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# **Millikelvin Confocal Microscopy of Semiconductor Membranes and Filter Functions for Unital Quantum Operations**

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The harmony of the world is made manifest in Form and Number, and the heart and soul and all the poetry of Natural Philosophy are embodied in the concept of mathematical beauty.

– D'Arcy Wentworth Thompson

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# Publications

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# Software

The following open-source software packages were developed (at least partially) during the work on this thesis.

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**Part I**

**A FLEXIBLE PYTHON TOOL FOR  
FOURIER-TRANSFORM NOISE  
SPECTROSCOPY**

## **Part II**

# **CHARACTERIZATION AND IMPROVEMENTS OF A MILLIKELVIN CONFOCAL MICROSCOPE**



**Part III**

**OPTICAL MEASUREMENTS OF  
ELECTROSTATIC EXCITON TRAPS IN  
SEMICONDUCTOR MEMBRANES**

# Introduction

1



## Conclusion & outlook

2



## **Part IV**

# **A FILTER-FUNCTION FORMALISM FOR UNITAL QUANTUM OPERATIONS**

# **APPENDIX**

