

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, primarily 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. **I. Newell** and L. Nguyen, *Cartan's and Gauss's equations and rigidity theorems for isometric embeddings in low Sobolev regularity*, Preprint [arXiv:2607.02412](https://arxiv.org/abs/2607.02412).
2. 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.

Talks and Seminars

- Cartan's and Gauss's equations and rigidity theorems for isometric embeddings in low Sobolev regularity, Edinburgh ICMS winter school: PDE in geometry and analysis, January 2026.
- 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
Differential Calculus with Linear Algebra and Fourier Methods, Stanford BOSP, tutor	2024
Continuous Mathematics, Stanford BOSP, 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