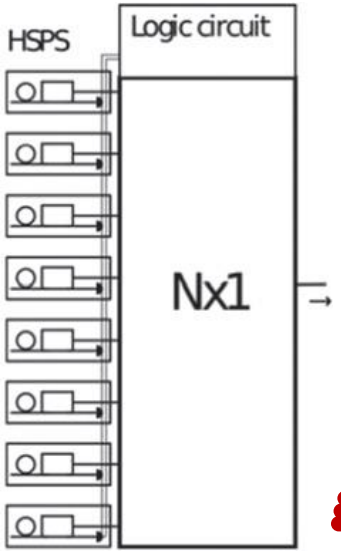


Importance of the qubit sources

« Key challenges will be the realization of **high-efficiency sources of indistinguishable single photons**, low-loss, scalable optical circuits, high-efficiency single-photon detectors, and low-loss interfacing of these components. »

Prof. Jeremy O'Brien, cofounder of PsiQ

Laser based - multiplexing



Use <u>several tens of low-efficient single photon source in parallel</u>

Requires additional electronics and efficient detectors to trigger the switch

Increasing amount of resources

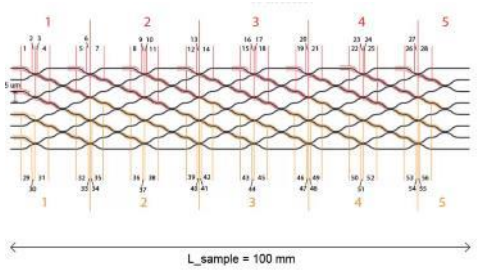
Quantum dot based near-optimal deterministic sources

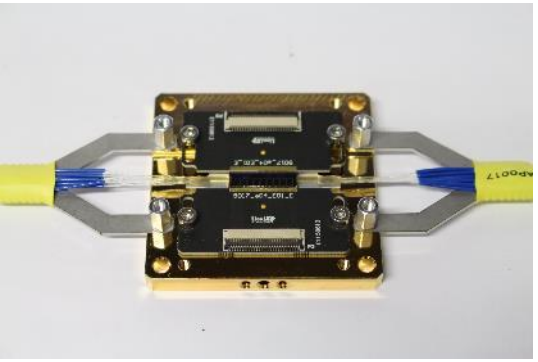
<u>No intrinsic limit in the efficiency</u>

QUANDELA Sparrow Quantum AegiQ

No need of detectors and electronics for the switches

The brightest optical qubit generators





QUIX
THE FASTEST WAY TO A QUANTUM FUTURE

Contrôle central (Ordinateur avec wifi & RJ45)

1. Lasers
2. Electroniques de contrôle
3. Processeur Quantique
4. Filtres optiques
5. Système cryogénique compact avec les générateurs de qubits

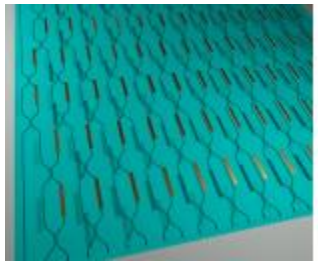
Official Provider of optical qubits for the two European platforms

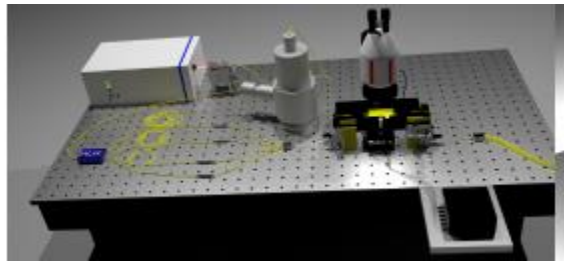
European funded projects aiming at developing two optical quantum computers.

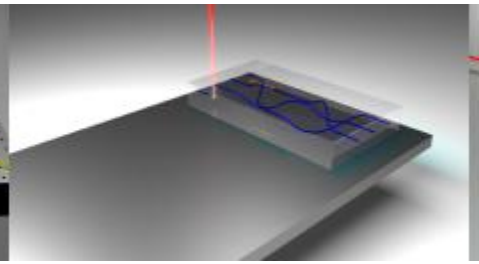
- One based in the Netherlands
- One based in Roma

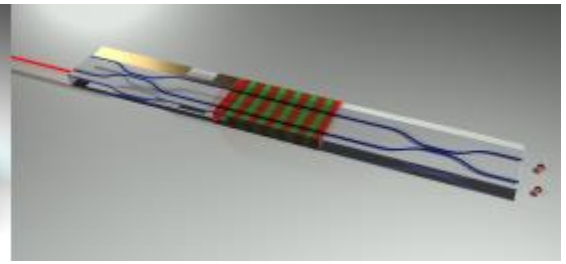
PHOQUSING and hybrid technology

The partners of the PHOQUSING project are trying to develop useful quantum computation by using a hybrid computational model combining classical and quantum processes. The aim is to implement such a hybrid computational system based on integrated cutting-edge photonics.









Our team

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Student in Quantum Algorithms

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Not really Elon Musk

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CNRS

Sales & Administration

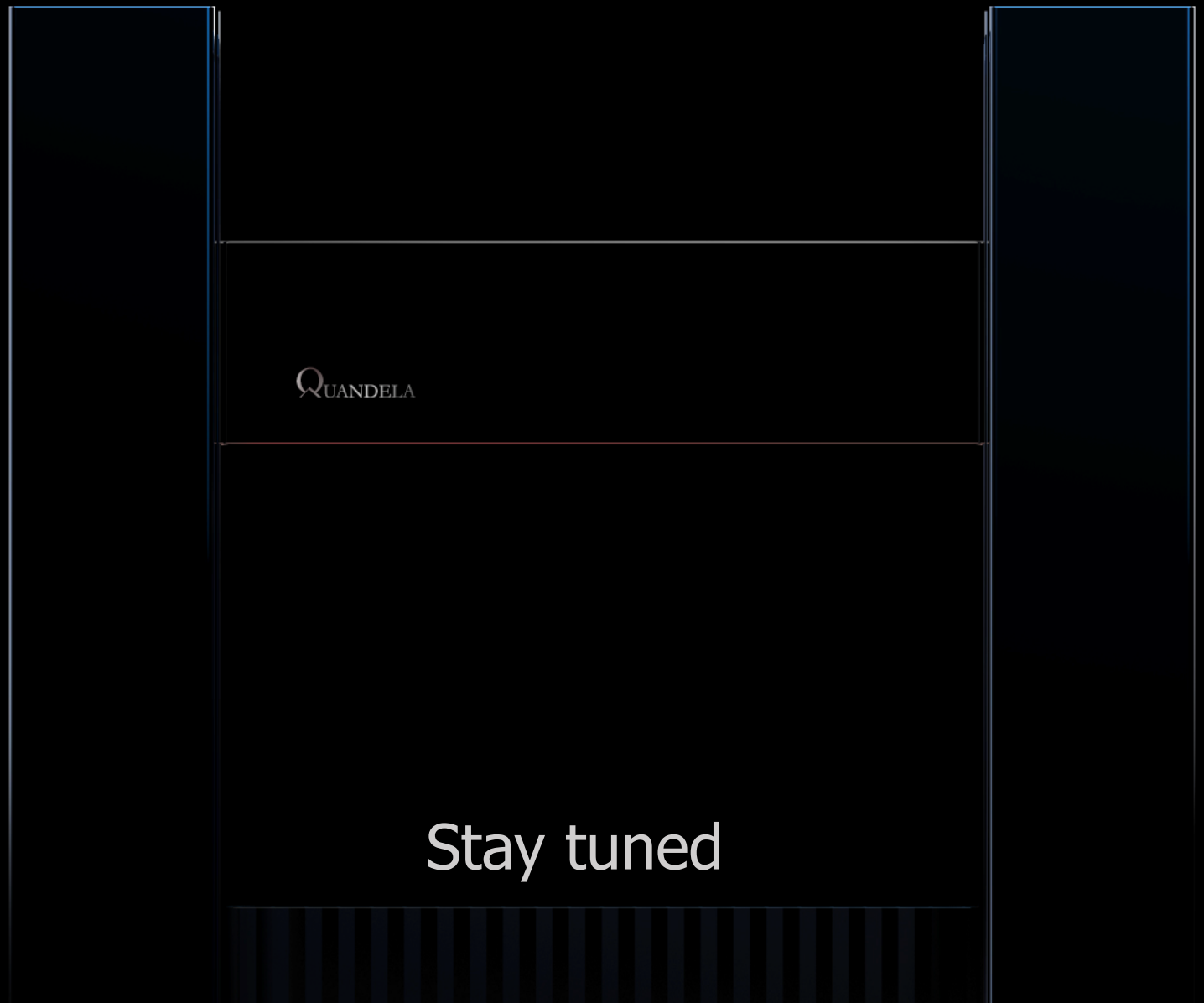
Sebastien Boissier, PhD

Expert in Quantum Emitters.
Excellent Salesman

Michel Corvez

Part-time HR Manager

ROQC – The European Optical Quantum Computer



Stay tuned

Qampus – The place for the French Qubits ?

Hardware and software startups of the Quantum

PASQAL QUANDELA |KETS> MULTIVERSE COMPUTING

Close to the labs of the Plateau of Saclay
and at 15min from Paris-Centre in RER

Thank you

valerian.giesz@quandela.com

Grant 817021
Grant 861097

a laboratory of

and of