

Hands-on Quantum Technology in Sweden - WACQT lab course

Report of first course, fall 2019, including participant course evaluation and on-site course responsible reflections.

Course summary: The course consisted of four separate labs, performed during September to December in the fall 2019, at the four universities LU, LiU, KTH and CTH. The purpose and aim of the course, together with the course description, are given on the WACQT graduate school webpage. The four lab topics were Quantum Information with Rare-Earth Ions (LU), Quantum Algorithms and Quantum Key Distribution (LiU), Single and entangled photons and their use in quantum communication (KTH) and Quantum Information in Superconducting Circuits (CTH). Each lab occasion lasted two to three working days and typically included presentations of additional quantum technology activities at the respective university. In total 26 PhD-students participated in the course.

Overall organisation: The majority of the organisation was carried out locally, at the different lab sites. This includes the signing up for the labs, preparing the program for the visiting participants, presenting and supervising the lab and correcting lab reports. The visiting participants were responsible for their own travel arrangements. The role of the graduate school leadership was to coordinate the scheduling of the labs and to provide an overall course description.

Participant course evaluation: After the completion of the course, all participants were encouraged to fill out an on-line course evaluation, put together by the graduate school leadership in cooperation with the local lab responsible. The response rate was 88% (23 out of 26), which makes the course evaluation highly representative. A presentation of the responses is appended to this document. The participants were asked about the overall course organization as well as about the individual labs. As a summary, the participants found that the course gave valuable knowledge about quantum technology (QT) research in Sweden as well as more detailed knowledge about basic QT topics and experiments. Several constructive comments were given on how to improve the organization for coming lab courses. The participants also gave feedback on the organization and execution of the four labs individually. To provide a snap-shot picture, when asking the participants to grade the different aspects of the labs with a number 1 to 10, the average for all aspects landed between 6.5 and 7.7, with rather small variations between the lab sites. While the overall impression thus was positive, there were several comments and ideas how to improve the labs and the organization for future labs.

Course responsible reflections: Based on the participant evaluation, the on-site lab responsible were given the opportunity to reflect over their own lab and possibilities for improvements for the following lab occasions. Overall, the lab responsible agreed with the comments of the students, although for certain aspects they had a different opinion. Keeping in mind that this was the first time the course was organized, the lab responsible identified several aspects that could be improved for the next lab course.

Conclusions: The conclusion by the graduate school leadership is that the course worked reasonably well and that it fills an important purpose in both providing the participants with

a basic experimental QT background and strengthening the Swedish QT community in a bottom-up fashion, connecting WACQT PhD-students and postdocs. Taking into account the comments by the participants and the lab responsible, we think that an improved, second round of the lab course can be given in the fall 2021.

Göran Johansson,

WACQT Graduate School director.