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Figure: Group Picture of the QE Master Program with steering committee.

# Backgrounds

## Marco's background:

- Physics Bachelor at ETHZ
- General physics knowledge (e.g. astro/- particle physics)
- Quantum Mechanics II too theoretical for my taste

## Moritz' background:

- Physics Bachelor from EPF Lausanne
- Exchange in third year at ETH Zürich (solid Quantum Mechanics grounding)
- Statistical Physics already taken

Theoretically inclined student, classes taken:

Fall Semester:

- Physics: Quantum Information Theory
- Engineering: Optical Communication Fundamentals, Information Theory
- Case Studies: Applications of Quantum Technology

Spring Semester:

- Physics: Advanced Topics on Quantum Information Theory, Quantum Information Processing I
- Engineering: Applied Cryptography, Algebra and Error-correcting codes
- Quantech Workshop: Quantum Communication (12 ECTS)

Experimentally inclined student (Marco), classes taken:

Fall Semester:

- Physics: Quantum Optics, Quantum Science with Superconducting Circuits
- Engineering: VLSI, Control Systems, Solid State Electronics & Optics
- Case Studies: Applications of Quantum Technology

Spring Semester:

- Physics: Quantum Information Processing I, Quantum Acoustics and Optomechanics, Advanced Quantum Optics
- a GESS Course
- Quantech Workshop: Trapped Ions (12 ECTS)

## Quantum Engineering vs a regular master

- 25 people from all over the world (8 swiss) with different backgrounds → "class" feeling
- Paper Club
- Quantech workshops
- Football team
- Freshly founded student association
- Tutor system
- Case Studies (IBM visit, ETH labs, ID Quantique)
- Close contact with professors
- Hang out with driven, motivated and somewhat crazy people.

# Why ETH

- Long-term engagement of ETH to Quantum Physics and ETH is world leader (Renner, Wallraff, Home, etc.)
- Unique program worldwide: between D-ITET and D-PHYS
- Exceeding expectations already in the first year
- Integrate a crazy Network of students

## General Recommendations: Electrical Engineers

How deep should one go in catching up on the physics depends on your interest - but you should know mechanics before building a car

Be flexible in thinking - abstract like physicist

Solid State Electronics & Physics II not sufficient → QM1 and or Introduction to Solid State Physics in first master semester recommended

## General Recommendations: Physicists

Main difference w.r.t. Physics Bachelor: closely confronted with the experimental aspects.

Still possible to take very theoretical classes

Expect a change of mentality in the engineering classes: learn the vocabulary and how to think like an engineer



# General Recommendations

The subject is ridiculously deep and vast

Don't specialize too early

If not from EE or Physics Bachelor:

- complex analysis
- electrodynamics
- Analysis (DGL) & Linear Algebra

→ maybe one semester more?

Don't skip on the basics

## Podcast

If you want to hear something from one of our former electrical engineers Anja ... (ETH Podcast)



# Backup Slides

Experimentally inclined student (Moritz), classes taken:

Fall Semester:

- Physics classes: Quantum Optics, Quantum Information Theory, Quantum Science with Superconducting Circuits
- Engineering classes: VLSI and Control Systems
- Case Studies: Applications of Quantum Technology

Spring Semester:

- Advanced Quantum Optics, Quantum Information Processing
- Quantech Workshop: Superconducting Qubits (12 ECTS)
- Data Science in Techno-Economic Systems
- Machine Learning