

Developing Reference Measurements for Evaluation and Standardization of Quantum Technologies

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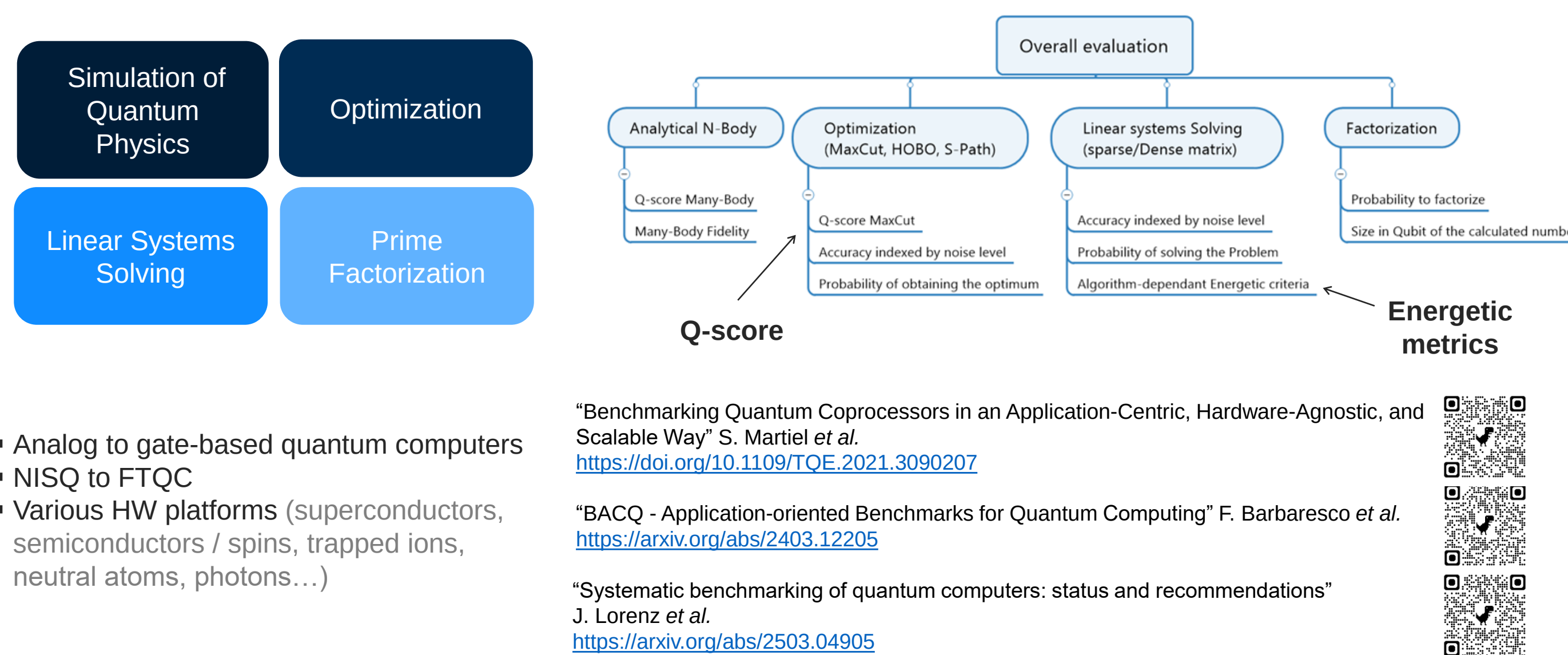
R&D Project

BACQ: Application-oriented benchmarks for quantum computers

- 3 years 2023-2026
 - 6 partners: Thales, Eviden, Teratec, CEA, CNRS, LNE
 - 7.2 FTE/year
 - 3.9 M€ budget

An **open-access package** for multicriteria evaluation of quantum computers practical performance, meaningful for industry end-users

[Set of reference **Problems** to be solved + **Metrics** + **Aggregation** tool for notation]



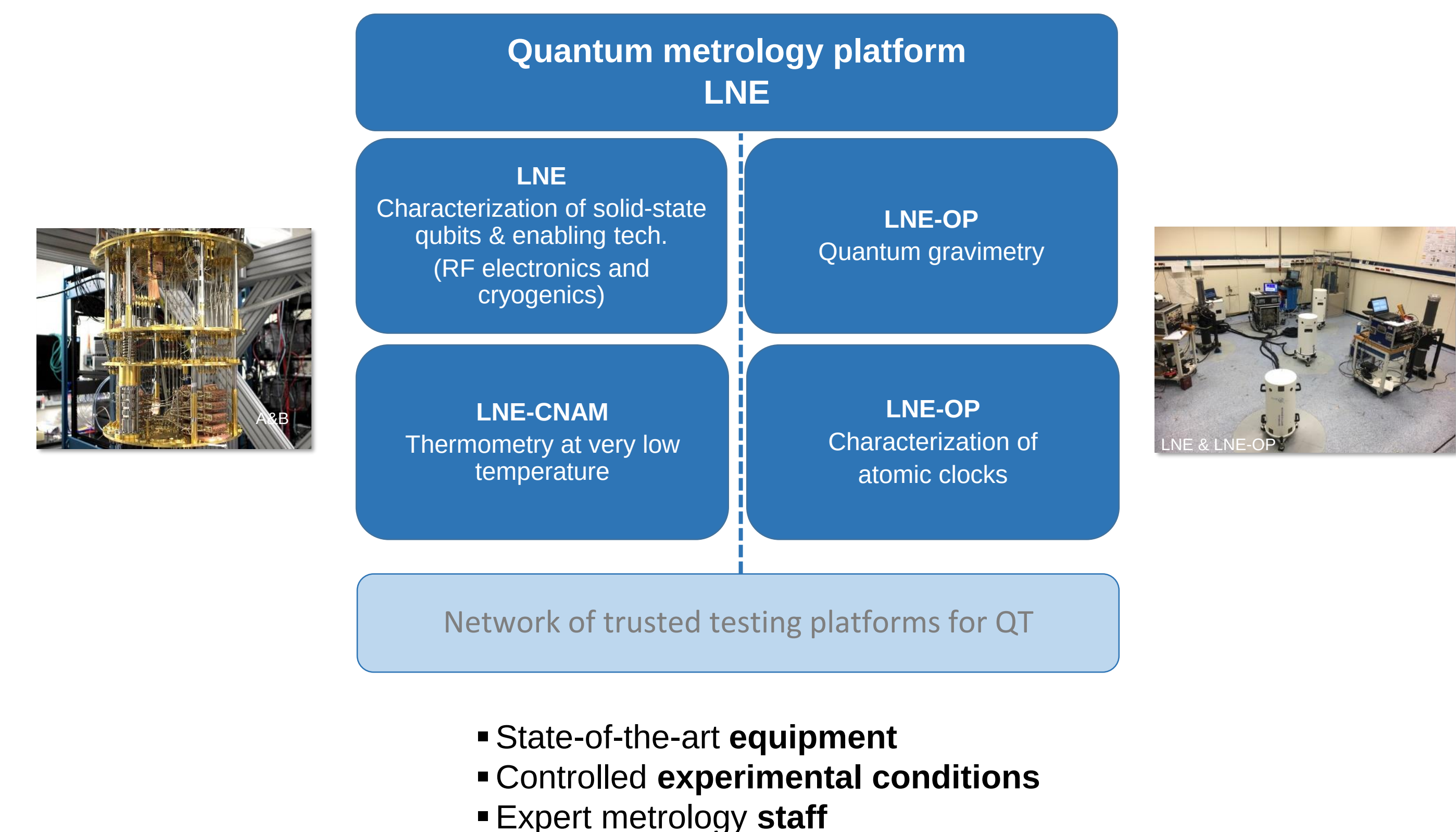
⇒ Towards **globally harmonized and recognized benchmarks**, providing **objective, transparent, reproducible and comparable results**

- To **compare** the performance of **various quantum computers**
- To **measure** the **progress** of quantum computers **towards utility**

Measurement and testing infrastructure

Quantum Metrology Platform

Expert, independent, and open infrastructure for **Metrology R&D and Measurement Services for QT**



⇒ Providing state-of-the-art **measurements, comparable, traceable, reproducible, high-precision, accurate**

Standardization

Standardization for Quantum Technologies

French National Committee



- Co-chaired by LNE and CEA
- 40+ members (Entreprises – startups and large companies; Academia; Gov. agencies)



WG1 "Strategic Advisory Group"

WG2 "Quantum metrology, sensing, imaging, and enabling technologies"

- EN (Draft) "RF-DC cabling for QT at low temperature - Parameters and test methods" (lead FR)

WG3 "Quantum Computing & Simulation" (lead FR)

- TR (Draft) "QC Benchmarks" (lead FR)
- TR (Draft) "Hybridization HPC-QC" (lead FR)

WG4 "Quantum communication and cryptography"

AG 1 "Advisory Group on Strategic Planning"

AHG 2 / WG "Quantum terminology and metrics"

AHG 3 "Quantum sensors"

- NP Proposal (Draft) IS "Performance evaluation and test methods for quantum gravimeters" (lead FR)

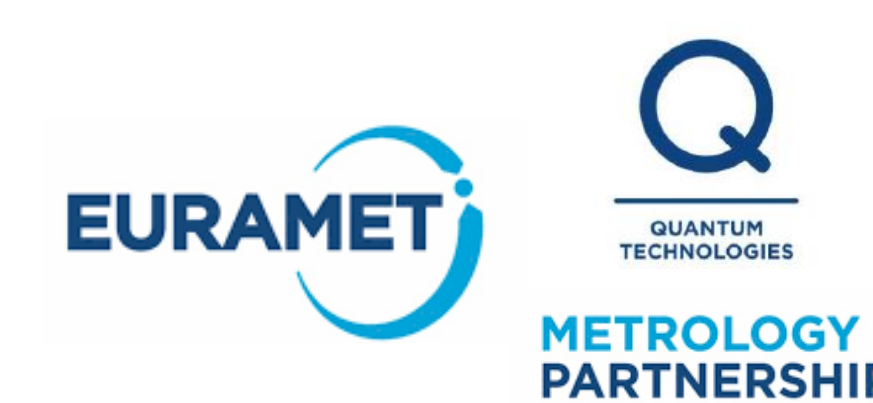
AHG 5 "Quantum Computing & Simulation" (co-lead FR-AU)

- NP Proposals (Draft) on QC Benchmarks (FR, AU, JP)

AHG 7 "Quantum enabling technologies"

EU and International collaborations

Building widely-shared, internationally harmonized and recognized measurement capabilities with NMIs, Research Organizations, Industry



- EMN-Q
European Metrology Network for QT
- Joint Research Project **MetSuperQ**
Metrology for Superconducting Qubits



- Project **Qu-Test** Open Testing and Experimentation for QT in Europe

- NMI-Q

- TQCI International Conference on QC Benchmarks
Editions 2023, 2024, 2025...



https://teratec.eu/Seminaires/TQCI/2023/Seminaire_TQCI-230511.html
https://teratec.eu/activites_quantiques/TQCI_240604_programme.html



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