Alice Rizzardo

Curriculum Vitae

▬▬▬ Employment

2021–present	**Senior Lecturer**, *University of Liverpool*, UK
2017–2021	**Lecturer**, *University of Liverpool*, UK
2016–2017	**EPSRC Postdoctoral fellow**, *University of Edinburgh*, UK
2015–2016	**Postdoctoral Research Fellow**, *International School for Advanced Studies (SISSA)*, Italy
2014–2015	**Postdoctoral Research Fellow**, *University of Edinburgh*, UK
2014 Spring	**Postdoctoral Fellow**, *Mathematical Sciences Research Institute*, USA
2012–2014	**Postdoctoral Research Fellow**, *International School for Advanced Studies (SISSA)*, Italy

▬▬▬ Higher Education

2006–2012	**Ph.D. in Mathematics**, *Columbia University*, USA
2004–2006	**Laurea Specialistica in Matematica**, *Università di Bologna*, Italy, *Summa cum Laude*
2001–2004	**Laurea Triennale in Matematica**, *Università di Bologna*, Italy, *Summa cum Laude*

▬▬▬ Academic Honors and Grants

Grants Awarded

2019	London Mathematical Society Scheme 1 Conference Grant, £2,000.
2016–2019	EPSRC Postdoctoral Fellowship, £252,375.
2016–2018	Marie Curie Individual Fellowship Grant, proposal score: 98.60%, €183,454.80 (declined in favor of EPSRC fellowship).

Unsuccessful applications that reached an advanced stage

2018	UKRI Future Leaders Fellowship, £664,549, reached the final interview stage.

▬▬▬ Research interests

Algebraic geometry, noncommutative geometry and homological algebra, including derived and triangulated categories and their enhancements, A-infinity categories, Fourier-Mukai functors.

Publications in refereed journals

1. T. Raedschelders, A. Rizzardo and M. Van den Bergh, *New examples of non-Fourier-Mukai functors*, Compositio Mathematica 158/6 (2022) pp. 1254-1267.

   We show that the example in [3] is not pathological by showing that the derived category of any smooth projective variety of dimension ≥ 3 admitting a tilting bundle is the source of a non-Fourier-Mukai functor between derived categories of smooth projective schemes.

2. A. Rizzardo and M. Van den Bergh, *A k-linear triangulated category without a model*, Annals of Mathematics 191 (2020) pp. 393–437.

   We give the first example of a triangulated category linear over a field, that cannot admit any enhancement.

3. A. Rizzardo and M. Van den Bergh, *An example of a non-Fourier-Mukai functor between derived categories of coherent sheaves*, with an appendix by A. Neeman, Inventiones Mathematicae 216/3 (2019) pp. 927–1004.

   We give the first example of a functor betweed the bounded derived categories of two smooth projective varieties that cannot admit any enhancement.

4. A. Rizzardo and M. Van den Bergh, *A note on non-unique enhancements*, Proceedings of the American Mathematical Society 147 (2019) pp. 451–453.

   We provide the first example of non-unique enhancements for triangulated categories over a field. This paper, and the seminars I gave on it, inspired other mathematicians to further study this area (for example I am quoted in the acknowledgements of Antieau 2018).

5. A. Rizzardo, *Adjoints to a Fourier-Mukai functor*, Advances in Mathematics 322 (2017) pp. 83–96.

   I compute explicit formulas for the adjoints to a Fourier-Mukai functor, in a high level of generality. Among others, this has applications in Donovan-Wemyss's twist autoequivalences.

6. A. Rizzardo, *Representability of cohomological functors over extension fields*, J. Noncomm. Geom 11/4 (2017) pp. 1267–1287.

   I start the study of scalar extensions of derived categories, crucial for the papers [2] and [3] and [8].

7. A. Rizzardo, *On the existence of Fourier-Mukai kernels*, Mathematische Zeitschrift 287 (2017) pp. 155–179.

   I provide a partial explicit description of the virtual Fourier-Mukai kernel for a functor between derived categories, even for those functors that do not admit an enhancement.

8. A. Rizzardo and M. Van den Bergh, *Scalar extensions of derived categories and non-Fourier-Mukai functors*, Advances in Mathematics 281 (2015), pp. 1100-1144.

   We give the first example of non-Fourier-Mukai functor between two (unbounded) derived categories.

Supervision and mentoring

May 2023	Mentor for an AMS MRC research conference on Derived Categories, Arithmetic and Geometry, leading a group of young mathematicians working on a research problem.
2018-2022	Felix Küng (PhD), graduated March 2022, postdoc at the Université Libre de Bruxelles since April 2022.
2021	Jennifer Goldman (Master's), graduated December 2021.
2018-2021	Supervised a Preliminary dissertation and two Maple/Latex projects.
2015	Co-supervised a Summer project (University of Edinburgh).

Teaching experience

I am a fellow of the Higher Education Academy (UK).

University of Liverpool

- Module leader for MATH349 Differential Geometry (15 credits) since 2019-20. Class size 42 to 87. I have taught this class in a traditional way, then in hybrid mode, and finally in flipped mode.

  As part of the development of this course I have added a 7-page section to the lecture notes "Applications of Differential Geometry to Art", showing how the models of hyperbolic space that I teach in the class are depicted by the artist M. C. Escher. I have created 20 hours of structured, interactive review activities for the class tutorials using PollEverywhere, plus a structured interactive activity relating Differential Geometry to everyday life "How to eat pizza correctly using differential geometry".

  Student feedback in 2020-21: average for "the module was well taught" was 4.1 (departmental average 3.9); average for "the module gave me a good understanding of the subject" was 4.4 (departmental average 3.8).

- Module leader for MATH442 Representation Theory of Finite Groups (15 credits) since 2019-20 (the class runs every other year). Class size in 2019 was 15 students, greatly increased from previous years. I have taught this class in traditional and hybrid mode.

  Created a structured interactive activity linking Representation Theory to Chemistry.

  Student feedback in 2019-20: average for "the module was well taught" was 4.4 (departmental average 4.1).

- Tutor for MATH111 Mathematical IT skills and Calculus I.

University of Edinburgh

- Supervised a Postgraduate reading seminar on Homological algebra (assigned lectures to students, provided support in preparing lectures and individual feedback).
- Teaching assistant for Fundamentals of Pure Mathematics.

Columbia University	○ Taught Calculus 1 and 2 (twice each), class size 30-35. Designed and taught the full course (class notes, homework, quizzes). Designed and marked exams. ○ Supervised an undergraduate learning seminar on Percolation Theory (assigned lectures, provided support in preparing lectures and individual feedback). ○ Teaching assistant for Calculus I, Calculus II, Linear Algebra, Honors Linear Algebra, Introduction to Higher Mathematics, Analysis and Optimization. ○ Help room: walk-in assistance for any class in mathematics.

Professional experience

Leadership

2021–present	Postgraduate Student coordinator for Pure Mathematics: ○ Selection of new PhD students, coordinator of progression for PhD students in Pure Mathematics. ○ Sole organizer for the event "Careers after a PhD" for current PhD students in the Department of Mathematics, with presentations by alumni of the program, current lecturers and a career service representative on career options after a PhD in Mathematics and how to pursue them. ○ Co-organizer of an event to promote our PhD program to current final year students at the University of Liverpool and elsewhere in the UK.
2021–present	Mathematics Equality and Diversity Champion.
2017-present	Established and coordinate a working seminar attended by undergraduate students, postgraduate students, postdocs and faculty in Pure Mathematics and Theoretical Physics, to learn together advanced topics in Algebraic Geometry. Attendance 15 to 20 people. I assign topics, provide support for preparing talks, and provide feedback. Topics included: Hodge theory, Bridgeland stability conditions, Fourier-Mukai transforms.
Jan 2022	Member of interview panel for two Lectureships in Pure Mathematics
2019–2021	Member of the Research Support Committee (University of Liverpool).
2014	Outreach to high school students: lectured in local high schools to prepare students for the Math Olympiads (Italy).
2011	Consulting for the San Marino Embassy to the United Nations (USA).

Conferences and meetings

2024	Organizer of two MSRI (Berkeley, USA) workshops during the thematic semester "Noncommutative Algebraic Geometry".
2018–present	Local organizer for the GLEN algebraic geometry network. Contributed to the organization of about two two-day meetings per year.
2018–present	Organizer of the Terry Wall lecture at the University of Liverpool, an annual lecture in Pure Mathematics by an internationally distinguished speaker aimed at undergraduate students in STEM.

Sept. 2019		Main organizer of the weeklong conference "The Geometry of Derived Categories" (62 confirmed participants). Activities included seminars by world leaders in the field and a poster session for young researchers.

Service

Reviewer for IMRN, Kyoto Journal of Mathematics, Arnold Mathematical Journal, Journal of Algebra, Michigan Mathematical Journal, Journal of Geometry and Physics. Quick opinion for Mathematische Zeitschrift. Contributor to the Stacks Project.

▬▬▬ Invited lectures (since 2015)

2023	Jul.	Conference on derived categories, moduli spaces, and counting invariants, Imperial College London, UK
2022	Sep.	Conference "Noncommutative Shapes", in celebration of Michel Van den Bergh's 60th birthday, Antwerp, Belgium
	Jun.	Abel Symposium "Triangulated categories in representation theory and beyond", Ålesund, Norway
	May	Workshop "Interactions between Algebraic Geometry and Noncommutative Algebra", Oberwolfach, Germany
	Apr.	LMS regional meeting midlands edition, Birmingham, UK
2021	Nov.	Joint University of Liverpool/Capital Normal University Seminar (online)
	Sep.	Summer School on Derived and Triangulated Categories, Wuppertal, Germany
	Apr.	British Mathematical Colloquium, Glasgow, UK (online)
2020	Nov.	Workshop "Derived, Birational, and Categorical Algebraic Geometry", BIRS, Canada (online)
2019	Aug.	Workshop "New Structures in Algebraic Geometry and their Symplectic Interpretations", Fields Institute, Toronto, Canada
	Jun.	Workshop "Derived Categories, Moduli Spaces and Deformation Theory", Cetraro, Italy
	Jun.	Lecture series in the Summer school "Strong homotopy methods in homological algebra", Nordfjordeid, Norway
	May	COW meeting, Cardiff University
	Apr.	British Mathematical Colloquium, Lancaster, UK
	Jan.	KCL/UCL Geometry seminar, UK

2018	Nov.	Algebraic Geometry seminar, University of Glasgow, UK
	Sep.	Young Person's COW meeting, Imperial College, London, UK
	Jun.	Workshop "The arithmetic of Derived Categories", CIRM, Trento, Italy
	May	Workshop "Interactions between Algebraic Geometry and Noncommutative Algebra", Oberwolfach, Germany
	Mar.	Algebra Seminar, University of Leeds, UK
2017	Dec.	Workshop "A-infinity structures in geometry and representation theory", HIM Bonn, Germany
	Nov.	Workshop on IHS manifolds and stability conditions, University of Bologna, Italy
	Oct.	Mathematics - String Theory seminar, IPMU, Japan
	Sep.	RIMS workshop: Noncommutative algebraic geometry and related topics, Kyoto University, Japan
	Sep.	Workshop "Algebraic Geometry in Torino", Italy
	Jul.	GQT Colloquium, the Netherlands
	May	Algebraic Geometry Seminar, University of Bergen, Norway
	May	Conference "Triangulated categories and geometry - a conference in honour of Amnon Neeman", Bielefeld, Germany
	Feb.	Algebraic Geometry Seminar, Université de Toulouse, France
2016	Nov.	ARTIN meeting, Lancaster, UK
	Aug.	Advanced School and Workshop on Moduli Spaces, Mirror Symmetry and Enumerative Geometry , ICTP, Trieste, Italy
	Jun.	Workshop GVA2016 "Geometry and Classification of Algebraic Varieties", Levico Terme, Trento, Italy
	May	Algebraic Geometry Seminar, Humboldt Universität zu Berlin, Germany
2015	Jul.	Workshop "Geometric Algebra: Bridges between commutative algebra, non-commutative geometry and representation theory", Fields Institute, Toronto, Canada
	Jun.	Workshop "VBAC2015: Fourier-Mukai, 34 years on", University of Warwick, UK
	Jun.	GLEN meeting (Glasgow-Liverpool-Edinburgh-Newcastle algebraic geometry seminar), UK
	Feb.	Algebraic Geometry Seminar, Università di Milano, Italy
	Feb.	EDGE Geometry Seminar, University of Edinburgh, UK