



COMPUTING



COMMUNICATION



SENSING

## 16 MARCH, 2021 - MORNING

9:00 9:30	Opening talk	<p><b>The technologies of the second quantum revolution</b>  <b>Speaker:</b>                  • <b>Dr Sébastien Tanzilli</b>, President of the IQFA Research Network on Quantum Engineering – <b>CNRS</b>                  An historical perspective and a review of quantum technologies, including quantum computers, quantum sensors and quantum communication networks</p>
09:30 10:10	Roundtable	<p><b>How Europe is preparing for a quantum future ?</b>  <b>Participants:</b>                  • <b>Dr Tommaso Calarco</b>, Chair – <b>European Quantum Community Network</b>                  • <b>Paula Forteza</b>, Deputy – <b>French National Assembly</b>                  • <b>Anja Karliczek</b>, Minister – <b>German Federal Ministry of Education and Research</b>                  • <b>Roger McKinlay</b>, Challenge Director, Quantum Technologies – <b>Innovate UK</b>                  • The European Union is investing more than a billion euro over ten years in the development of quantum technologies through the quantum flagship initiative                  • Leading european countries have also set in place their own roadmap</p>
 10:10 10:30	Talk	<p><b>How quantum computers are different ?</b>  <b>Speaker:</b>                  • <b>Pr Michelle Simmons</b>, Director – <b>Australian Research Council Centre of Excellence for Quantum Computation &amp; Communication Technology</b>                  • Quantum computers are believed to be able to solve certain computational problems substantially faster than classical computers                  • What are the inner working principles of such machines ?</p>
 10:30 10:50	Talk	<p><b>End users and sectoral applications of quantum computing</b>                  • What are quantum computers potential applications in domain such as chemistry, pharma, finance, mobility energy and machine learning ?                  • Which end-user communities are expected to be the first to adopt quantum computing ?</p>
Break – 20 minutes		
 11:10 11:30	Talk	<p><b>The emerging quantum computing ecosystem</b>  <b>Speaker:</b>                  • <b>Dr Celia Merzbacher</b>, Associate Director, <b>QUANTUM ECONOMIC DEVELOPMENT CONSORTIUM</b>                  • The world wide quantum computing industry is growing fast                  • Who are the identified key players and newcomers ? What product are their offerings ?</p>
 11:30 11:50	Talk	<p><b>Creating the first comprehensive European quantum computing solution</b>                  • Co-designing a full-stack quantum computing solution through connecting the Atos QLM to IQM's quantum process</p>
 11:50 12:30	Roundtable	<p><b>A quantum advantage in fighting climate change ?</b>  <b>Participants:</b>                  • <b>Dr Alexia Auffèves</b>, Head of Quantum Engineering Grenoble – Institut Néel, <b>CNRS</b>,                  • <b>Dr Elvira Shishenina</b>, Quantum Computing Research Scientist – <b>TOTAL</b>                  • When it comes to emission reduction, some of the earliest applications for quantum computing could be among the most important.                  • In addition to holding the potential to solve some of the world's most computationally challenging problems, quantum computers use significantly less energy, which could lead to lower costs and decreased digital carbon footprint as adoption grows.</p>
Break – 1 hour		



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## 16 MARCH, 2021 - AFTERNOON

### END USER APPLICATIONS (CHEMISTRY / PHARMA)



13:30 Round  
14:10 -table

**QC in the chemical and pharmaceutical industries**  
The chemical industry, and by extension the pharmaceutical industry, are poised to be an early beneficiary of the vastly expanded modeling and computational capabilities of quantum computing. What are the main use cases? Who are the key players? And what is the expected timeline?

**Participants:** [Dr Philipp Harbach](#), Head of In Silico Research – [Merck Group](#), [Dr Ulf Hengstmann](#), Digital Health Innovation Lead, [Bayer](#)



14:10 Talk  
14:30

**Quantum-computational chemistry as-a-service**  
How to integrate quantum simulation methods in existing computational-chemistry and material-science workflows?



14:30 Talk  
14:50

**Chemical simulation on a Google's quantum processor**  
Using the Google Sycamore quantum processor, scientists at Google have recently simulated two intermediate-scale chemistry problems, demonstrating it is possible to achieve chemical accuracy when combining quantum algorithms with error mitigation strategies.

Break – 20 minutes

### HARDWARE SESSION



15:30 Talk  
15:50

**A brief overview of quantum hardware platforms**  
**Speaker:** [Dr David Shaw](#), Director – [Fact Based Insight](#)  
Overview of current leading quantum computing technologies and promising platforms



15:50 Talk  
16:10

**The quest for fault-tolerant quantum computers**  
**Speaker:** [Pr John Preskill](#), Director of the Institute for Quantum Information and Matter – [California Institute of Technology](#)  
How to reach beyond current noisy intermediate scale quantum computers?



16:10 Talk  
16:30

**IBM's hardware development roadmap**  
A look at IBM's roadmap to build a 1000 physical qubits quantum processor at horizon 2023



16:30 Talk  
16:50

**Optimizing quantum hardware**  
How to build infrastructure software to power quantum technology?

### SENSING TECHNOLOGIES (1/2)



13:30 Talk  
14:10

**Overcoming resolution limits with quantum sensing**  
**Speaker:** [Dr Philippe Bouyer](#), Director – [LP2N, CNRS](#)  
Sensors are increasingly commonplace thanks to the internet of things, but quantum sensing promises dramatic new capabilities.



14:10 Talk  
14:30

**New perspectives in the field of geophysics**  
The first commercially available quantum gravimeter.



14:30 Talk  
14:50

**How to detect carbon emissions with quantum optical gas sensors?**  
QLM has developed a high-sensitivity and low-power gas detection and imaging systems based on infrared single-photon detection to meet the needs of natural gas producers, distributors and service providers for fast, accurate and low-cost gas leak identification.



14:50 Talk  
15:10

**Diamonds for quantum nano-sensing**  
The H2020 ASTERIQS project aims at developing diamond-based quantum sensors, it brings together 23 European partners from both academia and industry, all pioneers and leaders in this research area.

Break – 20 minutes

### CASE STUDIES (2/2)



15:50 Talk  
16:10

**How to improve microscopes' measurement capabilities?**  
A commercially available quantum microscope system for the analysis of magnetic materials at the atomic scale.



16:10 Talk  
16:30

**Quantum enhancement of accuracy and precision in optical interferometry**  
**Speaker:** [Dr Laurent Labonté](#), Associate Professor – [INPHYNI, CNRS](#)  
An absolute and high-precision quantum device for measurement of materials' optical properties.



16:30 Talk  
16:50

**Quantum sensors for positioning, navigation and timing**  
**Speaker:** [Dr Stephan Till](#), Senior Fellow – [UK Defence Science and Technology Laboratory](#)  
Quantum positioning systems step in when GPS fails. Example applications in the defence industry.



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## 17 MARCH, 2021 - MORNING

09:00	09:40	Roundtable	<p><b>Building the future quantum workforce</b>  <b>Participants:</b></p> <ul style="list-style-type: none"> <li>• <b>Dr Marko Rancic</b>, Head of Quantum Computing – <b>Total</b></li> <li>• <b>Pr Nicolas Treps</b>, Professor of Quantum Physics – <b>UPMC</b>, Co-Director – <b>Quantum Information Center Sorbonne</b></li> </ul> <ul style="list-style-type: none"> <li>• State of the job market</li> <li>• How to train a new generation of quantum engineers and quantum software developers ?</li> </ul>	
	09:40	10:00	Talk	<p><b>Is quantum computing the end of cybersecurity as we know it ?</b></p> <ul style="list-style-type: none"> <li>• Quantum computing as a threat to asymmetric cryptography</li> <li>• Quantum and post-quantum cryptography as solutions</li> </ul>
	10:00	10:20	Talk	<p><b>How is the EU assessing the user needs of a quantum communication infrastructure ?</b>  <b>Speakers:</b></p> <ul style="list-style-type: none"> <li>• <b>Dr Eleni Diamanti</b>, Research Director – <b>UPMC</b>, <b>CNRS</b>, Member – <b>Quantum Internet Alliance</b></li> </ul> <ul style="list-style-type: none"> <li>• EU countries plan to build an ultra-secure quantum communication network</li> <li>• Focus on the OpenQKD and EuroQCI projects</li> </ul>
Break – 20 minutes				
	10:40	11:00	Talk	<p><b>The search for quantum-resistant cryptography</b></p> <ul style="list-style-type: none"> <li>• Quantum-resistant algorithms basic principles</li> <li>• NIST standardisation efforts and other initiatives</li> </ul>
	11:00	11:20	Talk	<p><b>How do I deal with a threat that hasn't yet emerged ?</b>  <b>Speaker:</b></p> <ul style="list-style-type: none"> <li>• <b>Pr. Michele Mosca</b>, Co-founder – <b>Institute for Quantum Computing</b></li> </ul> <p>A methodology for quantum-risk assessment.</p>
11:50	12:30	Roundtable	<p><b>What is driving the quantum technology market growth ?</b>  <b>Participants:</b></p> <ul style="list-style-type: none"> <li>• <b>Michel Kurek</b>, Financial Market specialist – <b>QuantX</b>, <b>École Polytechnique</b></li> </ul> <ul style="list-style-type: none"> <li>• How to invest in a quantum future ?</li> <li>• How to accelerate technological transfer from lab to market ?</li> </ul>	
Break – 1 hour				



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## 17 MARCH, 2021 - AFTERNOON

### END USER APPLICATIONS (MOBILITY / ENERGY)



13:00 Round-table  
13:40

**QC in the automotive, logistic and energy industries**  
**Participants:** [Dr Julian Stephens](#), Technical Development Manager – [MJC2](#), [Dr Ken Washington](#), CTO – [Ford](#), [Julien Pestourie](#), Smart Grid Department Director, [EDF](#)  
• Traffic simulation, cars' batteries design and smart-grid optimization are among the most challenging problems for the mobility and the energy industries.  
• How could quantum computers offer better performances in solving such problems ?



13:40 Talk  
14:00

**The Airbus quantum computing challenge**  
**Speaker:** [Dr Thierry Botter](#), Head of Airbus Blue Sky & Deputy-Head of Central R&T – [Airbus](#), [Strategic](#) Advisor on Quantum Technologies – [European Commission](#)  
• Bringing flight physics into the quantum era.



14:00 Talk  
14:20

**Solving vehicle routing problems using a quantum annealer**  
**Speaker:** [Martin Hofmann](#), CIO – [Volkswagen](#)  
• Avoiding traffic jams and shortening waiting times using quantum algorithms.

### END USER APPLICATIONS (FINANCE / INSURANCE)



14:20 Round-table  
15:00

**QC in finance and insurance**  
**Participants:** [Dr Marco Pistoia](#), Head of Research and Engineering – [JPMorgan Chase & Co.](#)  
• Finance, especially quantitative finance, is full of hard computational problems.  
• How could quantum computers speed up portfolio optimization and other computations encountered in finance ?



15:00 Talk  
15:20

**Option pricing using QC**  
• How quantum computers can reach beyond Monte Carlo methods in quantitative finance ?

Break – 20 minutes

### SOFTWARE SESSION



15:40 Talk  
16:00

**A brief overview of quantum software platforms**  
**Speaker:** [Dr David Shaw](#), Director – [Fact Based Insight](#)  
How cloud initiatives are democratizing quantum computing.



16:00 Talk  
16:20

**Quantum as a Service with AWS Braket**  
AWS Braket is a fully managed quantum computing service that helps researchers and developers get started with the technology to accelerate research and discovery.



16:20 Talk  
16:40

**Quantum powered ML with TensorFlow Quantum**  
How to integrate quantum machine learning into already existing machine learning software tools ?

### CASE STUDIES (1/2)



13:00 Talk  
13:20

**How QC putting blockchain technology at risk ?**  
Blockchain protocols heavily rely on cryptographic primitives, is their a quantum-safe future for this technology ?



13:20 Talk  
13:40

**IoT and the quantum threat. What to do ?**  
Future-proofing IoT devices with quantum-safe security solutions



13:40 Round-table  
14:20

**How are telecom operators preparing for quantum ?**  
**Participants:** [Yewon Gim](#), Senior Technical Staff Member – [AT&T Foundry](#), [Park Jin-hyo](#), CTO – [SK Telecom](#)  
[Dr Thomas Rivera](#), Research Project Manager – [Orange Labs](#), [Andrew Lord](#), Head of R&D, [British Telecom Group](#)  
• What are the most at-risk telecom infrastructures regarding the threat of quantum computers ?  
• How to secure already existing telecom equipment with quantum and post-quantum cryptography ?

Break – 20 minutes

### CASE STUDIES (2/2)



15:00 Talk  
15:20

**Securing 5G networks with quantum cryptography**  
• The world first smartphone with a quantum random number generator chipset.  
• Integrating quantum key distribution within 5G networks infrastructures.



15:20 Talk  
15:40

**Recent advances in satellite based QKD**  
**Speaker:** [Dr Thomas Jennewein](#), Researcher – [Institute for Quantum Computing](#)  
Space based quantum communication will allow the distribution of secret encryption keys to ground-based stations with greatly increased distance between communicating parties



15:40 Talk  
16:00

**How has China developed the world's first mobile quantum satellite station and continues pushing the limit of quantum communication ?**  
**Speaker:** [Pr Jianwei Pan](#), VP – [University of Science and Technology of China](#)