Candidate's personal career development plan report (CDP)

Name: Viktor Svensson
Fellowship period: 1-Oct-2024 to 30-Sep-2027
Reporting period (1st, 2nd or 3rd fellowship year): 2nd year
Title of project: Quantum dot networks as a platform for quantum neuromorphic computing
Name of Supervisor: Morten Hjorth-Jensen
Place of work (institute/department): University of Oslo, Solid-state Physics and Quantum Technology

Brief overview of research project and major accomplishments expected:
Computation plays an increasingly vital role in our society but faces challenges when it comes to energy use and larger amounts of data. There are also fundamental computational challenges when simulating quantum systems with classical computers. Quantum computers may help with these problems but are hard to build. This project will combine neuromorphic computing with quantum computing to tackle these problems.

We are seeing great progress in our understanding and control of quantum systems. That said, a universal quantum computer capable of running quantum algorithms may still be many years away. In this project, I will use quantum systems more like machine learning models rather than computers. By training them to perform tasks, the hope is that we can sidestep the challenges that quantum computers face and provide a way to get useful computation out of systems in the near future.

This project focuses on a specific system, a network of coupled quantum dots, which can be tuned to a variety of different states and dynamics. I will investigate how this system can be trained, what tasks it can solve, and the potential of experimental realizations. This project will advance the field of quantum machine learning through a comprehensive study of an experimentally realizable system. One expected accomplishment is to explain what kind of properties the system needs to be useful. These properties will be interpreted and explained physically, and this can guide and inform potential experiments into these ideas.

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

Develop the skills, qualifications and record to get a permanent academic position at a location I would like to live in. If this does not happen, I want to be in a good position to get a research job in industry.

2. What further research activity or other training is needed to attain these goals?

My top priority is to get experience in teaching, supervising and developing courses. I also need to develop competence in different areas of quantum technology and publish articles. I would like to develop a higher level understanding of this research area to be able to identify and pursue the most promising and impactful research direction.

SHORT-TERM OBJECTIVES (1-2 years)

1. Research results

I have submitted two articles for publication in 2025, and I expect two to three papers in 2026.

In 2025, I attended and presented my work at the workshops “Quantum Science Generation” in Trento, and “Superconductor-Semiconductor Hybrids” in Copenhagen. I presented my work locally in Oslo at the QGap seminar. Next year I will continue to present my work, but I have yet to decide on which conferences and workshops I will go to.

In 2025, I released an open-source software package for simulating the quantum systems I’m studying. I will maintain and improve this software during the next period.

2. Research Skills and techniques:
    - Training in specific new areas, or technical expertise etc:

I will deepen my knowledge of quantum technology and quantum computing and learn new skills in machine learning. As the main investigator in my project, I will be learning how to push the research into a productive and promising direction.

3. Research management:
    - Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.)

I’m not planning to apply for funding soon, but I want to develop more skills and competence in how to find promising research directions and strategies to get funding for it.

4. Communication skills

I will continue to communicate my research with talks and posters in conferences and workshops, locally and internationally.

5. Other professional training

I co-supervised a master’s student in Lund during spring 2025. I’m also supervising a master student in Oslo, who is working on his thesis.

Next year I will look to get more teaching experience.

6. Anticipated networking opportunities

I continue collaboration with groups at other institutions abroad and intend to continue with this. I want to work more closely with people here in Oslo as well and I have been discussing possible collaborations.

7. Other activities with professional relevance:

I have attended the course “PostDocTraining” which covers several aspects of career development, time management and other skills. I want to continue learning these things and especially attempt to put them into practice.

Date & Signature of fellow	Date & Signature of supervisor
26-Dec-2025	-Dec-2025