

# Matthew Evans

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📧 [ml-evs](#)

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

## EDUCATION

- 2016– **PhD Physics**, *Theory of Condensed Matter Group*, 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 next-generation energy storage applications**  
with Dr Andrew Morris (*University of Cambridge*)  
Discovery and computational characterisation of novel high-capacity anode materials for Li-, Na- and K-ion batteries, using *ab initio* random structure searching (AIRSS) and evolutionary approaches, implemented in the [ilustrado](#) package. PhD research undertaken as a member of the EPSRC CDT for Computational Methods in Materials Science.
- MPhil High-throughput *ab initio* materials discovery**  
with Dr Andrew Morris (*University of Cambridge*)  
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 in graphene superlattices**  
with Prof Francisco Guinea (*University of Manchester*)  
Nearly-free electron model of graphene/h-BN superlattices with arbitrary defects included via Green's function methods. Awarded Tessella Prize for software development.
- 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 C<sub>60</sub> molecules.

## TEACHING

- 2016– Supervisor: Part IB Electromagnetism, Dynamics and Thermodynamics, (*Selwyn College*).  
2016– 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	<b>Python</b> , Fortran, C++, <i>Rust</i>	Databases	<b>MongoDB</b> , <i>SQL</i>
DFT	<b>CASTEP</b> , Quantum Espresso	Packages	<b>NumPy</b> , <b>spglib</b> , <b>Jupyter</b>
Platforms	<b>Linux</b> , <i>*nix</i>	HPC Facilities	ARCHER, CSD3, BNL
Software	<b>vim</b> , <b>LaTeX</b> , Inkscape, GIMP	Utilities	<b>git</b> , Docker, GNU toolchain
Data viz	<b>matplotlib</b> , Bokeh, d3.js, seaborn	Web	<i>JavaScript</i> , <i>HTML</i> , <i>CSS</i>

## (CONFERENCES + PRESENTATIONS)

- 2018 Total Energy and Force Methods, Poster Presentation, University of Cambridge
- 2017 *Crystal structure prediction for next-generation battery anodes* ([slides](#)), Invited Talk, Solid State Seminar Series, University of Cambridge
- Second conference of Research Software Engineers, Volunteer, University of Manchester
- CASTEP Developer Workshop, Demonstrator and Poster Presentation, University of Oxford
- 13th RSC Conference in Materials Chemistry, Poster Presentation ([link](#)), University of Liverpool
- STFC Annual Battery Meeting, Attendee, Abingdon
- CCP9 Young Researchers Event, Poster Presentation, University of Cambridge
- Scientific Computing Day, Poster Presentation, University of Cambridge
- 2016 High Performance Computing Autumn Academy, Presenter, University of Cambridge
- SMARTER5, Poster Presentation, University of Bayreuth, Germany
- CASTEP Workshop, Demonstrator and Poster Presentation, University of Oxford
- CCP9 Young Researchers Event, Poster Presentation, University of York
- 2015 High Performance Computing Autumn Academy, Attendee, University of Cambridge
- CASTEP Workshop, Attendee, University of Oxford

## PUBLICATIONS

3. **M. L. Evans**, Griffith, K. J. & Morris, A. J. Sn-P anodes for K-ion batteries: insights from *ab initio* structure prediction. (*in preparation*), (2018).
2. Marbella, L. E. *et al.* (De)Sodiation via Helical Phosphorus Intermediates in High Capacity Anodes for Sodium-ion Batteries. (*submitted*), (2018).
1. Zhu, T., **M. L. Evans**, Brown, R. A., Walmsley, P. M. & Golov, A. I. Interactions between unidirectional quantized vortex rings. *Phys. Rev. Fluids* **1**, 044502, (2016). DOI:[10.1103/PhysRevFluids.1.044502](#). arXiv:[1603.04313](#).

## REFEREES

Dr Andrew Morris, University of Birmingham; [ajm255@cam.ac.uk](mailto:ajm255@cam.ac.uk)

Prof Francisco Guinea, University of Manchester; [paco.guinea@icm.csic.es](mailto:paco.guinea@icm.csic.es)

Dr Paul Walmsley, University of Manchester; [paul.walmsley@manchester.ac.uk](mailto:paul.walmsley@manchester.ac.uk)

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