

Atos Activities in Quantum Engineering

2017

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Atos' Vision

- ▶ We're at the early beginning of the 2nd Quantum Revolution
- ▶ Quantum Technologies for High Performance Computing
 - Quantum Computing
 - Quantum Simulation for numerical optimization
 - post-Moore -> post-Exascale?
- ▶ The challenge is not just building qubits:
 - Quantum software : very new and largely unexplored area
 - Quantum-powered computing architectures : hybrid systems
 - Application, adoption & dissemination



Long Term R&D Program

- ▶ Long term R&D, 10+ years scope – started early 2016
- ▶ Advised by a high-level external scientific Board : Serge Haroche, Cédric Villani , Alain Aspect, David DiVincenzo, Artur Ekert, Daniel Estève
- ▶ Very supportive & involved in the European Flagship initiative



Atos R&D Program – Four Pillars

▶ 1- Quantum Programming Platform

- Complete programming and simulation environment for the quantum software developer
- Dedicated to quantum developers, researchers, early industrial adopters
- Developed in-house by our HPC experts – running on our specific hardware – 40 qubits reached

▶ 2- Quantum Algorithms

- Quantum Machine Learning
- HPC applications
- Benchmarking quantum algorithms with *real world* use cases & physical qubit models

Atos R&D Program – Four Pillars

▶ 3- New Computing Architectures

- Modelling and qualification of qubit technologies for system & software purposes
- Design of the new architectures of hybrid supercomputers
- Partnership with best academic labs in quantum hardware, covering all qubits technologies

▶ 4- Quantum resistant cryptography

- Investigate the alternatives to quantum breakable cryptographies (symmetric, asymmetric)
- Participate to the future standards
- Designing new generation of hardware security modules (HSM)

Atos' Interest in the Grenoble Ecosystem

- ▶ Strong culture of collaboration with industry and technological transfer
- ▶ Large coverage of quantum hardware technologies
- ▶ GreQUE COFUND & QuENG PhD : very interesting framework for industrial partners
- ▶ Quantum software chair of excellence initiative

Thanks

For more information please contact:

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