

# Andrew R. McCluskey

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## Education

### University of Bath(UBath)/Diamond Light Source(DLS)

BATH/HARWELL-OXFORD, UK

PHD IN CHEMISTRY

SEPT. 2015 - MAR. 2019

- Undertaking a PhD supervised by Prof. Karen Edler (UBath), Prof. Stephen Parker (UBath), Dr Andrew Smith (DLS) and Dr Jonathan Rawle (DLS)
- Developing computational methodologies and software to improve the analysis of small angle scattering, reflectometry, and grazing incidence small angle scattering
- Applying classical atomistic and coarse-grained simulations to the study of soft matter systems
- Implementing high-performance optimisation algorithms to rationalise experimental scattering data
- Collaborative project co-funded by Diamond Light Source and the University of Bath
- Participated in many small angle scattering and reflectometry experiments at Diamond Light Source and ISIS Neutron and Muon Source

### University of Edinburgh

EDINBURGH, UK

MCHEM IN MATERIALS CHEMISTRY WITH A YEAR IN INDUSTRY

SEPT. 2010 - JUN. 2015

- Degree Classification: **First Class**
- Spent one year learning practical soft matter chemistry/physics skills in industry at Cytec Industries
- Masters research project: Collagen self-assembly using cryo-TEM

## Research Experience

### The Nudelman Group, University of Edinburgh

EDINBURGH, UK

MASTER'S PROJECT STUDENT & SUMMER RESEARCH STUDENT

SEPT. 2014 - APR. 2015

- Using cryogenic transmission electron microscopy to investigate self-assembly of collagen.
- Presented work at a national conference (First Joint Meeting of the Scottish Microscopy Group & Microscopy Society of Ireland) as well as regularly at group meetings.

### Cytec Industries

STAMFORD, USA

TEMPORARY RESEARCH INTERN

JUN. 2013 - JUN. 2014

- Conducted research on the functionalisation and application of polyelectrolyte emulsions.
- Developed skills related to statistical analysis, including significance testing and design of experiments.
- Presented work at group meeting and wrote monthly reports to keep group members updated on progress.

## Teaching Experience

### University of Bath

BATH, UK

PHYSICAL CHEMISTRY TUTOR

SEPT. 2015 - PRESENT

- Running physical chemistry tutorials for first year natural sciences undergraduate students.
- Pioneered the use of Jupyter Notebooks in tutorials to both aid in the students understanding of the physical chemistry while introducing programming concepts.

COMPUTATIONAL LABORATORY DEMONSTRATOR

JAN. 2016 - PRESENT

- Helped in the running and development of first and second year undergraduate laboratory exercises, with a focus on the teaching of basic programming skills in Python and classical molecular dynamics.

MATHEMATICS FOR CHEMISTRY LECTURER

SEPT. 2016 - MAR. 2017

- Delivery of workshops in fundamental mathematical concepts for chemists, ensuring that all chemistry first year students had consistent mathematical background.

X-RAY & NEUTRON TECHNIQUES FOR CHEMISTS LECTURER

JAN. 2016 - PRESENT

- Delivery of workshops devoted to the analysis of small angle scattering and reflectometry as a component of a final year undergraduate course.

INTRODUCTION TO UNIX & PROGRAMMING LECTURER AND DEMONSTRATOR

FEB. 2018 - DEC. 2018

- Contributed a series of practical workshop designed to introduce PhD student from through-out the university of Unix and programming.
- Included leading a "Introduction of Python" workshop, based on Software Carpentry materials.

## ISIS Neutron Training Course

HARWELL-OXFORD, UK

### LECTURER

MAR. 2017 - PRESENT

- Twice invited to lecture at the ISIS Neutron Training Course.
- Developed and delivered a one hour lecture and interactive tutorial introducing classical molecular dynamics simulations and showing how they can be applied to neutron scattering.

## SASSIE Training Course

VARIOUS, UK

### DEMONSTRATOR

MAR. 2017 - PRESENT

- Aided in the demonstration of the SASSIE biological small angle scattering package at training events for PhD students and Postdocs.

## Python in Chemistry

BATH, UK

### CONTRIBUTOR

NOV. 2017 - PRESENT

- Actively contributing to the pythoninchemistry project developed by the University of Bath.
- Developing teaching resources that introduce my basic concepts from programming, such as functions, loops, and plotting.

# Computational Skills

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## PROGRAMMING FLUENCY

**Beginner** FORTRAN90, SQL, Julia

**Experienced** C, C++, OpenMP, MPI, Qt

**Expert** Python, Git

## SOFTWARE DEVELOPMENT

**pylj** pylv is an open-source Python library to facilitate student interaction with classical atomistic simulation. It is designed to operate within the Jupyter notebook framework, making it easy to implement in the classroom, or computer lab. pylv has been published in the Journal of Open-Source Education.

**refnx** refnx is a python package for the fitting of neutron and X-ray reflectometry data. I am a power-user of this software and have recently worked to contribute the analysis of molecular simulation input. this project is currently led by Andrew Nelson (ANSTO).

# Memberships & Committees

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## RSC/IOP Neutron Scattering Group Committee

### EARLY CAREER REPRESENTATIVE

JUN. 2017 - PRESENT

- Served as a member of the NSG Committee offering the insight of student and early career members.

## UK Research Software Engineer Association

### MEMBER

JUN. 2017 - PRESENT

- A member of UKRSE, a community and awareness organisation for the UK's Research Software Engineers.

## Royal Society of Chemistry

### ASSOCIATE MEMBER (POSTGRADUATE)

SEPT. 2010 - PRESENT

- Member of the RSC since start of undergraduate.

# Prizes & Funding

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2018/10/12 **IUCr Journals Prize for the Best Student Lecture**, SAS2018

2018/08/28 **Travel Fund to Attend VICEPHEC18**, University of Bath Travel Fund for Teaching Development – £135

2018/08/28 **Group Bursary to Attend VICEPHEC18**, Royal Society of Chemistry Teriary Education Group Bursary – £70

2018/06/14 **The Computational Prize – Best Oral Presentation**, University of Bath Bolland Symposium

2018/05/17 **Nominated for Faculty Teaching Assistant Award**, University of Bath Faculty of Science

2017/06/12 **Best Talk Award – Sponsored by Santander**, University of Bath Faculty of Science Graduate School Research Afternoon

2017/04/11 **Research Student Travel Grant**, Armourers & Brasiers' Gauntlet Trust – £900

# Publications

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5. Andrew R. McCluskey, James Grant, Adam R. Symington, Tim Snow, James Douth, Benjamin J. Morgan, Stephen C. Parker, & Karen J. Edler., 2019. Introducing classical molecular dynamics simulation to users of scattering. (*In Preparation*)
- Andrew R. McCluskey, James Grant, Andrew J. Smith, Jonathan L. Rawle, David J. Barlow, M. Jayne Lawrence, Stephen C. Parker, & Karen J. Edler., 2019. Applying molecular simulation to the analysis of lipid monolayer reflectometry. (*Submitted*). Preprint available on arXiv: <https://arxiv.org/abs/1901.05514>
3. Andrew R. McCluskey, Adrian Sanchez-Fernandez, Karen J. Edler, Stephen C. Parker, Andrew J. Jackson, Richard A. Campbell, & Tom Arnold., 2019. Bayesian determination of the effect of a deep eutectic solvent on the structure of lipid monolayers. (*Submitted*). Preprint available on arXiv: <https://arxiv.org/abs/1810.07616>
2. Andrew R. McCluskey, Benjamin J. Morgan, Karen J. Edler, & Stephen C. Parker., 2018. pylj: A teaching tool for classical atomistic simulation. *J. Open Source Educ.*, 1(2), 19. DOI: 10.21105/jose.00019
1. Andrew R. McCluskey, & Karen J. Edler., 2018. Model-dependent small-angle scattering for the study of complex organic materials. *Curr. Org. Chem.*, 22(8), 750-757. DOI: 10.2174/1875692115666170612104439

## Presentations

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### INVITED TALKS

2017/06/19	<b>Surfactants and Molecular Dynamics</b> , CCP-SAS Joint Meeting, Cardiff University	CARDIFF, UK
2017/06/12	<b>Putting computers to work for large experiments</b> , Faculty of Science Graduate School Research Afternoon, Bath University – <b>Best Talk Award</b>	BATH, UK
2016/05/23	<b>SAS, Sims and Soft Matter Self-Assembly</b> , CCP-SAS Joint Meeting, NIST	GAITHERSBURG, USA

### CONTRIBUTED TALKS

2018/10/30	<b>Comparing coarse-grained simulation-derived and traditional analysis method for monolayer reflectometry</b> , TRENDS AND PERSPECTIVES IN NEUTRON INSTRUMENTATION	TUTZING, GERMANY
2018/10/12	<b>Using high-performance computing and molecular dynamics to rationalise micelle structure from small angle scattering</b> , SAS2018	TRAVERSE CITY, USA
2018/10/09	<b>pylj: an open-source Python library for teaching the interaction between molecular simulation and scattering</b> , SAS2018 – <b>Best Student Lecture Prize</b>	TRAVERSE CITY, USA
2018/09/16	<b>Introducing programming to undergraduate chemists: and the tools we've developed to help them</b> , PYCON UK	CARDIFF, UK
2018/08/23	<b>Introducing programming to undergraduate chemists: and the tools we've developed to help them</b> , VICEPEC18	SHEFFIELD, UK
2018/06/14	<b>Using markov chain monte-carlo to estimate uncertainties in x-ray reflectometry modeling</b> , University of Bath Bolland Symposium	BATH, UK
2018/02/09	<b>Probabilistic analysis of reflectometry data: Phospholipids at the DES-air interface</b> , Neutrons and Global Challenges II: Health and Healthcare	LONDON, UK
2017/09/12	<b>Simulations to understand reflectivity: How coarse can we go?</b> , CCP5 AGM	GLASGOW, UK
2017/04/13	<b>Simulations to understand reflectivity: How coarse can we go?</b> , Faraday Joint Interest Group Conference	WARWICK, UK
2017/03/23	<b>Coarse graining and reflectivity: a love story?</b> , CompChem Seminar, University of Bath	BATH, UK
2017/02/28	<b>Reflectivity: from simulation to experiment</b> , International Soft Matter Workshop	HELFORD, UK
2016/06/23	<b>Smart analysis of soft matter</b> , Bombannes Summer School	BOMBANNES, FRANCE
2016/01/28	<b>Nanodisc models for calculation of small angle scattering patterns</b> , SMALP Meeting 2016	BIRMINGHAM, UK

### POSTER PRESENTATIONS

2018/12/17	Solid State Chemistry Group Christmas Meeting 2018	LONDON, UK
2018/04/26	UK Neutron and Muon Science and User Meeting	WARWICK, UK
2017/06/28	UK Neutron and Muon Science and User Meeting	WARWICK, UK
2017/06/06	canSAS-IX	BERKELEY, USA
2017/02/07	ESRF User Meeting	GRENOBLE, FRANCE
2016/11/21	BornAgain Workshop	MUNICH, GERMANY
2016/11/16	GISAXS2016	HAMBURG, GERMANY
2016/11/07	ISIS Student Meeting	ABINGDON, UK
2016/07/27	UK Neutron and Muon Science and User Meeting	WARWICK, UK
2016/07/20	M4 Colloids	BATH, UK
2016/06/13	Molecular Simulation @ Bristol	BRISTOL, UK
2016/06/06	Diamond Science Away Day	OXFORD, UK
2016/05/23	CCP-SAS Joint Meeting, NIST	GAITHERSBURG, USA
2016/04/13	2nd Conference on Multiscale Modelling of Condensed Phase and Biological Systems	MANCHESTER, UK
2016/04/04	Solutions in the Spring	CAMBRIDGE, UK
2014/11/27	First Joint Meeting of the Scottish Microscopy Group & Microscopy Society of Ireland	GLASGOW, UK