

November 28, 2024

Jun-Prof. Benedikt Fauseweh  
TU Dortmund University  
Department of Physics  
44227 Dortmund  
Germany

Dear Prof. Fauseweh,

I am writing to you to apply for the project '*Long-range Topological Superconductors as Building Blocks for Quantum Computers*'. I am a Junior Sophister student at Trinity College Dublin studying Theoretical Physics. The reasons for my application are threefold. Firstly, I am interested in condensed matter theory as a field of study. Secondly, this project is appealing to me due to its potentially impactful applications in quantum computing. Finally, an opportunity to do research in Germany would be quite exciting.

As an undergraduate student, I have recently studied, and will in the coming semester study, courses in complex analysis, linear PDEs, quantum mechanics, statistical mechanics and electrodynamics, with a heavy emphasis on the underlying mathematics. I believe many of the topics covered in these courses, as described on the TCD maths website, would allow me to garner a solid understanding of the subjects being researched, as well as providing me the tools to contribute to research. I have found these modules both enjoyable and inspiring, and have no doubt I would feel the same about such exciting research.

In addition to the high quality theoretical physics foundation I have outlined, I have also taken modules in computational physics and condensed matter physics. I therefore have a decent understanding of numerical methods, as well as their use in Python, especially as applied to physical and mathematical problems. Studying condensed matter physics has afforded me a platform on which to build my understanding of the theory.

To conclude, I am applying for this project due to my interest in the topological superconductors being researched, and the applications if the critical temperature of the studied superconductor is found to be higher than the conventional models. Thank you for your considerations.

Yours sincerely,

David Lawton.