

# Andrew D.K. Beckett

Researcher in Mathematical Physics and Geometry

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## Education

### The University of Edinburgh

PhD in Mathematical Physics

Edinburgh, UK

Sep. 2019 – Jul. 2024

- Thesis: *Spencer cohomology, supersymmetry and the structure of Killing superalgebras*, supervised by José Figueroa-O'Farrill

### The University of Edinburgh

Edinburgh, UK

MSc in Mathematical Physics

Sep. 2018 – Aug. 2019

- Obtained with distinction
- Dissertation: *Generalised Spencer cohomology and 5-dimensional supersymmetry*, supervised by José Figueroa-O'Farrill

### University of Glasgow

Glasgow, UK

MSci in Mathematics and Physics

Sep. 2014 – Jun. 2018

- Obtained with first-class honours; direct entry into second year
- Dissertation: *The Higgs self-coupling and electroweak pair production*, supervised by Christoph Englert
- Dissertation: *Finite-dimensional Hopf actions*, supervised by Kenneth Brown

## Teaching Experience

### School of Mathematics, The University of Edinburgh

Edinburgh, UK

Workshop tutor, marker

Jan. 2020 – Aug. 2024

- Marked final exams for various courses (2021–2024)
- MATH11138 Geometry of General Relativity (2021–2022, 2022–2023); gave a lecture in Feb. 2023
- MATH10067 Honours Complex Variables (Skills) (2022–2023); mathematical presentation and writing workshops using  $\text{\LaTeX}$
- MATH08075 Engineering Mathematics 1B (2019–2020, 2021–2022, 2022–2023)
- MATH10066 Honours Differential Equations (2022–2023); including numerical methods laboratories using Python
- MATH08063 Several Variable Calculus and Differential Equations (2022–2023)
- SMSTC Classical and Quantum Integrable Systems (2021–2022)
- MATH10088 Differentiable Manifolds (2020–2021, 2021–2022)
- MATH08057 Introduction to Linear Algebra (2020–2021, 2021–2022)
- SMSTC Manifolds (2020–2021)
- MATH08058 Calculus and its Applications (2019–2020)

Summer school tutor, course designer

Jun.–Jul. 2020 & 2021

- Sutton Trust Summer School, a pre-university summer school for aspiring students from disadvantaged backgrounds
- As part of a team of tutors, designed course materials including a video, notes, problem sheets and project briefs
- Delivered online live sessions and supported individual student projects via video chat room

### School of Mathematics and Statistics, University of Glasgow

Glasgow, UK

Tutor, marker

Sep. 2017 – Mar. 2018

- MATHS2004 Mathematics 2B: Linear Algebra
- MATHS2006 Mathematics 2D: Topics in Linear Algebra and Calculus
- MATHS2008 Mathematics 2F: Foundations of Pure Mathematics

### School of Physics and Astronomy, University of Glasgow

Glasgow, UK

Mentor, tutor, lab demonstrator

Jun.–Aug. 2016 & 2018

- PHYS1015-PHYS1019 Physics International Summer School
- Intensive 8-week summer school on flipped-classroom model
- Worked as part of a team of tutors to deliver classroom and laboratory sessions in a variety of formats, emphasising active learning, problem solving and collaboration between students

## Community Interactions

### Talks

Conference, workshop and selected seminar talks

- *Killing spinors and (super)algebras in general signature* at Edinburgh Mathematical Physics Group (EMPG) research seminar (Oct. 2024)
- *Spencer cohomology and supersymmetry in 5 dimensions* at Mathematical Supergravity (UNED, Madrid, Feb. 2024)
- *Homogeneous symplectic spaces and central extensions* at 41st International Conference on Bayesian and Maximum Entropy Methods in Science and Engineering (MaxEnt2022) (IHP, Paris, Jul. 2022)
- *Spencer cohomology and supersymmetry* at 62nd North British Mathematical Physics Seminar (NBMPs 62) (Online, Jun. 2021)
- *Symmetry, supersymmetry and deformation* at SPAAM student seminar, Warwick (virtual), (Online, Jun. 2021)

Gong show talks

- *Spencer cohomology and supersymmetry* at TPI School on QFT and Holography (FSU Jena, Germany, Feb. 2024)
- *Homogeneous symplectic spaces* at 17th IYR Workshop on Geometry, Mechanics and Control (KU Leuven, Belgium, Mar. 2023)

### Visits and other travel

Scientific Visits

- Visit to Dr. Paul de Medeiros at Department of Mathematics and Physics, UiS, Stavanger, Norway (Jun. 2023)
- PRISMA+ summer internship at ETAP-ATLAS particle physics group at JGU Mainz with travel grant from UoG (Jun.–Aug. 2017)

Conference and workshop attendance

- Non-Relativistic Strings and Beyond (NORDITA, Stockholm, Sweden, May 2023)
- Pseudo-Riemannian geometry and invariants in General Relativity (UiS, Stavanger, Norway, May–June 2022)

## Local seminars and reading groups at University of Edinburgh

### Organiser

- Students in Theoretical and Mathematical Physics (STAMP) seminar (co-founder) (2022–2023)
- Translating Souriau reading group (2021–2022)
- Maxwell PG Colloquium (2020–2021)
- Rheonomic Supergravity reading group (2020–2021)

### Contributer

- Geometric Representation Theory and Interactions with Field Theory (GRIFT) seminar (2022–2023)
- Hodge Club (algebra, geometry and topology student seminar) (2021–2023)
- QM/QFT for Mathematicians reading group (2022)
- Gauge Theory reading group (2019–2020)

### Regular attendee

- Edinburgh Mathematical Physics Group (EMPG) research seminar (2019–2023)
- Eisenboatis (algebraic geometry reading group) (2023)
- Lie algebroids, Poisson manifolds and Jacobi structures lecture mini-series (2020)
- Ehresmann, Koszul and Cartan connections on fibre bundles lecture mini-series (2019)

## Service and volunteering

### Peer review

- Journal of High Energy Physics (one review, 2023)
- Physical Sciences Forum (one review, 2022)

### School of Mathematics Postgraduate Student Committee member

- PG Representative (2021–2022)
- PG Colloquium Organiser (2020–2021)

### Volunteer for Piscopia Initiative

- Mock interviewer at Piscopia's first PiFORUM national conference (online) for women and nonbinary students considering a PhD (Sep. 2020)

### Glasgow University student societies member

- Physics Society Academic Events Organiser (2016–2018)
- MacLaurin society undergraduate mathematics “help room” volunteer (2017–2018)

## Publications and Preprints

### Journal articles

- Andrew D.K. Beckett, “Killing superalgebras in 2 dimensions,” *SIGMA* **21** (2025), 082. [Link] [arXiv:2410.01765]
- Andrew D.K. Beckett, “Killing (super)algebras associated to connections on spinors,” *SIGMA* **21** (2025), 081. [Link] [arXiv:2409.11306]
- Andrew Beckett, José Figueroa-O’Farrill, “Killing superalgebras for lorentzian five-manifolds,” *JHEP*, **2021** (2021), 209. [Link] [arXiv:2105.05775]

### Conference proceedings

- Andrew Beckett, “Homogeneous Symplectic Spaces and Central Extensions,” *Phys. Sci. Forum*, **5** (2022), 24. [Link] [arXiv:2207.03231]

### Preprints

- Andrew D.K. Beckett, “Killing (super)algebras for generalised spin manifolds.” [arXiv:2511.07246]
- Andrew D.K. Beckett, “Notes on generalised spin structures.” [arXiv:2511.03627]
- Andrew Beckett, José Figueroa-O’Farrill, “Symplectic Actions and Central Extensions.” [arXiv:2203.07405]
- Linden Disney-Hogg, Andrew Beckett, Isabella Deutsch, “An English translation of A. Wiman’s “On the algebraic curves of genus  $p = 4, 5$  and  $6$ , which possess unambiguous transformations into themselves.”” [arXiv:2204.01656]

## Honours & Awards

### Professional qualifications

2023	Associate Fellow of the Higher Education Academy (AFHEA), Higher education teaching accreditation achieved through Edinburgh Teaching Award (Category 1) programme	Edinburgh, UK
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### Scholarships

2023	School of Mathematics teaching fellowship, PhD Scholarship extension, 0.5 years	Edinburgh, UK
2019	STFC Studentship, PhD Scholarship, 3.5 years	Edinburgh, UK
2018	Highly Skilled Workforce scholarship, MSc Scholarship, full fees	Edinburgh, UK

### Prizes

2019	Class Medal, Best overall performance, joint (MSc Mathematical Physics)	Edinburgh, UK
2018	Archibald McAulay Memorial Prize, Janet R McAulay Memorial Prize, (MSci Mathematics and Physics)	Glasgow, UK
2017	Dougall Prize, Mackay Smith Prize, (MSci Mathematics and Physics)	Glasgow, UK
2016	Lanfine Bursary, Lang Scholarship, (MSci Mathematics and Physics)	Glasgow, UK
2015	Dougall Prize, Lanfine Bursary, (MSci Mathematics and Physics)	Glasgow, UK

## Skills

<b>Coding</b>	Python (basic), Mathematica (basic)
<b>Typesetting &amp; Presentation</b>	Office, $\text{\LaTeX}$ , Beamer
<b>Languages</b>	English (native), German (B1/A2), French (basic), Spanish (basic)