Curriculum Vitae – Alan Matthew Thompson

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Employment History

- **Loughborough University**, Department of Mathematical Sciences, Loughborough, United Kingdom.
  Lecturer in Algebraic Geometry (September 2018 – Present).
- **University of Cambridge**, Department of Pure Mathematics and Mathematical Statistics, Cambridge, United Kingdom.
  Postdoctoral Research Associate (October 2016 – August 2018) attached to the EPSRC programme grant *Classification, Computation, and Construction: New Methods in Geometry*.
  Supervisor: Professor Mark Gross, FRS.
- **University of Warwick**, Mathematics Institute, Coventry, United Kingdom.
  Visiting Fellow (October 2016 – September 2017) on secondment from the University of Cambridge, above.
  Supervisor: Professor Miles Reid, FRS.
- **University of Waterloo**, Department of Pure Mathematics, Waterloo, ON, Canada.
  Fields-Ontario Postdoctoral Fellow (July 2014 – June 2016).
  Supervisor: Professor Ruxandra Moraru.
- **University of Alberta**, Department of Mathematical and Statistical Sciences, Edmonton, AB, Canada.
  Fields-Ontario-PIMS Postdoctoral Fellow (January 2014 – June 2014), under the PIMS Collaborative Research Group in *Geometry and Physics*.
  Supervisor: Professor Charles Doran.
- **Fields Institute for Research in Mathematical Sciences**, Toronto, ON, Canada.
  Fields-Ontario Postdoctoral Fellow (July 2013 – December 2013) participating in the Fields thematic program on *Calabi-Yau Varieties: Arithmetic, Geometry and Physics*.
- **University of Alberta**, Department of Mathematical and Statistical Sciences, Edmonton, AB, Canada.
  Postdoctoral Fellow (September 2011 – June 2013).
  Supervisor: Professor Charles Doran.

Education

- **University of Oxford**, Oxford, United Kingdom.
  D.Phil. Mathematics, granted leave to supplicate June 2011, graduated November 2011.
  Thesis title: *Models for threefolds fibred by K3 surfaces of degree two*.
  Supervisor: Professor Balázs Szendrői.
- **University of Warwick**, Coventry, United Kingdom.
  Master of Mathematics (with Honours), class one, July 2007.
  Supervisor: Professor Miles Reid, FRS.

Research Interests

My primary interest is in algebraic geometry, especially the geometry of surfaces and threefolds. In particular, my current research interests include: the geometry and moduli of K3 surfaces and Calabi-Yau threefolds, the explicit construction of Calabi-Yau threefolds, the study of degenerations and fibration structures, mirror symmetry, and the minimal model programme.

Publications

1) V. Alexeev, P. Engel, and A. Thompson, *Stable pair compactification of moduli of K3 surfaces of degree 2*. Published online by *J. Reine Angew. Math.*, April 2023. dx.doi.org/10.1515/crelle-2023-0011.
2) V. Alexeev and A. Thompson, *ADE surfaces and their moduli*, J. Algebraic Geom. **30** (2021), no. 2, 331–405. dx.doi.org/10.1090/jag/762
3) R. Kooistra and A. Thompson, *Threefolds fibred by mirror sextic double planes*, Canad. J. Math. **73** (2021), no. 5, 1305–1346. dx.doi.org/10.4153/S0008414X20000498
4) A. Harder and A. Thompson, *Pseudolattices, del Pezzo surfaces, and Lefschetz fibrations*, Trans. Amer. Math. Soc. **373** (2020), no. 3, 2071–2104. dx.doi.org/10.1090/tran/7960
5) C. F. Doran, A. Harder, A. Y. Novoseltsev, and A. Thompson, *Calabi-Yau threefolds fibred by high rank lattice polarized K3 surfaces*, Math. Z. **294** (2020), no. 1–2, 783–815. dx.doi.org/10.1007/s00209-019-02279-9
6) C. F. Doran and A. Thompson, *Mirror symmetry for lattice polarized del Pezzo surfaces*, Commun. Number Theory Phys. **12** (2018), no. 3, 543–580. dx.doi.org/10.4310/CNTP.2018.v12.n3.a3
7) C. F. Doran, A. Harder, and A. Thompson, *Mirror symmetry, Tyurin degenerations and fibrations on Calabi-Yau manifolds*, String-Math 2015 (S. Li, B. Lian, W. Song, and S.-T. Yau, eds.), Proc. Symp. Pure Math., vol. 96, American Mathematical Society, 2017, pp. 93–131. dx.doi.org/10.1090/pspum/096
8) C. F. Doran, A. Harder, and A. Thompson, *Hodge numbers from Picard-Fuchs equations*, SIGMA **13** (2017), 045, 23 pages. dx.doi.org/10.3842/SIGMA.2017.045
9) C. F. Doran, A. Harder, A. Y. Novoseltsev, and A. Thompson, *Calabi-Yau threefolds fibred by mirror quartic K3 surfaces*, Adv. Math. **298** (2016), 369–392. dx.doi.org/10.1016/j.aim.2016.03.045
10) C. F. Doran, A. Harder, A. Y. Novoseltsev, and A. Thompson, *Calabi-Yau threefolds fibred by Kummer surfaces associated to products of elliptic curves*, String-Math 2014 (V. Bouchard, C. Doran, S. Méndez-Diez, and C. Quigley, eds.), Proc. Symp. Pure Math., vol. 93, American Mathematical Society, 2016, pp. 263–287. dx.doi.org/10.1090/pspum/093
11) A. Clingher, C. F. Doran, J. Lewis, A. Y. Novoseltsev, and A. Thompson, *The 14th case VHS via K3 fibrations*, Recent Advances in Hodge Theory: Period Domains, Algebraic Cycles and Arithmetic (M. Kerr and G. Pearlstein, eds.), London Math. Soc. Lecture Note Ser., vol. 427, Cambridge University Press, 2016, pp. 165–227. dx.doi.org/10.1017/CBO9781316387887.008
12) C. F. Doran, A. Harder, A. Y. Novoseltsev, and A. Thompson, *Families of lattice polarized K3 surfaces with monodromy*, Int. Math. Res. Notices (2015), no. 23, 12265–12318. dx.doi.org/10.1093/imrn/rnv071
13) A. Harder and A. Thompson, *The geometry and moduli of K3 surfaces*, Calabi-Yau Varieties: Arithmetic, Geometry and Physics (R. Laza, M. Schütt and N. Yui, eds.), Fields Inst. Monogr., vol. 34, Springer, 2015, pp. 3–43. dx.doi.org/10.1007/978-1-4939-2830-9_1
14) S. A. Filippini, H. Ruddat, and A. Thompson, *An introduction to Hodge structures*, Calabi-Yau Varieties: Arithmetic, Geometry and Physics (R. Laza, M. Schütt and N. Yui, eds.), Fields Inst. Monogr., vol. 34, Springer, 2015, pp. 83–130. dx.doi.org/10.1007/978-1-4939-2830-9_4
15) A. Thompson, *Degenerations of K3 surfaces of degree two*, Trans. Amer. Math. Soc. **366** (2014), no. 1, 219–243. dx.doi.org/10.1090/S0002-9947-2013-05759-5
16) A. Thompson, *Explicit models for threefolds fibred by K3 surfaces of degree two*, Canad. J. Math. **65** (2013), no. 4, 905–926. dx.doi.org/10.4153/CJM-2012-037-2

Preprints

17) C. F. Doran and A. Thompson, *The mirror Clemens-Schmid sequence*, preprint, September 2021, `arXiv:2109.04849`.

Grants

- INI Network Support for Mathematical Sciences grant *UK Algebraic Geometry Network* (with A. Craw, A.-S. Kaloghiros, T. Logvinenko, J. Martens, and M. Wemyss), April 2023 – March 2025. Value: £23,000.
- EPSRC New Investigator Award EP/V005545/1 *Mirror Symmetry for Fibrations and Degenerations*, May 2021 – October 2023. Value: £238,263.
- London Mathematical Society scheme 1 grant awarded for the *Workshop in Geometry and Mathematical Physics*, held at Loughborough University in March 2019. Value: £3,653.
- Foundation Compositio Mathematica grant awarded for the *Workshop in Geometry and Mathematical Physics* (with A. Veselov), held at Loughborough University in March 2019. Value: €2,000.

Teaching Qualifications

- **Fellow of the Higher Education Academy**, awarded for successful completion of Loughborough University's Academic Professional Apprenticeship, April 2021.
- **Associate of the Higher Education Academy**, awarded for successful completion of the University of Oxford's "Developing Learning and Teaching" programme, November 2010.

Teaching Experience

- **Module Leader**, Department of Mathematical Sciences, Loughborough University.
  - MAA240/243 Analysis 2 (2018/19 – Present), 190–240 first and second year undergraduates.
  - MAC142 Introduction to algebraic geometry (2022/23), 65 third year undergraduates.
  - MAB151 Mathematical methods 3 (2020/21 and 2021/22), 180–215 second year undergraduates.
  - MAA310 Mathematics for mechanical engineering (2019/20), 180 first year undergraduates.
- **Module Leader**, Faculty of Mathematics, University of Cambridge.
  - Part III Commutative algebra (2016/17), 65 fourth year undergraduates.
- **Course Instructor**, Department of Pure Mathematics, University of Waterloo.
  - MATH 146 Linear algebra 1 (advanced level) (2015/16), 80 first year undergraduates.
  - MATH 135 Algebra (2014/15 and 2015/16), 60–210 first year undergraduates.
- **Course Instructor**, Department of Mathematical and Statistical Sciences, University of Alberta.
  - MATH 102 Linear algebra for engineers (2011/12 and 2012/13), 35–120 first year undergraduates.
  - MATH 125 Linear algebra I (2011/12), 70 first year undergraduates.
- **Undergraduate Mathematics Tutor**, St Peter's College, Oxford.
  - Prelims geometry (2010/11), 8 first year undergraduates.
  - A0: Linear algebra (2010/11), 7 second year undergraduates.
  - ASO: Number theory (2010/11), 6 second year undergraduates.
- **Undergraduate Mathematics Tutor**, Brasenose College, Oxford.
  - A0: Linear algebra (2010/11), 7 second year undergraduates.
- **Non-stipendiary Lecturer in Mathematics**, Hertford College, Oxford.
  - A0: Linear algebra (2009/10), 5 second year undergraduates.
- **Teaching Assistant**, Mathematical Institute, University of Oxford.
  - C3.1 Algebraic topology (2009/10), 7 fourth year undergraduates.

  - B3.4 Algebraic number theory (2008/09), 10 third year undergraduates.
  - B3.2 Geometry of surfaces (2008/09), 10 third year undergraduates.
  - B3.4 Algebraic number theory (2007/08), 10 third year undergraduates.
- **Undergraduate Mathematics Tutor**, Washington International Studies Council, Oxford.
  - ASO: Number theory (2007/08), 1 second year undergraduate.
- **Undergraduate Supervisor**, Mathematical Institute, University of Warwick.
  In the 2006/07 academic year I supervised a group of 4 first year undergraduates taking the following courses:
  - MA106 Linear algebra.
  - MA113 Differential equations.
  - MA127 3D geometry and motion.
  - MA129 Foundations.
  - MA131 Analysis I & II.
  - MA135 Vectors and matrices.
  - ST111 Probability.

Supervision

- Postdoctoral research associate Luca Giovenzana, May 2021 – April 2023.
- Ph.D. student James Jones, Loughborough University, October 2021 – Present.
- Ph.D. student Joseph Prebble, Loughborough University, October 2019 – Present.
- Since 2018 I have supervised 7 third year undergraduate projects for students taking the module "MAC300 BSc mathematics project" and 2 fourth year undergraduate projects for students taking the module "MAD300 MMath mathematics project" at Loughborough University. In 2022 one of my BSc project students won the departmental project prize for the best undergraduate project in that year.

Conferences/ Seminars Organised

- Organiser of the "COW" UK national algebraic geometry seminar, 2017 – present (with A.-S. Kaloghiros, and T. Logvinenko).
- Organiser of the *COW meets EAGLE (Enumerative Algebraic Geometry en LibertÉ)* workshop, University of Birmingham, February 2023 (with M. van Garrel, A.-S. Kaloghiros, T. Kelly, and T. Logvinenko).
- Organiser of *Sankaran at 60*, a conference to celebrate the 60th birthday of G. Sankaran, University of Cambridge, April 2022 (with A. Craw, M. Gross, A.-S. Kaloghiros, and T. Logvinenko).
- Organiser of the *COW/EmSG/GLEN Joint Summer School*, September 2020 (with A. Kasprzyk, A.-S. Kaloghiros, T. Logvinenko, J. Martens, and C. Pech).
- Organiser of the Loughborough geometry and mathematical physics seminar, 2019–20 (with E. Ferapontov).
- Organiser of the *Workshop in Geometry and Mathematical Physics*, Loughborough University, March 2019 (with A. Veselov).
- Organiser of the Warwick algebraic geometry seminar, 2016 – 17 (with C. Böhning).
- Organiser of the *3C in G workshop on computational algebra*, King's College, University of Cambridge, April 2017 (with M. Gross and A. Kasprzyk).
- Organiser of the session *Fibrations, mirror symmetry, and Calabi-Yau geometry*, 2015 CMS winter meeting, Montréal, Canada, December 2015 (with C. F. Doran and A. Malmendier).

Selected Talks

- *Pseudolattices, degenerations, and fibrations of K3 surfaces.* Washington University in St. Louis algebraic geometry seminar, Washington University in St. Louis, April 2023.
- *Type II degenerations of K3 surfaces, pseudolattices, and mirror symmetry.* "Explicit Moduli Problems in Higher Dimensions" conference, Banff International Research Station, March 2023.
- *The mirror Clemens-Schmid sequence.* K-theory, algebraic cycles and motivic homotopy theory seminar, Isaac Newton Institute, Cambridge, July 2022.
- *The Mirror Clemens-Schmid sequence.* CMSA algebraic geometry in string theory seminar, Harvard University, September 2021.
- *Mirror symmetry for fibrations and degenerations.* "ZAG" Zoom algebraic geometry online seminar, September 2020.
- *Compactifications of the moduli space of K3 surfaces of degree 2.* Séminaire Méditerranéen de Géométrie Algébrique, Université Paul Sabatier, Toulouse, October 2019.
- *Compactifications of the moduli space of K3 surfaces of degree 2.* Summer school on "Moduli and Stability Conditions", Leibniz Universität Hannover, August 2019.
- *Pseudolattices and homological mirror symmetry.* Conference on "Recent Developments in Higgs Theory", Higher School of Economics, Moscow, October 2018.
- *Threefolds fibred by K3 surfaces and mirror symmetry.* Center of Mathematical Sciences and Applications mirror symmetry seminar, Harvard University, April 2018.
- *ADE surfaces.* "Young Perspectives in Algebraic Geometry" conference, Universität Bayreuth, March 2018.
- *Mirror symmetry for lattice polarized del Pezzo surfaces.* Conference on "Mirror Symmetry and Applications", Higher School of Economics, Moscow, December 2017.
- *Mirror symmetry for lattice polarized del Pezzo surfaces.* Freie Universität Berlin arithmetic geometry seminar, Freie Universität Berlin, June 2017.
- *Towards a compactification of the moduli space of K3 surfaces of degree two.* Oxford algebraic and symplectic geometry seminar, University of Oxford, November 2016.
- *K3-fibred Calabi-Yau threefolds and mirror symmetry.* Opening meeting of the "Classification, Computation, and Construction: New Methods in Geometry" program, University of Warwick, October 2016.
- *Calabi-Yau threefolds fibred by lattice polarized K3 surfaces.* Retrospective workshop for the 2013 fall thematic program on "Calabi-Yau Varieties: Arithmetic, Geometry and Physics", Herstmonceux Castle, United Kingdom, June 2016.
- *Calabi-Yau threefolds fibred by lattice polarized K3 surfaces.* UIC algebraic geometry seminar, University of Illinois at Chicago, September 2015.
- *Towards a compactification of the moduli space of K3 surfaces of degree two.* Conference on "Moduli Spaces and Enumerative Geometry", IMPA, Rio de Janeiro, April 2015.
- *Calabi-Yau threefolds fibred by Kummer surfaces.* Conference on "Calabi-Yau Manifolds and their Moduli", University of Alberta, June 2014.
- *Families of lattice polarised K3 surfaces with monodromy.* University of Georgia algebraic geometry seminar, University of Georgia, September 2013.
- *From K3 to CY3.* Introductory summer school on "Calabi-Yau Varieties: Arithmetic, Geometry and Physics", Fields Institute, Toronto, August 2013.
- *Degenerations of K3 surfaces of degree two.* Workshop on "Hodge Theory and String Duality", Banff International Research Station, December 2011.
- *Degenerations of K3 surfaces of degree two.* Workshop on "Arithmetic and Geometry of K3 Surfaces and Calabi-Yau Threefolds", Fields Institute, Toronto, August 2011.

Public Lectures/ Outreach Activities

- Since 2018 I have taken regular part in open/visit days at Loughborough University, including giving the central *Mathematics at Loughborough* presentation on 3 occasions.
- *To infinity... and beyond*? Public lecture at the LogiCON science convention, MacEwan University, May 2014.
- *The mathematics of knots* (*or: what do pure mathematicians do all day?*). Public lecture at the LogiCON science convention, University of Alberta, May 2013.
- *Non-Euclidean geometry.* Public lecture at the LogiCON science convention, TELUS World of Science, Edmonton, April 2012.
- Project Coordinator for the Alberta Summer Mathematics Institute 2012. This role involved providing support to a group of nine high school students whilst they worked on a range of challenging mathematics research projects.
- Volunteered as an External Mentor for the United Kingdom Mathematics Trust senior mentoring scheme (October 2009 – June 2011), providing support and guidance to two A-level students as they attempted a series of mathematical problems designed to stretch their abilities and inspire them to study higher mathematics.

Service

- Undergraduate Admissions Tutor, Department of Mathematical Sciences, Loughborough University (2022 – Present).
- Member of the EPSRC Early Career Forum (2021 – Present).
- Member of the EPSRC Peer Review College (2021 – Present).
- Reviewing Editor for the journal *Experimental Results*, published by Cambridge University Press (2019 – 2023).
- Department Webmaster, Department of Mathematical Sciences, Loughborough University (2019 – 2022).
- Reviewer for *AMS Mathematical Reviews* (2014 – 2022).
- Postdoctoral Research Associate Representative on the steering committee for the EPSRC program grant *Classification, Computation, and Construction: New Methods in Geometry* (2016 – 17).
- Postdoctoral Fellow Representative to the Mathematics Faculty Council, University of Waterloo (2015 – 16).
- House Officer (2008 – 10) and First Year Representative (2007) on the New College Middle Common Room committee, University of Oxford.

Affiliations

- Member of the Institute of Mathematics and its Applications (2018 – Present).
- Member of the London Mathematical Society (2017 – Present).
- Member of the Canadian Mathematical Society (2015 – 2022).
- Associate Member of the Institute of Mathematics and its Applications (2007 – 2018).