

Education

DPhil in Mathematics

Oct. 2022 - Present

*Hertford College, University of Oxford**Advisors:* Prof Gui-Qiang Chen, Prof Luc Nguyen*Research area:* Partial differential equations, differential geometry

Thesis topic: I study the isometric embedding of Riemannian manifolds through the medium of nonlinear PDEs (namely, the Gauss-Codazzi-Ricci (GCR) equations). I am especially interested in low-regularity problems: the interpretation, validity, and geometric consequences of the GCR equations for rough embeddings. I also study ‘geometric rigidity’ problems motivated from elasticity theory. Broadly, I am interested in compensated compactness methods for nonlinear PDEs, mixed-type problems, and connections between differential geometry and hyperbolic conservation laws from continuum physics.

Master of Mathematics and Computer Science

Oct. 2018 - Jun. 2022

*Oriel College, University of Oxford**Rank:* 1/36*Thesis:* Fundamental Solutions of Linear Partial Differential Operators. Mark: 88.*Exam marks for third and fourth years (70 and above is First Class):*

Fixed Point Methods for Non-linear PDEs: 100

Riemannian Geometry: 100

Functional Analytic Methods for PDEs: 76

Further Functional Analysis: 80

Differentiable Manifolds: 67

Analytic Number Theory: 74

Logic and Proof: 70

Machine Learning: 80

Functional Analysis I and II: 71 and 82

Probability, Measure and Martingales: 86

Continuous Martingales and Stoch. Calculus: 76

Artificial Intelligence: 76

Quantum Information: 78

Distribution Theory and Analysis of PDEs: 83

Fourier Analysis and PDEs: 98

Awards and Scholarships

Clarendon Scholarship, University of Oxford

Oct. 2022 - Present

Mathematical Institute Scholarship

Oct. 2022 - Present

Hoare Prize in Mathematics and Computer Science

Jul. 2022

Penultimate Year Prize, Oriel College, Oxford

Jul. 2021

Academic Scholarship, Oriel College, Oxford

Jul. 2019 – Jul. 2022

LMS Undergraduate Research Bursary

Jun. 2021

Publications and Preprints

1. N. Boullé, **I. Newell**, P. E. Farrell, and P. G. Kevrekidis, *Two-component three-dimensional atomic Bose-Einstein condensates supporting complex stable patterns*, Phys. Rev. A 107 (2023), 012813.
2. **I. Newell** and L. Nguyen, *Cartan's and Gauss' equations and rigidity theorems for isometric embeddings in low Sobolev regularity*, to appear on arXiv and submit for publication in 2025.

Talks and Seminars

- The Gauss Equation for Isometric Embeddings of Regularity $W^{1+\frac{2}{3},3} \cap C^1$, invited talk at the Keble Complexity Cluster, Oxford, May 2025.
- John Nash's 1954 paper on isometric embeddings, Oxford Nonlinear PDE seminar, Oct. 2024.
- Rigidity for isometric embeddings and the Borisov-Gromov problem, Oxford Nonlinear PDE seminar, Oct. 2023.
- Isometric embeddings of negatively curved surfaces in Euclidean 3-space, Oxford Nonlinear PDE seminar, Feb. 2023.

Teaching

Part B Distribution Theory, tutor	2025
Part C Hyperbolic Equations, TA	2024
Continuous Mathematics, tutor	2024
Multivariable calculus and complex analysis, private tutor	2023
Part A Linear Algebra, St Edmund Hall, tutor	2023
Prelims Linear Algebra, Wycliffe Hall, tutor	2023
Part B Fourier Analysis, TA	2023
Part B Functional Analysis II, revision class tutor	2023
Part B Distribution Theory, TA	2022

Administrative Activities

Organiser for the Oxford Nonlinear PDE seminar. Involves finding & scheduling speakers, booking rooms, sending out announcements, etc.	2023 - Present
Organiser for the Lunchtime PDE seminar.	2024 - Present

Work Experience

Mathematical Institute, Oxford	Jun. - Aug. 2021
Summer research internship. Funded by an LMS Undergraduate Research Bursary.	
<i>Project title:</i> Bifurcation analysis of two coupled 3D Bose-Einstein condensates.	
<i>Advisor:</i> Prof Patrick Farrell	
Extremely Heavy Industries, Larchmont NY, USA	Jun. - Aug. 2019
Software internship, full-stack web development. I worked on building a demo portfolio management page using ExHI's Hoist toolkit and React.	

Other Interests

Rock climbing, cooking, classical piano