



## Invited Talk 5



### Quantum Computing – The Path to Quantum Advantage

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#### Abstract:

The field of quantum computing and quantum sensing has evolved tremendously over the last years into a large interdisciplinary community in which significant resources are invested worldwide. Almost eight years back we have made quantum computing available through the cloud for the first-time providing access to real quantum hardware. Since then, a continuous stream of technical breakthroughs and improvements on the hardware as well as on the software and algorithm level has been demonstrated to build up a full stack quantum computer.

Advancing the state-of-the-art as quickly as possible requires pursuing in parallel improvements across the full stack, pushing scale, quality, and speed to the next level, developing a quantum-centric supercomputing architecture and performant software capabilities. For example, we increased the scale to an enormous number of 1121 qubits on a single quantum processor and showed a path to further scaling by introducing modularity. Concomitantly, speed and quality have been increased to boost overall performance.

In this presentation, I will give an overview of what we have achieved across the quantum computing stack and share our extended roadmap to further advance the Era of Quantum Utility.