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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