CHRISTOPHER SYMONDS

PERSONAL INFORMATION

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PROFILE

I am a doctoral student in the final stages of my PhD, expecting to submit my thesis in late august/early september. I am a proactive researcher with experience in quantum molecular dynamics methods, the study of ultrafast chemical processes and theoretical method development.

EDUCATION

PhD in Computational Chemistry

2012-Present **University of Leeds** *School of Chemistry*

Thesis: *Simulation of Quantum Effects by use of the Coupled Coherent States Family of Methods*

Description: My work during this project has focussed on applying the Coupled Coherent States (CCS) approach and Multi-Configurational Ehrenfest (MCE) method to various systems, most notably using CCS to simulate high harmonic generation in a single electron system, and discovering and compensating for differences in numerical behaviour of simulations using the two formulations of the MCE method. So far this has resulted in one publication (Phys. Rev. A, 91, 023427 (2015)), with another two in preparation. This work involved creating and expanding a large, modular and adaptable program using Fortran95 which was capable of using different equation sets and Hamiltonians without significant rewrites.
Advisor: Prof. Dmitry Shalashilin, D.Shalashilin@leeds.ac.uk

Integrated MPhys in Physics

2008-2012 **University of Leeds** *School of Physics and Astronomy*

Classification - *1st Class (Hons)*

Description: My final year MPhys project involved investigating the properties and uses of microwave cavities, both experimentally and through simulation, with an emphasis on cavity-QED for quantum computation purposes.
Advisor: Prof. Ben Varcoe, B.Varcoe@leeds.ac.uk

Foundation Year

2007-2008 **University of Manchester**

Passed with 85% grade, equivalent to AAA at A level in Maths, Further Maths and Physics

A-Levels

2001-2004 **Notre Dame RC Sixth Form College**

Computing – B, Maths – C, Physics – C

RESEARCH INTERESTS

My main research interests remain in the investigation of fast processes using quantum mechanics, use of quantum optics and in the development of theoretical methods.

TEACHING EXPERIENCE

- I help with teaching in the undergraduate labs, which involves interview-based marking and helping students with software based or mathematical queries.
- Help also with a weekly workshop for the "Physics for Chemists" first year module which involves helping students with simple physics and mathematics problems.
- In the final year of my undergraduate degree I took the module "Physics in Schools", which placed me in a Leeds high school one afternoon a week, where it was my job to run an after school science club for age 11-13 students, performing demonstration experiments, teaching the science behind the experiments and planning and supervising more hands on sessions.

SKILLS

Computational and Programming Skills

- Over the course of my PhD I have learnt to be proficient in Fortran, bash and the use of OpenMP, git, gnuplot, OriginPro and the SunGrid Engine
- I have attended workshops on program optimisation, profiling, and systematic debugging as well as a week long summer school on high performance computing run by the Hartree centre which covered topics from system architecture to parallel programming.

Communication Skills

- Over the course of my PhD I have presented my work at regional, national and international conferences, as well as at internal seminars and conferences within the department.
- Through this experience I have learnt how to explain complex ideas in terms accessible to non-specialists and how to explain and defend my work succinctly and confidently.
- My written communication skills are also well developed, and in addition to my publications and preparing various reports during my time at Leeds I regularly help with editing the work of others in the group.

Self Management

- Over the course of work towards my PhD, it has been necessary to set my own targets and deadlines, set weekly and monthly goals and manage my time properly to meet my targets.
- Have been able to balance the heavy workload of both my undergraduate and postgraduate study with my responsibilities as a parent.

Teamwork

- Much of the work over the past few years has required collaboration with others, both within the research group and in other groups in other departments or universities.

RELEVANT WORK EXPERIENCE

University of Leeds

2012-Present **Post Graduate Demonstrator** School of Chemistry

Consists of helping and marking the work of second year students in the undergraduate experimental labs and also helping with the teaching ofd the first year students in the "Physics for Chemists" module

University of Leeds

2012,2011,2010 **Summer Research Student** Experimental Quantum Information

Worked for two consecutive summers in the Experimental Quantum Information labs on development of a magnetic cardiogram, and in the summer of 2012 worked in the same labs helping a MSc student in the completion of his experimental work.

PUBLICATIONS

Physical Review A

February 2015 **Coupled-Coherent States Approach for High Harmonic Generation**

Authors: C. Symonds, J. Wu, M. Ronto, C. Zagoya, D. Shalashilin, C.F. de M. Faria

Journal of Physical Chemistry A

In Preparation **Multidimentional quantum simulations of model systems and ab initio first principle quantum direct dynamics of ultrafast photochemistry with Multiconfigurational Ehrenfest approach.**

Authors: D. Makhov, K Saita, C. Symonds, D. Shalashilin

Journal of Chemical Physics

In Preparation **Multiple Cloning corrections to the Multi-Configurational Ehrenfest approach - application to the Spin Boson Model**

Authors: C. Symonds, D. Shalashilin

FUNDING AND AWARDS

2012 · University of Leeds School of Chemistry Doctoral Training Grant

2011 · Nuffield Summer Research Scholarship

2009 · Derek Moody Award for Academic Excellence

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