Abstract: In a press release on March 6th 2017, IBM has committed itself to develop a commercial quantum system called IBM Q. For the first time this enables IBM to directly target potential customers in this field e.g. HPC groups or industrial R&D departments. Early access to a Quantum Computer on the cloud is enabled via the IBM Quantum Experience. The IBM Quantum Computer has been presented at this years CeBIT in Hannover. The great advantage of a universal Quantum Computer is based on quantum mechanical effects, which are not known in classical every-day life, e.g. superposition, entanglement, and teleportation. Using these effects in smart ways certain algorithms can be boosted beyond classical limits. But controlling and measuring qubits in large scales turns out to be a great challenge. In my talk I will point out the fundamental differences between a classical computer and a quantum computer. I will show in detail how the IBM Quantum Computer works and what potential pitfalls are there for scaling quantum systems. In a live demo we will program simple quantum algorithms and execute them on the IBM quantum computer in real-time.

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