

# Boris Andrews CV

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 [borisandrews.github.io](https://borisandrews.github.io)

## EDUCATION

- 2021 – 2025 **University of Oxford, PhD (DPhil) in Mathematics (Numerical Analysis)**  
(predicted)
  - Thesis: *Structure-preserving FEMs via auxiliary variables: conservative & accurately dissipative integrators / global & local structures for BVPs*
  - Supervisors: [Patrick Farrell](#), [Wayne Arter](#)
- 2017 – 2021 **University of Oxford, Integrated Masters in Mathematics (MMath), First (Distinction)**  
  - Thesis: *Computation and approximation properties of near orthogonal matrices for tall random matrices*
  - Supervisor: [Yuji Nakatsukasa](#)

## RESEARCH INTERESTS

**Structure-preserving numerical methods for PDEs & ODEs**, Conservation & dissipation structures | Global & local energy estimates & conservation laws | Asymptotic-preserving integrators | Geometric machine learning

**Finite element theory**, Finite element exterior calculus (FEEC) | Domain decomposition | Parallel in time (PinT)

**Plasma modelling**, Magnetohydrodynamics (MHD) | Hybrid fluid-particle models

**Turbulent systems**, Stabilisation | Preconditioning

## PUBLICATIONS & PREPRINTS

- Preprints **High-order conservative and accurately dissipative numerical integrators via auxiliary variables**, with [Patrick Farrell](#), 16 July 2024  
  - In review: *Foundations of Computational Mathematics*
- Upcoming (Draft on request) **High-order structure-preserving discretisation for ideal MHD arising in the Parker problem**, with [Mingdong He](#), [Kaibo Hu](#), [Patrick Farrell](#)  
**Structure-preserving finite-element methods for inhomogeneous boundary-value problems via auxiliary variables**  
**High-order conservative–dissipative integrators for reversible–irreversible systems**  
**An augmented Lagrangian preconditioner for natural convection at high Reynolds number**, with [Alexei Gazca](#), [Patrick Farrell](#), [Benjamin Castellaz](#)  
**High-order fully conservative integrators for integrable ODE systems**  
**High-order asymptotic-preserving integrators for charged particles in arbitrary magnetic fields**
- Upcoming **Conservative integrators exhibit greater stability than symplectic integrators on the Toda lattice**, with [Sebastian Ohlig](#), [Patrick Farrell](#)

## PROGRAMMING LANGUAGES

**Experienced:** Python (*Firedrake*), MATLAB, LaTeX | **Limited:** Julia, C, Fortran, HTML

## PRIZES, AWARDS AND SCHOLARSHIPS

- 2021 – 2025 **DPhil studentship**, *Engineering and Physical Sciences Research Council (EPSRC)*  
**DPhil studentship**, *United Kingdom Atomic Energy Authority (UKAEA)*
- 2017 – 2021 **Foundation scholarship**, *Worcester College, University of Oxford*  
**Collection prizes**, *Worcester College, University of Oxford*

## SEMINAR, WORKSHOP AND CONFERENCE PRESENTATIONS

(\*scheduled/provisional)

- 2025 **EMS school on Mathematical Modelling, Numerical Analysis and Scientific Computing\*** (*Kácov, Czechia*) | **Invited talk\*** (*Brown University*) | **Firedrake User Meeting USA\*** (*Fort Worth, Texas*) | **Numerical Mathematics & Scientific Computing seminar\*** (*Rice University*)
- 2024 **External seminar** (*Rice University*) | **Computing Division technical meeting** (*UKAEA*) | **Firedrake User Meeting** (*University of Oxford*) | **PDEsoft** (*University of Cambridge*) | **European Finite Element Fair** (*University College London*) | **Exploiting Algebraic and Geometric Structure in Time-integration Methods workshop** (*University of Pisa*) | **UKAEA PhD student engagement day** (*UKAEA*) | **Junior Applied Mathematical Seminar** (*University of Warwick*)
- 2023 **ICIAM 2023** (*Waseda University*) | **Numerical analysis group internal seminar** (*University of Oxford*) | **Junior Applied Mathematics Seminar** (*University of Oxford*) | **Met Office presentation** (*University of Oxford*)
- 2022 **PRISM workshop** (*Missenden Abbey, UK*) | **PRISM workshop** (*Missenden Abbey, UK*)

## PROFESSIONAL EXPERIENCE

- Sep – Oct **University of Oxford**, *Supervision of summer internship*, [Sebastian Ohlig](#)  
2024 ○ Project: *Stability study of conservative vs. symplectic integrators on the Toda lattice*
- Aug – Oct **Tokamak Energy**, *Internship*, *Physics: theory and modelling*  
2022 ○ Project: *Implementation of non-Maxwellian backgrounds in the GENE gyrokinetic code*  
○ Supervisor: [Salomon Janhunen](#)
- Jul – Aug **Perm State University**, *Internship*, *Computational fluid dynamics*  
2019

## TEACHING EXPERIENCE

- 2024 – 2025 **Tutor**, *University of Oxford*, *Computational Mathematics*
- 2023 – 2024 **Tutor**, *University of Oxford*, *Prelims corner*  
**Teaching assistant**, *University of Oxford*, *Numerical Linear Algebra*
- 2021 – 2022 **Teaching assistant**, *University of Oxford*, *Random Matrix Theory*  
**Tutor**, *Oriel College, University of Oxford*, *Analysis I*

## LANGUAGES

**Fluent:** English | **Intermediate:** Dutch | **Beginner:** Japanese, German