

# ANTHONY ASHMORE

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## ACADEMIC POSITIONS

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<b>Sorbonne Université</b> , Paris, France <i>Marie Skłodowska-Curie Global Fellow</i>	2023 to 2024
<b>University of Chicago</b> , Chicago, USA <i>Kadanoff Fellow</i>	2022 to 2023
<b>University of Chicago</b> , Chicago, USA <i>Marie Skłodowska-Curie Global Fellow</i>	2020 to 2022
<b>University of Pennsylvania</b> , Philadelphia, USA <i>Postdoctoral Research Fellow</i>	2019 to 2020
<b>University of Oxford</b> , Oxford, UK <i>Junior Research Fellow, Merton College</i>	2016 to 2019

## EDUCATION

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<b>Imperial College London</b> , London, UK <i>PhD, Theoretical Physics</i> <ul style="list-style-type: none"><li>• “Generalised geometry for supersymmetric flux backgrounds” with Prof. Daniel Waldram</li></ul>	Sep 2012 to Nov 2016
<b>Princeton University</b> , Princeton, New Jersey, US <i>MA, Physics</i> <ul style="list-style-type: none"><li>• Enrolled as PhD student; studies interrupted by family circumstances to return to UK</li></ul>	Sep 2011 to Aug 2012
<b>University of Oxford</b> , Oxford, UK <i>MPhys (Hons), Physics, First Class</i>	Sep 2007 to June 2011

## PUBLICATIONS

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- [1] “A heterotic Kodaira–Spencer theory at one-loop”, A. Ashmore, J. J. M. Ibarra, D. D. McNutt, C. Strickland-Constable, E. E. Svanes, D. Tennyson, and S. Winje [[arXiv:2306.10106 \[hep-th\]](#)].
- [2] “Numerical spectra of the Laplacian for line bundles on Calabi–Yau hypersurfaces”, A. Ashmore, Y.-H. He, E. Heyes, and B. A. Ovrut, *JHEP* **07** (2023) 164, [[arXiv:2305.08901 \[hep-th\]](#)].
- [3] “Geometric flows and supersymmetry”, A. Ashmore, R. Minasian, and Y. Proto [[arXiv:2302.06624 \[hep-th\]](#)].
- [4] “ $N = (2, 0)$  AdS<sub>3</sub> Solutions of M-theory”, A. Ashmore, *JHEP* **23** (2022) 101, [[arXiv:2209.10680 \[hep-th\]](#)].
- [5] A. Ashmore, “Calabi-Yau metrics, CFTs and random matrices” in *Nankai Symposium on Mathematical Dialogues*. [[arXiv:2202.05896 \[hep-th\]](#)].
- [6] “Calabi-Yau Metrics, Energy Functionals and Machine-Learning”, A. Ashmore, L. Calmon, Y.-H. He, and B. A. Ovrut, *International Journal of Data Science in the Mathematical Sciences* (2021) , [[arXiv:2112.10872 \[hep-th\]](#)].
- [7] “Exactly Marginal Deformations and Their Supergravity Duals”, A. Ashmore, M. Petrini, E. L. Tasker, and D. Waldram, *Phys. Rev. Lett.* **128** 19, (2022) 191601, [[arXiv:2112.08375 \[hep-th\]](#)].
- [8] “Machine learning line bundle connections”, A. Ashmore, R. Deen, Y.-H. He, and B. A. Ovrut, *Phys. Lett. B* **827** (2022) 136972, [[arXiv:2110.12483 \[hep-th\]](#)].

- [9] “Topological  $G_2$  and  $\text{Spin}(7)$  strings at 1-loop from double complexes”, A. Ashmore, A. Coimbra, C. Strickland-Constable, E. E. Svanes, and D. Tennyson, *JHEP* **02** (2022) 089, [[arXiv:2108.09310](#) [[hep-th](#)]].
- [10] “Calabi-Yau CFTs and Random Matrices”, N. Afkhami-Jeddi, A. Ashmore, and C. Cordova, *JHEP* **02** (2022) 021, [[arXiv:2107.11461](#) [[hep-th](#)]].
- [11] “Hidden Sectors from Multiple Line Bundles for the  $B - L$  MSSM”, A. Ashmore, S. Dumitru, and B. A. Ovrut, *Fortsch. Phys.* **70** 7-8, (2022) 2200071, [[arXiv:2106.09087](#) [[hep-th](#)]].
- [12] “Moduli-dependent KK towers and the swampland distance conjecture on the quintic Calabi-Yau manifold”, A. Ashmore and F. Ruehle, *Phys. Rev. D* **103** 10, (2021) 106028, [[arXiv:2103.07472](#) [[hep-th](#)]].
- [13] “Explicit soft supersymmetry breaking in the heterotic M-theory  $B - L$ ”, A. Ashmore, S. Dumitru, and B. A. Ovrut, *JHEP* **08** (2021) 033, [[arXiv:2012.11029](#) [[hep-th](#)]].
- [14] “Eigenvalues and eigenforms on Calabi-Yau threefolds”, A. Ashmore [[arXiv:2011.13929](#) [[hep-th](#)]].
- [15] “Line Bundle Hidden Sectors for Strongly Coupled Heterotic Standard Models”, A. Ashmore, S. Dumitru, and B. A. Ovrut, *Fortsch. Phys.* **69** 7, (2021) , [[arXiv:2003.05455](#) [[hep-th](#)]].
- [16] “Heterotic backgrounds via generalised geometry: moment maps and moduli”, A. Ashmore, C. Strickland-Constable, D. Tennyson, and D. Waldram, *JHEP* **11** (2020) 071, [[arXiv:1912.09981](#) [[hep-th](#)]].
- [17] “Machine Learning Calabi-Yau Metrics”, A. Ashmore, Y.-H. He, and B. A. Ovrut, *Fortsch. Phys.* **68** 9, (2020) 2000068, [[arXiv:1910.08605](#) [[hep-th](#)]].
- [18] “Generalising  $G_2$  geometry: involutivity, moment maps and moduli”, A. Ashmore, C. Strickland-Constable, D. Tennyson, and D. Waldram, *JHEP* **01** (2021) 158, [[arXiv:1910.04795](#) [[hep-th](#)]].
- [19] “Marginal deformations of 3d  $\mathcal{N} = 2$  CFTs from  $\text{AdS}_4$  backgrounds in generalised geometry”, A. Ashmore, *JHEP* **12** (2018) 060, [[arXiv:1809.03503](#) [[hep-th](#)]].
- [20] “Finite deformations from a heterotic superpotential: holomorphic Chern-Simons and an  $L_\infty$  algebra”, A. Ashmore, X. de la Ossa, R. Minasian, C. Strickland-Constable, and E. E. Svanes, *JHEP* **10** (2018) 179, [[arXiv:1806.08367](#) [[hep-th](#)]].
- [21] “Exactly marginal deformations from exceptional generalised geometry”, A. Ashmore, M. Gabella, M. Graña, M. Petrini, and D. Waldram, *JHEP* **01** (2017) 124, [[arXiv:1605.05730](#) [[hep-th](#)]].
- [22] “The exceptional generalised geometry of supersymmetric  $\text{AdS}$  flux backgrounds”, A. Ashmore, M. Petrini, and D. Waldram, *JHEP* **12** (2016) 146, [[arXiv:1602.02158](#) [[hep-th](#)]].
- [23] “Exceptional Calabi-Yau spaces: the geometry of  $\mathcal{N} = 2$  backgrounds with flux”, A. Ashmore and D. Waldram, *Fortsch. Phys.* **65** 1, (2017) 1600109, [[arXiv:1510.00022](#) [[hep-th](#)]].
- [24] A. Ashmore and Y.-H. He, “Calabi-Yau three-folds: Poincaré polynomials and fractals” in *Strings, gauge fields, and the geometry behind: The legacy of Maximilian Kreuzer*, pp. 173–186. (2011) . [[arXiv:1110.1612](#) [[hep-th](#)]].
- [25] “Numerical analysis of space charge effects in electron bunches at laser-driven plasma accelerators”, A. Ashmore, R. Bartolini, and N. Delerue, *Central Eur. J. Phys.* **9** (2011) 980–985, [[arXiv:1008.4823](#) [[physics.acc-ph](#)]].

## GRANTS AND FUNDING

<b>Marie Curie Individual Fellowship:</b> €260,000	2020 to 2024
<i>Global Fellowship for three-year research programme at the University of Chicago and Sorbonne Université</i>	
<b>MATRIX-Simons Travel Grant :</b> \$1,600	Jan 2024
<i>Awarded to attend “New Deformations of Quantum Field and Gravity Theories” at MATRIX, a research institute for the mathematical sciences in Australia.</i>	
<b>Grant for Short Term Scientific Mission:</b> €1,150	Jan 2016
<i>Awarded by COST Action MP1210, for visit to LPTHE at UPMC, Paris</i>	
<b>EPSRC Prize Studentship</b>	2012 to 2016
<i>Awarded for PhD study, one of seven university wide</i>	

## TEACHING AND MENTORING EXPERIENCE

<b>Tutor</b> , Merton College, Oxford	Spring 2019
<i>Third-year undergraduate tutorials on General Relativity and Cosmology</i>	
<b>Lecturer</b> , Mathematical Institute, Oxford	Autumn 2018
<i>Course lecturer and assessor for General Relativity I masters course</i>	
<b>Tutor</b> , Merton College, Oxford	Autumn 2018
<i>Second-year undergraduate tutorials on Mathematical Methods</i>	
<b>College mentor</b> , Merton College, Oxford	2017 to 2019
<i>College subject mentor providing supplementary academic support to undergraduates</i>	
<b>Class tutor</b> , Mathematical Institute, Oxford	2017 to 2018
<i>Intercollegiate classes for General Relativity I and General Relativity II masters courses</i>	
<b>Tutorial assistant</b> , Imperial College London	2012 to 2015
<i>First- and second-year undergraduate tutorials covering classical mechanics, quantum mechanics, thermodynamics, statistical mechanics and nuclear physics</i>	

## AWARDS AND PRIZES

<b>Departmental Teaching Award</b> , Mathematical Institute, Oxford	2019
<i>Awarded for lecturing of General Relativity I graduate course</i>	

## PROFESSIONAL ACTIVITIES AND ACADEMIC SERVICE

<b>Mentor</b>	Aug 2022 to present
<i>Mentor for String Theory Mentoring Program</i>	
<b>External examiner</b>	Aug 2022
<i>External examiner for masters thesis at University of Stavanger, Norway</i>	
<b>Seminar organiser</b>	2021 to present
<i>Organiser for Particle Theory Seminar series at University of Chicago</i>	
<b>External examiner</b>	Aug 2021
<i>External examiner for masters thesis at University of Stavanger, Norway</i>	
<b>Outreach</b>	Oct 2020
<i>High-school talk for Women in Math Honor Society students on string theory and uses of mathematics</i>	
<b>Reviewer</b>	2018 to present
<i>Referee for Annals of Physics, Annales Henri Poincaré, the Journal of Symbolic Computation, SIGMA and SciPost</i>	
<b>Undergraduate interviews</b> , Merton College, University of Oxford	Dec 2018
<i>Interviewer and assessor for undergraduate applicants in physics</i>	

<b>Workshop organiser</b> , South East Mathematical Physics Seminars <i>Organiser of the 12th meeting of the South East Mathematical Physics Seminar</i>	Jul 2018
<b>General interest talk</b> , Merton College, University of Oxford <i>Presentation on string theory and my work for a general audience</i>	Jun 2018
<b>Oxford string theory website</b> , University of Oxford <i>Web administrator for string theory group website</i>	2018 to 2019
<b>Library committee</b> , Merton College, University of Oxford <i>Committee member on matters relating to the college library and archives, including approving annual budget and publication rights</i>	2018 to 2019
<b>Gardens committee</b> , Merton College, University of Oxford <i>Committee member on matters relating to the maintenance and amenity of the college gardens and grounds</i>	2017 to 2019
<b>Outreach</b> <i>Interviewed for podcasts discussing black holes and symmetries in nature</i>	2014 to 2016

#### CONFERENCE PRESENTATIONS

“Calabi–Yau Metrics, CFTs and Random Matrices” <i>Plenary talk, string_data.2021, University of Cape Town, South Africa</i>	Dec 2021
“Calabi–Yau metrics: what are they good for?” <i>Plenary talk, Nankai Symposium, Nankai University, Tianjin</i>	Aug 2021
“Numerical metrics and the swampland distance conjecture” <i>Plenary talk, String Pheno 2021, Virtual</i>	July 2021
Chair of discussion session on numerical metrics <i>Simons Collaboration on Special Holonomy in Geometry, Analysis and Physics, Virtual</i>	May 2021
“Moduli and obstructions from a heterotic superpotential” <i>String Theory, Geometry and String Model Building, Mainz</i>	Sep 2018
“Moduli and obstructions of $N = 1$ heterotic backgrounds” <i>String Pheno 2018, Warsaw</i>	July 2018
“Generalising Calabi–Yau for generic flux backgrounds” <i>22nd European String Workshop – COST MP1210 Conference, University of Milano–Bicocca</i>	Feb 2017
“Marginal deformations from generalised geometry” <i>Strings, Cosmology and Gravity Student Conference, Institut Henri Poincaré</i>	Feb 2017
“Generalised geometry and supersymmetric flux backgrounds” <i>The Particle Physics and Cosmology of Supersymmetry and String Theory, DESY Hamburg</i>	Mar 2015
“Supergravity backgrounds and generalised geometry” <i>London Student Triangle, Imperial College London</i>	Nov 2014
“The geometry of supersymmetric AdS backgrounds” <i>Strings, Cosmology and Gravity Student Conference, Max Planck Institute for Physics, Munich</i>	Nov 2013

#### INVITED SEMINARS

“Machine Learning for String Compactifications” <i>University of Wisconsin – Madison Theory Seminar</i>	March 2023
“Deformed $N=1$ SCFTs and their Supergravity Duals” <i>Exceptional Geometry Seminar Series</i>	May 2022
“Deformed $N=1$ SCFTs and their Supergravity Duals” <i>String Phenomenology Seminar Series</i>	April 2022
“Exactly Marginal Deformations and their Supergravity Duals”	March 2022

<i>Joint Israeli High Energy Seminar</i>	
“Machine Learning for Calabi-Yau Compactifications”	Nov 2021
<i>Joint Edinburgh Mathematical Physics Group Seminar</i>	
“Calabi-Yau Metrics, CFTs and Random Matrices”	Oct 2021
<i>String Theory Seminar at Imperial College London</i>	
“Calabi-Yau Metrics, CFTs and Random Matrices”	Sept 2021
<i>Joint Geometry Fields and Strings Seminar at University of New England</i>	
“Calabi-Yau metrics: what are they good for?”	May 2021
<i>String Theory Seminar at University of Vienna</i>	
“Calabi-Yau metrics: what are they good for?”	May 2021
<i>High-Energy Theory Seminar at University of Liverpool</i>	
“Calabi-Yau metrics: what are they good for?”	Apr 2021
<i>String Theory Seminar at Virginia Tech</i>	
“Calabi-Yau metrics, machine learning, and the spectrum of the Laplace operator”	Feb 2021
<i>High-Energy Theory Seminar at KEK Theory Center</i>	
“Moduli of general $N = 1$ heterotic backgrounds”	Oct 2018
<i>Mathematical Physics Seminar at University of Surrey</i>	
“Moduli of general $N = 1$ heterotic backgrounds”	Apr 2018
<i>String Theory Seminar at Enrico Fermi Institute, University of Chicago</i>	
“Marginal deformations from generalised geometry”	Feb 2018
<i>Joint Edinburgh Mathematical Physics Group Seminar</i>	
“Generalising Calabi-Yau for generic flux backgrounds”	Jan 2016
<i>String Theory Seminar at Queen Mary University of London</i>	
“Generalising Calabi-Yau for generic flux backgrounds”	Nov 2015
<i>String Theory Seminar at LMU Munich</i>	
“Generalising Calabi-Yau for generic flux backgrounds”	Nov 2015
<i>Paris String Theory Seminar at Ecole Normale Supérieure</i>	
“Generalising Calabi-Yau for generic flux backgrounds”	Oct 2015
<i>String Theory Seminar at Mathematics Department, University of Oxford</i>	

## REFERENCES

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Daniel Waldram	Xenia de la Ossa
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Imperial College London	University of Oxford
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Blackett Laboratory,	Woodstock Road,
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