Semester report - Spring semester 2023

The spring semester 2023 has been an active semester for the Quantum Engineering Commission. A big event for us was our 3-day ETH Quantum Hackathon with 100 participants from 25 universities from all around Europe. Also, for the first time we organized an exchange program with 20 students from ETH and 20 students from LMU/TUM who are involved in quantum science and technology. We held a weekly paper club, we participated at SOLA, and we organized BBQs and parties. In the background, we redesigned and updated our website and increased our presence on social media. For supporting students in their studies as best as possible, we improved our material for exam preparation, we provide statistics about past student internships, and we are currently organizing our mentoring program for the new students who will start in September.

We thank AMIV, VSETH, the Quantum Center, as well as the companies who sponsored our events for their great support!

Jonathan Knoll

President

Matteo Stefanini

*Vice President and Treasurer*

General assembly, 20th of March 2023.

Quantum Paper Club

The Quantum Paper Club remains an important branch of the QEC: As in the last semesters, we organized a talk every Thursday evening. We invited a diverse group of speakers, consisting of professors, postdocs, PhDs, master and bachelor students, as well as experts from industry. The talks covered a wide range of topics, from quantum optics, superconducting qubits, trapped ions, and quantum machine learning to more theoretical talks such as about quantum information in black holes.

These talks are a great way to learn about new topics and to get to know many researchers from different groups at ETH, as well as from other places in Europe. In order to foster networking between the students, it became a tradition to head to Alumni Lounge after the talk to continue the scientific discussions over a beer. In addition, we provided free food and drinks at the beginning and at the end of the semester. During one of the informal discussions, we got invited to a lab tour at TIQI, which highlights how valuable the personal interactions between students and researchers at different stages can be for everyone.

We concluded the semester with a talk by Prof. Nicolas Gisin from the University of Geneva. Participation was incentivized with a free dinner and gathered more than 80 participants. This event coincided with the Munich exchange, which meant that 20 students from TUM/LMU also attended the talk. Many new connections were formed between the students from different study degrees, levels, and universities. A list of all paper club talks is available on our [website](#).
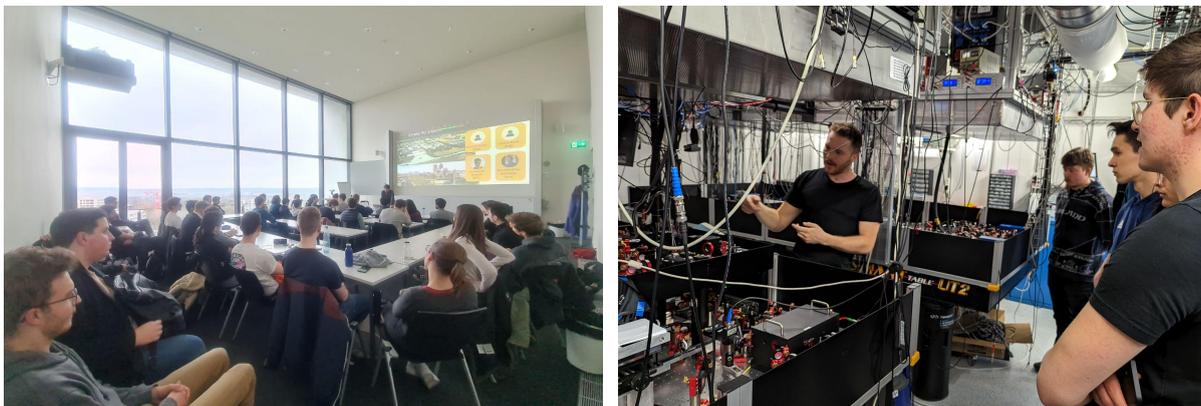
ETH Quantum Hackathon 2023

One highlight of the spring semester was the ETH Quantum Hackathon which we organized on the weekend from 5th to 7th of May. We received more than 200 applications from 35 universities, making the selection of 100 participants very hard. From the selected 100 participants, 60 were coming from outside Zurich and in total we had students from 25 different universities. The participants had 25 hours to work in a team of four students on one of the challenges provided by our sponsors IQM, Qilimanjaro, and Moody's Analytics. The challenges covered QAOA for solving the travelling salesman problem, quantum monte carlo integration in quantum finance, as well as exploiting symmetries in variational quantum machine learning.

The sponsors presented both their challenge and their company on Friday evening and gave a more in-depth introductory workshop on Saturday morning. The event kicked off with opening speeches by Prof. Günther Dissertori, rector of ETH Zurich, Dr. Philipp Kammerlander, Executive Director of the Quantum Center, and Prof. Andreas Wallraff, principal investigator of the Quantum Device Lab at ETH. We offered a supporting program consisting of 22 lab tours in 7 research labs, and an introductory lecture about quantum information processing by Dr. Philipp Kammerlander. The latter intended to get participants with less experience in quantum up to speed.
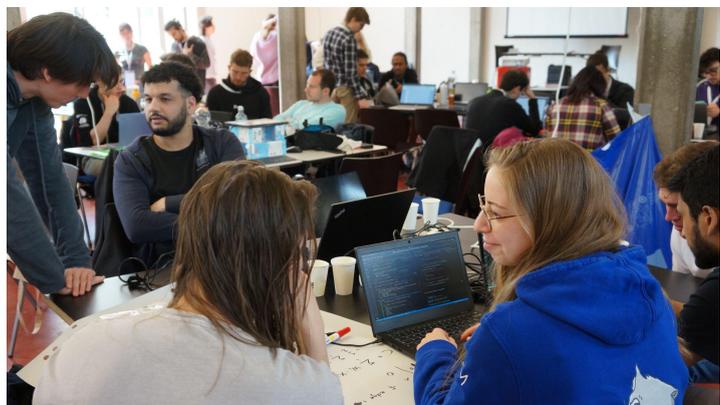
To improve next year's hackathon, we conducted a detailed survey among the participants. 71% rated the event with 5 out of 5 stars and the remaining 29% with 4 out of 5 stars. For the question how likely it is that the participants will recommend their friends to join next year, 96% answered with 5 on the scale from 1 to 5 and the remaining 4% with a 4. Already during and after the event, we received a lot of great feedback in personal conversations with the participants.

Some of the external bachelor students told us that the hackathon convinced them to apply for the MSc Quantum Engineering at ETH, while some master students mentioned they will apply to certain groups they saw during the lab tours for their PhD. Also the company representatives were very happy with the organization and with the publicity they got, and they would like to participate again next year.

We thank IQM, Qilimanjaro, Moody's Analytics, and Google Quantum AI for sponsoring our event, and for supervising the challenges.

Exchange with TUM/LMU

The second flagship event this semester was the exchange with Master's students from the MSc Quantum Science and Technology at TUM/LMU in Munich. For this, the QEC collaborated with PushQuantum, the QEC's equivalent in Munich. The exchange consisted of two weekends: one weekend in Munich and one in Zurich. Each of the 20 selected ETH students was assigned to an exchange partner from Munich. This pair hosted each other during the time in the respective other city. On both sides, the interest in the exchange was significantly higher than available spots.

The goal of the exchange was to create a network between two of the largest quantum hubs in Europe, involving students from three of the most prestigious universities. The schedules aimed to include three dimensions of such a network: academia, industry, and social bonding.

During the weekend in Munich, we visited the Max-Planck Institute for Quantum Optics, with an introductory talk by Prof. Ignacio Cirac, as well as labs in the Walther Meißner Institute and the Walter Schottky Institute. On the industry side, PushQuantum organized a pitch event and panel discussion with representatives from the start-ups planqc, Quantum Diamonds, IQM, and the incubator TUM Venture Lab Quantum.

In Zurich, we organized lab tours at TIQI, Qudev, and the Esslinger lab for our visitors from Munich. We also invited them to the large end-of-semester Quantum Paper Club talk by Prof. Nicolas Gisin. In the first half of the next day, we visited IBM Research in Rüschlikon, with talks about the local quantum efforts as well as lab tours, including the clean room and the "noise-free" labs. Afterwards, we had a speaker session with representatives from

McKinsey, Zurich Instruments, and QZabre. At this session, Dr. Philipp Kammerlander had the chance to introduce the Quantum Center and talk about the structural specialties of quantum research in Switzerland. To finish the formal part, we visited QZabre's facilities in Oerlikon. After a BBQ for dinner, the evening was topped off by the QEC semester-end party, which was attended by a total of 80 people, including the guests from Munich. This way, even QEC members who did not participate in the exchange could network with the students from Munich. The detailed agendas for the Munich visit and Zurich visit are posted on our website.

We received exclusively positive feedback for the exchange. Both parties were very interested in opportunities for research and work in the respective other city, and the close social nature of the exchange led to friendships between participants. Both the QEC and PushQuantum see great mutual benefits and would like to continue these exchanges as a tradition in the coming years.

SOLA 2023

The QEC participated in this year's SOLA race organized by the ASVZ. The team consisted of 14 students who covered a distance of 115km in total. The QEC supported this event by covering the participation fee as well as branded sports shirts for the participants. The event concluded with a BBQ in front of the physics department, together with many physics labs who also participated in the race. Thus, in addition to the social bonding via the sport, this was also a good networking opportunity.

Mid-semester barbeque

After the first half of the semester, we organized a barbeque on Käferberg where more than 30 students joined. This event was great for networking since, in addition to students from many different MSc QE cohorts and QEC alumni, many physicists joined. For some of them, this was the first QEC event they attended.


Semester-end Party

As the second part of the TUM/LMU exchange took place on the last weekend of the semester, we organized a semester-end party on the same weekend. Everyone from the exchange joined and we opened the party to everyone from our quantum community. More than 80 students joined, including many physicists as well as quantum engineers from all four generations. This was a great chance to get to know other students and it was a fun conclusion of this semester.

Website Redesign

We completely redesigned our website, updated the content, and added a section where we advertise jobs, internships, as well as thesis offers which we receive from our partners and contacts. Our website is available under qec.amiv.ethz.ch.
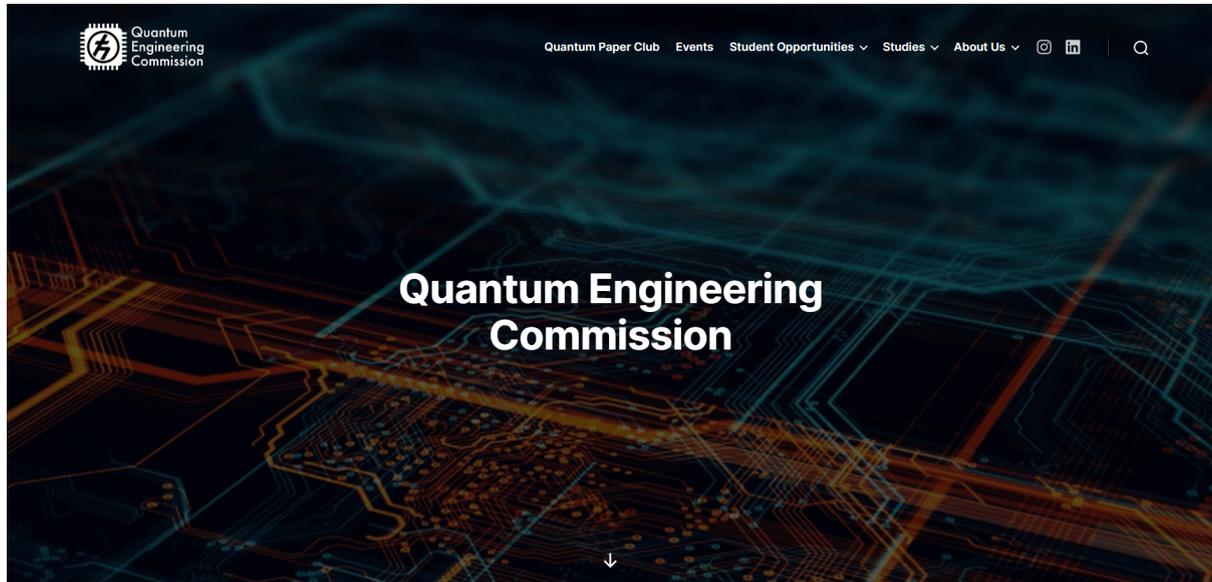
Study support and mentoring program

On the studies side, we will offer a mentoring system again, where every student from the new batch of quantum engineers will be matched with a student from the second or third year. We will extend the system by offering coffee vouchers to encourage meetings of mentors and mentees.

Additionally, we implemented a unified process to submit exam protocols and course reviews geared specifically towards quantum engineers, which will be made available on the QEC website.

In order to support students in their interviews for jobs and internships, we are collecting data about the internships and jobs of former quantum engineering students. We are sharing an anonymized report among the quantum engineers, including the distribution of salaries.

Board

At our General Assembly in March, we formed a new board with the following ten members:

- Jonathan Knoll, *President*
- Matteo Stefanini, *Vice-president and treasurer*
- Elena Acinapura, *Events*
- Chrysander Hagen, *Studies*
- Michael Bruno, *Studies*
- Jan Obermeier, *Quantum Paper Club*
- Eric Goldhahn, *Quantum Paper Club*
- Noah Tajwar, *IT*
- Giovanni Vio, *PR*
- Dominique Wanningen, *PR*

The board is not only composed of QE students, but also MSc physics as well as BSc physics and BSc interdisciplinary sciences.

Outlook

Over the summer, the QEC will reduce its activities to allow everyone to focus on exam preparation. As a short study-break, we are organizing a two-day hike with an overnight stay in a mountain hut in July.

We plan to kick off the first week of the autumn semester with many fun events for the new quantum engineers in order to connect them and introduce them to ETH and to Zurich. We are planning to extend the number of these events compared to last year.

The Quantum Paper Club is continuing in the autumn semester and we are again planning our traditional QEC fondue in December. Likely, more events are going to take place since some ideas have been proposed already.