ÁLVARO MUÑIZ-BREA

School of Mathematics, University of Edinburgh

Peter Guthrie Tait Road, Edinburgh EH9 3FD, UK

 amunizbrea.com GitHub Substack amunizb@ed.ac.uk LinkedIn Google Scholar

Mathematician interested in quantitative finance and machine learning

Education

University of Edinburgh   **2021 – present (exp Aug 2025)**

PhD in Mathematics   *Edinburgh, UK*

Advisor: Prof. Nick Sheridan

University of Cambridge   **2020 – 2021**

Part III of the Mathematical Tripos (MASt). Pass with First Class Honours   *Cambridge, UK*

Essay: "A Case Study in Intersection Theory". Advisor: Prof. Dhruv Ranganathan

Universidade de Santiago de Compostela   **2015 – 2020**

BSc in Mathematics (double degree). GPA: 9.38/10.00   *Santiago de Compostela, Spain*

Dissertation: "Differential and algebraic study of Grassmannians". Advisor: Prof. Manuel Pedreira

Universidade de Santiago de Compostela   **2015 – 2020**

BSc in Physics (double degree). GPA: 9.28/10.00   *Santiago de Compostela, Spain*

Dissertation: "Entanglement entropy and holography". Advisor: Prof. José Edelstein

Ruprecht-Karls Universität Heidelberg   **2018 – 2019**

Erasmus Programme   *Heidelberg, Germany*

Industry experience

Edinburgh University Trading & Investment Club (EUTIC)   **October 2024 – present**

Quant Division—member   *Edinburgh, UK*

G-Research   **April 2024**

Spring into Quant Finance   *Royal Riviera (Saint-Jean-Cap-Ferrat, France)*

Events attended

Optiver   **October 2024**

Trading Workshop   *Edinburgh, UK*

Cubist Systematic Strategies (Point 72)   **September 2024**

Quant Academy Meet & Greet   *London, UK*

Research experience

University of Edinburgh   **2021 – present**

Graduate student   *Edinburgh, UK*

- Funded by European Research Council (ERC) grant
- Research on Lagrangian cobordisms and Chow groups

Instituto de Ciencias Matemáticas (ICMAT)   **Summer 2020**

Summer Research Student   *Madrid, Spain*

- Grant programme Severo Ochoa - ICMAT: Introduction to Research 2020
- Research on contact Hamiltonian systems

Universidade de Santiago de Compostela   **2019-2020**

Undergraduate Student Researcher   *Santiago de Compostela, Spain*

- Funded by Spanish Ministry of Education and Professional Training
- Research on Grassmann varieties

Publications and preprints

Dimensionality of tropical Chow groups
(submitted) arxiv:2408.12417

Lagrangian cobordisms and K-theory of symplectic bielliptic surfaces
(submitted) arxiv:2403.17098

The Hamilton-Jacobi theory for contact Hamiltonian systems
Mathematics 9(16) (2021)   *joint with M. de León and M. Lainz*

In preparation (drafts available upon request):

- Fourier transforms and a filtration on the Lagrangian cobordism group of tori

Courses and projects

Time Series | *Kaggle*	**2024**
Intermediate Machine Learning | *Kaggle*	**2024**
Intro to Machine Learning | *Kaggle*	**2024**

Awards and scholarships

G-Research Travel Grant | *G-Research*	**2024**
National Top Graduates Award *(top 1-2% in Spain)* | *Spanish Society of Academic Excellence (SEDEA)*	**2021**
M. T. Meyer Scholarship & Gertrude Mather Jackson Prize | *Girton College, University of Cambridge*	**2021**
European Research Council (ERC) Studentship | *University of Edinburgh*	**2021-2025**
Fellowship for postgraduate studies abroad | *Fundación Barrié*	**2020-2021**
Grant Programme Severo Ochoa - ICMAT: Introduction to Research 2020 | *ICMAT*	**2020**
Collaboration Research Grant | *Spanish Ministry of Education and Professional Training*	**2019-2020**
"Matrícula de Honor" *(top 5%)* in 24 courses | *University of Santiago de Compostela*	**2015-2020**
Acknowledgment for outstanding performance in university entrance exams | *Xunta de Galicia*	**2015**

Talks

Conference talks

Topology Workshop | *Universidad de Santiago de Compostela (Santiago, Spain)*	**2024**
VI Congreso de Jóvenes Investigadores de la RSME | *Universidad de León (León, Spain)*	**2023**
X Encuentro de Jóvenes Topólogos | *Universidad de Zaragoza (Zaragoza, Spain)*	**2022**
IYIMeeting 2021 | *The Domus (A Coruña, Spain)*	**2021**
Matemáticas: moito máis que números! | *Universidad de Santiago de Compostela (Santiago, Spain)*	**2021**

Seminar talks

	2024
University of Cambridge | *Differential Geometry and Topology Seminar*	
	2023
University of Edinburgh | *EDGE Seminar*	
University of Edinburgh | *Tropical geometry seminar*	
University of Edinburgh | *Preprint seminar*	
	2022
University of Edinburgh | *GPS seminar*	
International Centre for Mathematical Sciences (ICMS) | *GlaMS induction event*	
University of Edinburgh | *Hodge Club*	
University of Edinburgh | *Cob/CH seminar*	
University of Edinburgh | *Hodge Club*	
Online | *GlaMS example showcase*	

Teaching

Tutoring at the University of Edinburgh

Discrete-Time Finance, Probability	**2024-2025**
Python Programming (MSc course), General Topology, Computing and Numerics, Statistics	**2023-2024**
Computing and Numerics, General Topology, Honours Complex Variables, Differential Geometry	**2022-2023**
Calculus & its Applications, MathsBase	**2021-2022**

Other support

TA for "Séminaire de Mathématiques Supérieures 2022: Floer Homotopy Theory" *(Vancouver, Canada)*	**Summer 2021**
Personal tutor (freelance)	**2016-2020**

Attended conferences and summer schools

Mirrors in the Midlands | *University of Birmingham (England, UK)*	**Aug 2024**
Topology Workshop | *University of Santiago de Compostela (Santiago, Spain)*	**Jul 2024**
London Geometry and Machine Learning | *London (England, UK)*	**Jul 2024**
Summer School on h-principle | *ICMAT (Madrid, Spain)*	**Jun 2024**
From Hamiltonian Dynamics to Symplectic Topology and Beyond | *IHP (Paris, France)*	**Jun 2024**
Symplectic Paradise | *Bozeman (MT, USA)*	**Aug 2023**
A conference in honour of Leonid Polterovich | *ETH (Zurich, Switzerland)*	**July 2023**
Symplectic Topology workshop | *Imperial College London (England, UK)*	**June 2023**
Graduate Summer School on Mirror Symmetry in the log Calabi-Yau setting | *Eyam (England, UK)*	**May 2023**
VI Congreso de Jóvenes Investigadores de la RSME | *Universidad de León (Leon, Spain)*	**Feb 2023**
Homological Mirror Symmetry annual meeting | *University of Miami (FL, USA)*	**Jan 2023**
2022 Simons Collaboration on Homological Mirror Symmetry Annual Meeting | *New York (NY, USA)*	**Nov 2022**
XXVIII Encuentro de Topología | *Universidad de Zaragoza (Zaragoza, Spain)*	**Oct 2022**
Periods in Mirror Symmetry | *International Centre for Mathematical Sciences (Scotland, UK)*	**Sep 2022**
Una Europa Masterclass — AI in Law | *Uniwersytet Jagielloński w Krakowie (Krakow, Poland)*	**Sep 2022**
SYNC Early Career Workshop | *University of Davis (CA, USA)*	**Aug 2022**
Séminaire de Mathématiques Supérieures 2022: Floer Homotopy Theory | *PIMS (BC, Canada)*	**Jul 2022**
Convexity in contact and symplectic topology | *Institut Henri Poincaré (Paris, France)*	**Aug 2022**

Organizing

Graduate School on Mirror Symmetry in the log Calabi-Yau setting \| *Eyam Hostel (England, UK)* — **May 2023**
- Summer school co-organised with D. Kozevnikov and K. Hugtenburg
- Managed a £20,000 budget to organise a 5 day residential summer school with over 30 participants

Hodge Club \| *University of Edinburgh* — **2022-2023**
- Co-organised the PhD geometry seminar together with W. Bevington and K. Rega

Languages

Spanish (native), Galician (native), English (fluent), German (intermediate), Arabic *(MSA)* (basic).
Python *(numpy, pandas, scikit-learn)*, git, LaTeX, HTML, Lean

Activities and interests

Poker, books, fitness, hiking & backpacking