

# ÁLVARO MUÑIZ-BREA

School of Mathematics, University of Edinburgh  
Peter Guthrie Tait Road, Edinburgh EH9 3FD, UK

 [amunizbrea.com](https://amunizbrea.com)  [a.muniz-brea@ed.ac.uk](mailto:a.muniz-brea@ed.ac.uk)  [LinkedIn](#)  [Google Scholar](#)

## Education

<b>University of Edinburgh</b> <i>PhD in Mathematics</i> Advisor: Prof. Nick Sheridan	<b>2021 – present (exp Aug 2025)</b> <i>Edinburgh, UK</i>
<b>University of Cambridge</b> <i>Part III of the Mathematical Tripos (MASt). Pass with First Class Honours</i> Essay: “A Case Study in Intersection Theory”. Advisor: Prof. Dhruv Ranganathan	<b>2020 – 2021</b> <i>Cambridge, UK</i>
<b>Universidade de Santiago de Compostela</b> <i>BSc in Mathematics (double degree). GPA: 9.38/10.00</i>	<b>2015 – 2020</b> <i>Santiago de Compostela, Spain</i>
<b>Universidade de Santiago de Compostela</b> <i>BSc in Physics (double degree). GPA: 9.28/10.00</i> Dissertation: “Entanglement entropy and holography”. Advisor: Prof. José Edelstein	<b>2015 – 2020</b> <i>Santiago de Compostela, Spain</i>
<b>Ruprecht-Karls Universität Heidelberg</b> <i>Erasmus Programme</i>	<b>2018 – 2019</b> <i>Heidelberg, Germany</i>

## Research experience

<b>University of Edinburgh</b> <i>Graduate student</i> <ul style="list-style-type: none"><li>Funded by European Research Council (ERC) grant</li><li>Research on Lagrangian cobordisms and Chow groups</li></ul>	<b>2021 – present</b> <i>Edinburgh, UK</i>
<b>Instituto de Ciencias Matemáticas (ICMAT)</b> <i>Summer Research Student</i> <ul style="list-style-type: none"><li>Grant programme Severo Ochoa - ICMAT: Introduction to Research 2020</li><li>Research on contact Hamiltonian systems, supervised by Prof. Manuel de León</li></ul>	<b>Summer 2020</b> <i>Madrid, Spain</i>
<b>Universidade de Santiago de Compostela</b> <i>Undergraduate Student Researcher</i> <ul style="list-style-type: none"><li>Funded by Spanish Ministry of Education and Professional Training</li><li>Research on Grassmann varieties</li></ul>	<b>2019-2020</b> <i>Santiago de Compostela, Spain</i>

## Industry experience

<b>G-Research</b> <i>Spring into Quant Finance</i>	<b>Spring 2024</b> <i>France</i>
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## Awards and scholarships

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

## Publications and preprints

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### Lagrangian cobordisms and K-theory of symplectic bielliptic surfaces

*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):*

- Dimensionality of tropical Chow groups
- Filtrations on Lagrangian cobordism groups of tori

## Talks

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### Conference talks

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

University of Cambridge | *Differential Geometry and Topology Seminar*

**2024**

**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

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### Tutoring at the University of Edinburgh

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**

## Attended conferences and summer schools

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<b>London Geometry and Machine Learning</b>   <i>London (England, UK)</i>	<b>Jul 2024</b>
<b>Summer School on h-principle</b>   <i>ICMAT (Madrid, Spain)</i>	<b>Jun 2024</b>
<b>From Hamiltonian Dynamics to Symplectic Topology and Beyond</b>   <i>IHP (Paris, France)</i>	<b>Jun 2024</b>
<b>Floer Homotopy Theory Spring School</b>   <i>Grand-Varennes (Paris, France)</i>	<b>Apr 2024</b>
<b>Symplectic Paradise</b>   <i>Bozeman (MT, USA)</i>	<b>Aug 2023</b>
<b>A conference in honour of Leonid Polterovich</b>   <i>ETH (Zurich, Switzerland)</i>	<b>July 2023</b>
<b>Symplectic Topology workshop</b>   <i>Imperial College London (England, UK)</i>	<b>June 2023</b>
<b>Graduate Summer School on Mirror Symmetry in the log Calabi-Yau setting</b>   <i>Eyam (England, UK)</i>	<b>May 2023</b>
<b>VI Congreso de Jóvenes Investigadores de la RSME</b>   <i>Universidad de León (Leon, Spain)</i>	<b>Feb 2023</b>
<b>Homological Mirror Symmetry annual meeting</b>   <i>University of Miami (FL, USA)</i>	<b>Jan 2023</b>

<b>2022 Simons Collaboration on Homological Mirror Symmetry Annual Meeting</b>   <i>New York (NY, USA)</i>	<b>Nov 2022</b>
<b>XXVIII Encuentro de Topología</b>   <i>Universidad de Zaragoza (Zaragoza, Spain)</i>	<b>Oct 2022</b>
<b>Periods in Mirror Symmetry</b>   <i>International Centre for Mathematical Sciences (Scotland, UK)</i>	<b>Sep 2022</b>
<b>SYNC Early Career Workshop</b>   <i>University of Davis (CA, USA)</i>	<b>Aug 2022</b>
<b>Séminaire de Mathématiques Supérieures 2022: Floer Homotopy Theory</b>   <i>PIMS (BC, Canada)</i>	<b>Jul 2022</b>
<b>Convexity in contact and symplectic topology</b>   <i>Institut Henri Poincaré (Paris, France)</i>	<b>Aug 2022</b>

## Organizing

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<b>Graduate School on Mirror Symmetry in the log Calabi-Yau setting</b>   <i>Eyam Hostel (England, UK)</i>	<b>May 2023</b>
<ul style="list-style-type: none"><li>• Summer school co-organised with D. Kozzevnikov and K. Hugtenburg</li><li>• Managed a £20,000 budget to organise a 5 day residential summer school with over 30 participants</li></ul>	
<b>Hodge Club</b>   <i>University of Edinburgh</i>	<b>2022-2023</b>
<ul style="list-style-type: none"><li>• Co-organised the PhD geometry seminar together with W. Bevington and K. Rega</li></ul>	

## Languages

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Spanish (native), Galician (native), English (fluent), German (intermediate), Arabic (*MSA*) (basic).  
Python,  $\text{\LaTeX}$ , HTML, Lean