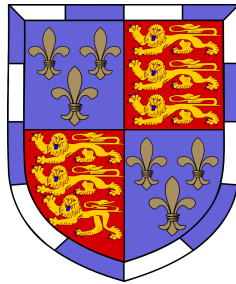




# Optimal Importance Sampling in Quantum Monte Carlo for Lattice Models



**Blaž Stojanovič**

Supervisor: Prof. A. Lamacraft

Department of Physics  
University of Cambridge

This dissertation is submitted for the degree of  
*Master of Philosophy in Scientific Computing*

St. John's College

March 2021



I would like to dedicate this thesis to . . .



## **Declaration**

I hereby declare that except where specific reference is made to the work of others, the contents of this dissertation are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other university. This dissertation is my own work and contains nothing which is the outcome of work done in collaboration with others, except as specified in the text and Acknowledgements. This dissertation contains fewer than 15,000 words including appendices, figure legends, and tables.

Blaž Stojanovič  
March 2021



## **Acknowledgements**

And I would like to acknowledge ...





## **Abstract**

This is where you write your abstract ...



# Table of contents

<b>List of figures</b>	<b>xiii</b>
<b>List of tables</b>	<b>xv</b>
<b>Nomenclature</b>	<b>xvii</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Quantum Monte Carlo . . . . .	1
1.2 Why do we Quantum Monte Carlo . . . . .	1
1.3 Where does Machine Learning come in? . . . . .	1
<b>2 Variational Autoencoders</b>	<b>3</b>
2.1 Short title . . . . .	3
<b>3 My third chapter</b>	<b>5</b>
3.1 Convolutions . . . . .	5
<b>References</b>	<b>7</b>
<b>Appendix A Jax ecosystem</b>	<b>9</b>
<b>Appendix B Additional results</b>	<b>11</b>



## List of figures



## List of tables





# Nomenclature

## Acronyms / Abbreviations

CNN Convolutional Neural Network

DL Deep Learning

DMC Diffusion Quantum Monte Carlo

GAN General Adversarial Network

ML Machine Learning

NN Neural Network

QMC Quantum Monte Carlo

VAE Variational Autoencoder

VMC Variational Quantum Monte Carlo



# **Chapter 1**

## **Introduction**

### **1.1 Quantum Monte Carlo**

hello? [1]

### **1.2 Why do we Quantum Monte Carlo**

### **1.3 Where does Machine Learning come in?**



# **Chapter 2**

## **Variational Autoencoders**

### **2.1 Reasonably long section title**



# **Chapter 3**

## **My third chapter**

### **3.1 Convolutions**





# References

- [1] Kingma, D. P. and Welling, M. (2013). Auto-encoding variational bayes. *arXiv preprint arXiv:1312.6114*.



# **Appendix A**

## **Jax ecosystem**



## **Appendix B**

### **Additional results**

