Statement of purpose for application to Masters program in Quantum Science and Engineering

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I aim to have a more educated understanding of the impact that quantum technology will have on the industry, how this technology will develop. With this statement, I will convey my interest in quantum technology and also demonstrate the skills and knowledge I have gained from my academic and extracurricular experience that will support my application to the program.

Within the domain of hardware development for quantum computing and computing in general, I am interested in nano-scale standalone and hybrid photonic systems complemented by advanced quantum architecture. In the corresponding domain of software development, I am interested in quantum computational science for development the of efficient algorithms. The active research in these fields conducted at two pillars of Quantum Science Engineering at EPFL is what motivates me to apply for the masters program.

I have studied introductory quantum optics and atomic physics in my undergraduate degree. These courses have helped me gain an understanding of the quantised light-matter interactions. They have also given an insight into how these principles can be applied to make novel devices in quantum technology. Extracurricular activities related to these topics led me to gain some programming experience for quantum computers. I used IBM's Quantum Cloud Computing service to test a simplified version of Shors algorithm.

To improve my interpersonal and leadership skills I founded the 'RoboClyde Society' at our University. This was the first team from Scotland to participate in the European Rover Challenge, where students from universities around the world come together to build a demonstration mars rover. Our team had members from the Science, Engineering, and Business faculties at the university. Leading such an interdisciplinary organisation has given me an insight into the challenges that come when working with people from different academic backgrounds. Together we won the 3^{rd} place in the remote edition of the European Rover Challenge in 2021.

My final year project 'Photon statistics of micro to nano scale lasers at threshold' gave me experience with quantum optical experimental methods. I first conducted experiments on the emission from a microlaser, and collected data for analysis. Using python I analysed the data to characterise the emission and study the noise properties of these lasers near threshold. Throughout the project I also learned about the potential application of these lasers. I am specifically interested in their application in photonic classical and quantum computing.

I would also like to briefly address the Experimental Physics II module that I 'failed' in Year 3 of my course. This was during COVID, when I experienced some financial difficulties and had to do extra part-time work which made it impossible for me to attend the lab sessions. That time was difficult, managing part-time work and university responsibilites alongwith my personal project, 'RoboClyde' all in the midst of lockdowns was stressfull. Regardless, I did the best I could in everything I was able to work on and continue to do so.

It is clear that there is a lot of potential for new companies and services to emerge from quantum tech. For example software for modelling quantum systems, bridging classical and quantum computers, fabrication of components for quantum tech, etc. Since this field is still in its infancy in the industrial scene, having a strong academic background is essential to keep up with the changes. This is why am pursuing the masters program in Quantum Science and Engineering at EPFL.