



Canada-France Quantum Alliance (CAFQA)

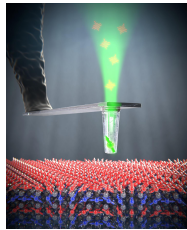
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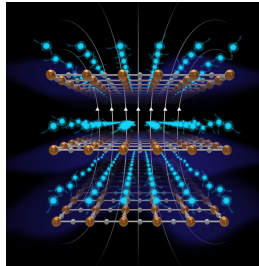
Quantum science and technologies

Quantum sensors & metrology



Picture credit: CNRS – Univ. Montpellier

Quantum materials



Picture credit: Université de Sherbrooke

Quantum computation & simulation



Picture credit: Univ. Paris Saclay

Quantum cryptography & communications



Picture credit: Univ. Waterloo

From concepts to devices

Backing on : Quantum information science and processing, quantum control and engineering, quantum thermodynamics, quantum circuits, quantum optics and photonics, quantum algorithms...

CONTEXT: TWO NATIONAL STRATEGIES ANNOUNCED IN 2021

The 2021 announcements of the national quantum strategies in France and in Canada share not only general principles but also the focal scientific points:

- providing additional means for research, talents, start-ups and industry considering aspects of security and international cooperation
- tackling societal and ethical aspects of quantum applications protecting intellectual property
- developing international standards for quantum technologies

In France: 150 M€ for research projects and equipment (PEPR) over 5 years, within the total 1,8 G€ investment

In Canada: \$360 millions over 7 years to deploy the academic strategies

Forces in France and Canada



Quantum sensors
& metrology

Quantum materials

Quantum computation
& simulation

Quantum cryptography &
communications



Research axes at UniCA



- **8 Founding laboratories: 4 main research axes**



**Quantum
Metrology**



Ex. Entanglement-based white-light quantum interferometry

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Fundamental Quantum Science



Ex. Quantum fluids of light, Quantum probabilities, Quantum control...

Research axes at UniCA



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Quantum Computing/
Simulation



Ex. Quantum computing for quantum chemistry, for AI and robotics ...

Quantum simulation with hot atomic vapor , with semiconductor two-dimensional platforms, ultracold atomic gases confined in 1-d (theory)

Research axes at UniCA



- **8 Founding laboratories: 4 main research axes**



Quantum Communication



Ex. Real-field and operational quantum communication links
Single-photon emitters in a semiconducting platform
Quantum integrated photonics
Quantum memories based on rare-earth doped crystal ...

CAFQA : General Objectives



Bring together the French and Canadian researchers in different fields of quantum sciences and facilitate their interactions and further cooperation



Create a visible, competitive, and “like-minded” trans-Atlantic research community to attract funding from the national strategies, respectively, as well as other possible fundings and to connect, when appropriate, with the applied or industrial sectors



Increase the number of PhD students and promote their trans-Atlantic mobility of young talents and to build a new generation of competitive quantum science researchers aware of societal implications of quantum sciences



Increase the research efficiency through a pooling, when appropriate and possible, of existing means and technological platforms and sharing efforts in constructing new ones

CAFQA : Actions in progress



Annual open joint workshops to facilitate interactions and initiate new collaborations (Paris 2023, Ottawa 2024, Grenoble 2025 + Satellites → Nice)



Promoting joint training opportunities by facilitating student exchanges and developing joint PhD and post-doctoral programs



Promoting the mobility of scientists by facilitating transnational visits



Pooling of national means by facilitating access to large-scale national facilities (Synchrotron, nanofabrication, high magnetic fields, ...)