

Matthew Evans

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*ab initio calculations • energy storage
crystal structure databases • software development*

Education

- 2016– **PhD Physics**, University of Cambridge, *Expected graduation 2019*.
2015–2016 **MPhil Scientific Computing**, University of Cambridge, *Distinction*.
2011–2015 **MPhys Physics with Theoretical Physics**, University of Manchester, *First Class (Hons)*.

Research interests & Experience

- PhD Crystal structure prediction for energy storage applications**
with Dr Andrew Morris
Discovery and computational characterisation of novel high-capacity anode materials for Li and Na-ion batteries, using *ab initio* random structure searching (AIRSS) and related approaches.
- MPhil High-throughput *ab initio* materials discovery**
with Dr Andrew Morris
Database approaches to materials design; wrote a software package, [MATADOR](#), to aggregate and analyse the results of first-principles calculations.
- MPhys Electronic structure of defects of graphene superlattices**
with Prof Francisco Guinea
Nearly-free electron model of graphene/h-BN superlattices with arbitrary defects included via Green's function methods. Awarded Tessella Prize for development of a high-performance Python code to perform the computation and analysis.
- UG Interactions of quantised vortices in superfluid helium**
with Dr Paul Walmsley & Prof Andrei Golov (*University of Manchester*)
Spent two summers developing [vfmcpp](#), a C++/OpenMP implementation of the vortex filament model of superfluid helium, to study microscopic vortex dynamics and reconnection events [1].
- UG Hard sphere packing of nanotube-encapsulated fullerenes**
with Dr Ho-Kei Chan & Prof Elena Besley (*University of Nottingham*)
Application of a novel hard sphere packing regime to study CNT-encapsulated C₆₀ molecules.

Teaching Experience

- 2016–2018 Supervisor: Part IB Electromagnetism, Dynamics and Thermodynamics, (*Selwyn College*).
2016–2018 Demonstrator: Part IB Computational Physics (C++), (*Cavendish Laboratory*).
2016–2017 Volunteer: Key Stage 2 Code Club (*Ridgefield Primary School, Cambridge*).
2016 Demonstrator: Graduate-level Electronic Structure, (*Cavendish Laboratory*).
2016 Demonstrator: CASTEP Workshop (*Oxford*) (x2), HPC Autumn Academy (*Cambridge*).

- 2012–2015 Tutor: GCSE Maths & Key Stage 2 Programming for [The Tutor Trust](#), (*Manchester*).
- Provided tuition to small groups and ‘looked after children’ across 15 schools.
 - Helped lead a successful pilot to teach primary school children programming using Scratch.

Computing

Exposure: **Daily**, Intermittant, *Occasional*.

Languages	Python , Fortran, C++, <i>Rust</i>	Databases	MongoDB , <i>SQL</i>
Computation	CASTEP , Quantum Espresso	Packages	NumPy , spglib , Jupyter
Platforms	Linux , <i>*nix</i>	HPC Facilities	ARCHER, Thomas, BNL, Darwin
Software	vim , \LaTeX , Inkscape, GIMP	Utilities	git , Docker, GNU toolchain
Data viz	matplotlib , Bokeh, d3.js, seaborn	Web	<i>JavaScript</i> , <i>HTML</i> , <i>CSS</i>

Conferences & Presentations

- 2017 Second conference of Research Software Engineers, Volunteer, University of Manchester
- 2017 CASTEP Developer Workshop, Demonstrator and Poster Presentation, University of Oxford
- 2017 13th RSC Conference in Materials Chemistry, Poster Presentation, University of Liverpool
- 2017 STFC Annual Battery Meeting, Attendee, Abingdon
- 2017 CCP9 Young Researchers Event, Poster Presentation, University of Cambridge
- 2016 High Performance Computing Autumn Academy, Presenter, University of Cambridge
- 2016 SMARTER5, Poster Presentation, University of Bayreuth, Germany
- 2016 CASTEP Workshop, Demonstrator and Poster Presentation, University of Oxford
- 2016 CCP9 Young Researchers Event, Poster Presentation, University of York
- 2015 High Performance Computing Autumn Academy, Attendee, University of Cambridge
- 2015 CASTEP Workshop, Attendee, University of Oxford

Publications

- [1] T. Zhu, **M. L. Evans**, R. A. Brown, P. M. Walmsley, and A. I. Golov. Interactions between unidirectional quantized vortex rings. *Phys. Rev. Fluids*, 1:044502, Aug 2016.

Referees

Dr Andrew Morris, University of Birmingham; ajm255@cam.ac.uk
 Prof Francisco Guinea, University of Manchester; paco.guinea@icm.csic.es
 Dr Paul Walmsley, University of Manchester; paul.walmsley@manchester.ac.uk