

JOSH IZAAC

EMAIL: josh.izaac@uwa.edu.au

EDUCATION

- MAR 2013 **Doctor of Philosophy in Physics**
UNIVERSITY OF WESTERN AUSTRALIA | Supervisor: Prof. Jingbo WANG
Thesis: *Continuous-time Quantum Walks & Applications*
- JAN 2012 **Bachelor of Science (Hons) in Physics**
UNIVERSITY OF WESTERN AUSTRALIA | Supervisor: Jingbo WANG
WEIGHTED AVERAGE MARK: 91.4% | GPA: 7.0/7.0 | FIRST CLASS HONOURS
Thesis: *Continuous-time Quantum Walks: Disorder, Resonance & Interactions*
- MAR 2009 **Bachelor of Science in Physics and Applied Mathematics**
UNIVERSITY OF WESTERN AUSTRALIA
WEIGHTED AVERAGE MARK: 92.1% | GPA: 6.9/7.0

RESEARCH EXPERIENCE

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| Current
MAR 2013 | Doctor of Philosophy (Physics)
UNIVERSITY OF WESTERN AUSTRALIA Supervisor: Prof Jingbo WANG
Working with the Quantum Dynamics and Computation research group, exploring possible real world applications of quantum walks. Preliminary work involves investigating quantum walk based models of electron transport in molecules, in collaboration with Prof. Dylan Jayatilaka of the Computational Quantum Chemistry research group. |
| NOV 2012-MAR 2013 | iVEC Internship
UNIVERSITY OF WESTERN AUSTRALIA Supervisor: Asst/Prof Peter METAXAS
Worked with the spintronics and magnetisation dynamics research group at UWA, investigating hybrid vortex-domain wall dynamics. This work was performed using the iVEC-managed Fornax supercomputer, requiring high performance computing techniques using GPUs in addition to a good physical understanding of nanomagnetism, and could lead to significant advances in manufacturing non-volatile memory storage devices. |
| JAN-NOV 2012 | Bachelor of Science (Hons.) Research Project
UNIVERSITY OF WESTERN AUSTRALIA Supervisor: Prof Jingbo WANG
Exploring the physical dynamics and quantum computational potential of quantum walks. Due to the complex numerical analysis required, a majority of the research is performed using the iVEC supercomputing facilities. |
| JAN-FEB 2011 | UWA School of Physics Vacation Scholarship
UNIVERSITY OF WESTERN AUSTRALIA Supervisor: Prof Mike TOBAR
Investigated high-Q sapphire resonators and their measurement at low temperatures using Time-domain Reflectometry on an Agilent network analyser. |
| JULY 2008 | CSIRO Student Research Scheme
CURTIN UNIVERSITY Supervisor: Prof Roland DE MARCO
Investigated ion selective electrodes and nanocharacterisation of high quality thin film sensors using atomic force microscopy. |

PUBLICATIONS

- [1] J. A. Izaac, J. B. Wang, and Z. J. Li. Continuous-time quantum walks with defects and disorder. *Physical Review A*, 88(4):042334, October 2013.
- [2] Z. J. Li, J. A. Izaac, and J. B. Wang. Position-defect-induced reflection, trapping, transmission, and resonance in quantum walks. *Physical Review A*, 87(1):012314, January 2013.

SCHOLARSHIPS AND AWARDS

- 2012 Hackett Postgraduate Scholarship (AUD\$35,000 per annum)
Awarded to the top-ranked applicants in the university-wide postgraduate application round
- 2011 John and Patricia Farrant Scholarship
Awarded to the top student in 3rd year physics who plans to undertake honours study
Physics (Level 3) Prize
Awarded to the top student in 3rd year physics
- 2010 Convocation, the UWA Graduates Association Prize – Physics, Geology & Chemistry
Digby Fitzhardinge Memorial Prize
Awarded to the top student in 2nd year physics
- 2009 Convocation, the UWA Graduates Association Prize – Physics, Geology & Chemistry
Lady James Prize in Chemistry
Awarded to the top student in 1st year chemistry

TEACHING

Current Employment	
FEB-MAY 2013	Class Tutor, University of Western Australia TUTOR FOR THIRD YEAR/HONOURS COMPUTATIONAL PHYSICS This involved helping students tackle problems in physics and mathematics through the use of various numerical algorithms, as well as providing FORTRAN and UNIX support.
AUG-SEP 2012	MARKER FOR THIRD YEAR QUANTUM COMPUTATION Compiled assignment solutions and marked third year physics students. This required a good understanding of introductory quantum computing in order to produce detailed solution guides.
FEB-JULY 2012	TUTOR FOR SECOND YEAR COMPUTATIONAL MATHEMATICS This involved helping students with problems in applied mathematics/physics, and demonstrating how computational tools such as Mathematica can be used to complement traditional methods (for instance via numerical methods, visualization).
Past Employment	
OCT 2010-JUN 2012	Tutoring Australasia Pty Limited SUBJECT SPECIALIST TUTOR (MATHS AND SCIENCES) <ul style="list-style-type: none">Effectively collaborate with team members to ensure that knowledge and information is shared between tutors, enabling superior educational outcomes for students.Provide high quality subject support for Tutors as part of normal duties.
MAY 2009-OCT 2010	TUTOR (MATHS, SCIENCES AND ASSIGNMENT RESEARCH) <ul style="list-style-type: none">Apply educational techniques to ensure that the individual learning needs of students are met.Knowledge of contemporary educational techniques and practices.Demonstrated ability to lead valuable learning experience.

COMPUTER SKILLS

Basic Familiarity: Visual Basic, Matlab, C#, C
Advanced Proficiency: Mathematica, FORTRAN, Python, Unix-based systems,
Bash scripting, \LaTeX , Excel, Word, PowerPoint

Experience using high performance computational tools such as OpenMP, CUDA and MPI

INTERESTS AND ACTIVITIES

Technology, Open-Source, Programming
Kayaking (*Two Star Award*), Piano (*Sixth Grade*)
Taekwondo (*Low Red belt, 5th Kup*), Travelling

RESEARCH INTERESTS

Quantum walks, whilst a relatively new area of research, have become an incredibly exciting field due to their potential applications in quantum information theory and quantum simulations; perhaps even leading to the future production of quantum computers and with that the possibility of revolutionizing the way we carry out computation and information processing.

My current research interests mainly lie in the characterisation and applications of quantum walks, with specific focus on quantum simulation of complex biochemical systems such as photosynthesis and electron transport in functional nano-materials. This requires a high degree of analytic and computational work, and enabled me to develop a high level of expertise using high performance computing techniques. With the growing importance of high performance computing in physical research, these skills have enabled me to cross disciplines, and perform magnetisation dynamic simulations that could lead to significant advances in manufacturing non-volatile memory storage devices.

REFERENCES

Professor Jingbo WANG +618 6488 3790	Doctoral Supervisor, School of Physics University of Western Australia , Crawley
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Winthrop Professor Ian McARTHUR +618 6488 2737	Head of School of Physics University of Western Australia , Crawley
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