



Seminar announcement

Commercial Quantum Technologies

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Description

For the last thirty years, Quantum Technologies have been the preserve of fundamental research and development at universities. Continuously improving devices have been constructed within these academic laboratories, showcasing exciting applications through proof-of-principle experiments. This progress has led to a recent wave of excitement and activity to transfer these technologies to practical use in the real world. A rapidly growing spectrum of start-up companies, alongside some industry players such as Google, Amazon and IBM, are now actively pursuing commercial quantum devices for quantum communication, quantum sensing and quantum computation.

We want you to learn about both, the scientific background of quantum technologies but also how start-ups go about developing them. In this seminar, you will collaborate in teams of two students. Each team will dedicate the initial phase of their project to learn the physics behind a specific quantum hardware and its potential application and you will present a talk about these aspects. Subsequently, in the latter part of the project, you will delve into business aspects, that is, how to identify commercially viable applications and how to take the basic quantum technology to a commercially viable device and from there to the market place.

In the first part you will be supported by academic members, PhD students and Postdocs. In the second part you will meet founders and the team of quantum technology start-up companies.

Physical Quantum Technologies

- NV Centers in diamond for sensing and for quantum computing
- Parahydrogen-induced polarisation for medical imaging & cancer
- Optically trapped Rydberg atoms for quantum computing
- Photonic Quantum Information Processing
- Software design for quantum error correction
- Quantum optics for particle sensing

Participating Companies

- Advanced Quantum (<https://www.advanced-quantum.de/>)
- NVision Imaging Technologies (<https://www.nvision-imaging.com/>)
- Plancq (<https://www.planqc.eu/>)
- Q.Ant (<https://qant.com/de/>)
- QC Design (<https://www.qc.design/>)
- QuiX (<https://www.quixquantum.com/>)
- XeedQ (<https://xeedq.com/>)

Prerequisites

Quantum mechanics at the level of the 2nd year theory lecture.

Literature

Depending on the topic, textbook chapters, review and research articles

Additional Information

The module refers to bachelor and master students

Seminar: 3 ECTS

Advanced Seminar: 4 ECTS