

# Arend Bayer

## University Address

School of Mathematics, The University of Edinburgh, United Kingdom

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## Research interests

Applications of Derived categories within algebraic geometry

Stability conditions, wall-crossing

Birational geometry of moduli spaces

Gromov–Witten invariants, Donaldson–Thomas invariants

## Education

2004–2006 Ph.D. at *MPI für Mathematik, Bonn, Germany*, supervised by Yu. I. Manin

2000–2003 Diplom at *University of Bonn, Germany*; thesis supervised by Yu. I. Manin

1998–1999 *University of Cambridge, England*, “Part III”, with distinction

1997–1998 Student at *University of Heidelberg, Germany*, Vordiplom

## Employment

2012– University of Edinburgh, Lecturer (2012-2014), Reader (since 2014)

2009–2012 Assistant Professor (Tenure Track) at University of Connecticut

Spring 2009 Postdoctoral fellowship at the MSRI, Berkeley

2006–2008 Post-Doc at the University of Utah

2004–2006 PhD position at the Max-Planck-Institut, Bonn, Germany

## Awards

Whitehead prize 2016 of the London Mathematical Society

University of Cambridge Adams prize in Mathematics 2015

ERC starting grant “Wall-Crossing and Birational Geometry”, 12/2013–11/2018

NSF grant “Wall-crossing, stability conditions and mirror symmetry” (DMS 1101377), 2011-02014

NSF grant “Wall-Crossing for Moduli Spaces of Bridgeland-Stable Objects, Birational Geometry and Gromov-Witten Theory” (DMS 0801356), 2008–2011

Visiting Fellowship, Isaac Newton Institute Cambridge, UK, Spring 2011

Postdoctoral fellowship at the MSRI, Berkeley, Spring 2009

## Advisees

PhD students: Rebecca Tramel (2011–2015), now Post-doc at UIUC. Soheyla Feyzbaksh (2014–?), Sjoerd Beentjes (2014–?).

Post-docs: Ciaran Meachan (2013–2015), Chunyi Li (2014–2017), Matthew Woolf (2015–2016), Diletta Martinelli (2016–?), Alice Rizzardo (2016–?)

## Editorial work/Refereeing

Editorial Advisor, Bulletin/Journal/Proceedings/Transactions of the LMS

Editor, *Proceedings of the Royal Society of Edinburgh Sect. A*

Frequent refereeing and informal quick opinions (JAMS, Inventiones, Duke, Compositio, Crelle, Algebraic Geometry, Journal of Algebraic Geometry, Commentarii Mathematici Helvetici, Geometry & Topology, . . .)

Reviewer for grant application: NSF (also as panelist), NSA, EPSRC, ERC, FRS-FNRS

## Conferences co-organised

School and Conference *Moduli Spaces, Mirror Symmetry and Enumerative Geometry*, August 2016, ICTP Trieste.

Second *British Algebraic Geometry* (BrAG) meeting, Edinburgh, April 2016.

Concentration period and workshop on *Geometry from stability conditions* (part of the 2014/15 EPSRC symposium on Derived Categories), Warwick, February 2015.

First BrAG meeting, Warwick, September 2014.

Fall 2010 AGNES meeting at University of Connecticut, September 2010.

Co-founder of the biannual conference series *AGNES - Algebraic Geometry Northeastern Series*.

*Western algebraic geometry seminar* (WAGS), University of Utah, November 2008.

### Publications

A short proof of the deformation property of Bridgeland stability conditions. arXiv:1606.02169. Submitted for publication.

Wall-crossing implies Brill-Noether. Applications of stability conditions on surfaces. arXiv:1604.08261.

To appear in the Proceedings for the AMS Summer Institute for Algebraic Geometry, University of Utah, 2015.

With A. Craw and Z. Zhang. Nef divisors for moduli spaces of complexes with compact support. arXiv:1602.00863. Submitted for publication.

With E. Macrì, P. Stellari. The space of stability conditions on abelian threefolds, and on some Calabi-Yau threefolds, 2014. *Inventiones mathematicae*, pages 1–65, 2016. arXiv:1410.1585.

With Tom Bridgeland. Derived automorphism groups of  $K3$  surfaces of Picard rank 1, 2013. arXiv:1310.8266. To appear in *Duke Math. J.*

With B. Hassett, Y. Tschinkel. Mori cones of holomorphic symplectic varieties of  $K3$  type. Mori cones of holomorphic symplectic varieties of  $K3$  type. *Annales Scientifiques de l'ENS*, 48(5):941–950, 2015. arXiv:1307.2291.

With E. Macrì. MMP for moduli of sheaves on  $K3$ s via wall-crossing: nef and movable cones, Lagrangian fibrations. *Inventiones Math.*, 198(3):505–590, 2014. arXiv:1301.6968.

With E. Macrì. Projectivity and birational geometry of Bridgeland moduli spaces. *J. Amer. Math. Soc.*, 27(3):707–752, 2014. arXiv:1203.4613.

With A. Bertram, E. Macrì, Y. Toda. Bridgeland stability conditions on threefolds II: An application to Fujita's conjecture. *J. Algebraic Geom.*, 23(4):693–710, 2014. arXiv:1106.3430

With E. Macrì, Y. Toda. Bridgeland stability conditions on threefolds I: Bogomolov-Gieseker type inequalities. *J. Algebraic Geom.*, 23(1):117–163, 2014. arXiv:1103.5010.

With E. Macrì. The space of stability conditions on the local projective plane. *Duke Math. J.*, 160 (2011) no. 2, 263–322. arXiv:0912.0043

Polynomial Bridgeland stability conditions and the large volume limit. *Geom. Topol.* 13 (2009), 4:2389–2425. arXiv:0712.1083.

With C. Cadman. Quantum Cohomology of  $[\mathbb{C}^N/\mu_r]$  *Compos. Math.*, 146(5):1291–1322, 2010. arXiv:0705.2158.

With Yuri I. Manin. Stability Conditions, Wall-crossing and weighted Gromov-Witten Invariants, 2006. *Mosc. Math. J.*, 9 (2009), 1. arXiv:math.AG/0607580.

Semisimple quantum cohomology and blowups. *Int. Math. Res. Not.*, (40):2069–2083, 2004. math.AG/0403260.

With Yuri I. Manin. (Semi)simple exercises in quantum cohomology. In *The Fano Conference*, pages 143–173. Univ. Torino, Turin, 2004. math.AG/0103164.

### Invited Lecture series

The following lists invited lecture series of at least three lectures:

School on *Moduli Spaces, Mirror Symmetry and Enumerative Geometry*, August 2016, ICTP Trieste.

Summer School on *Stability conditions on triangulated categories and geometric applications*, Nordfjordeid, Norway, June 2016.

Hausdorff school *Derived categories*, University of Bonn, April 2016.

CNRS program *Géométrie Algébrique / Géométrie complexe* meeting, Luminy, November 2015.

*Triangulated categories in Algebra, Geometry and Topology*, University of Warsaw, June 2014.

*Minicourses on stability*, University of Coimbra, April 2014.

*Graduate Student Workshop on Moduli Spaces and Bridgeland Stability*, University of Illinois Chicago, March 2014.

Four lectures on “Stability conditions and birational geometry”, University of Freiburg, November 2012.

*Summer School on Mathematical String Theory 2010*, Virginia Tech, June/July 2010.

*Rencontres mathématiques de Glanon*, Glanon (France), June/July 2008.

*VIGRE Mini-Course on Derived Categories*, University of Utah, June 2007.

#### **Invited talks**

*Algebraic Geometry*, Satellite conference 7th European Congress of Mathematics, Hannover, July 2016

*Homological Mirror Geometry*, BIRS (Banff), March 2016

*Algebra Seminar*, University of Sheffield, December 2015

*Derived Categories and Moduli spaces*, Stavanger, September 2015

*AMS Summer Institute Algebraic Geometry*, University of Utah, July 2015

*Fourier-Mukai transforms, 35 years on*, VBAC, Warwick, June 2015

Morning speaker at *The 4th Joint British Mathematical Colloquium & British Applied Mathematics Colloquium*, Cambridge, April 2015

*Simons Symposium Symposium on Geometry over non-closed fields*, Puerto Rico, March 2015

*Workshop on Algebraic Geometry*, MFO Oberwolfach, March 2015

*Algebraisches Geometrie Seminar*, University of Hannover, December 2014

*Complex Geometry and Algebraic Geometry*, BICMR at Peking University, July 2014

*K3 surfaces and their moduli*, Schiermonnikoog (Netherlands), May 2014

*Geometry workshop*, British Mathematics Colloquium, Queen Mary University London, April 2014

*Geometry and Arithmetic of Surfaces*, LMU and TU Munich, March 2014

*Birational Geometry and Foliations*, Hausdorff Institute for Mathematics Bonn, February 2014

*Calabi-Yau manifolds, mirror symmetry and related topics*, University of Tokyo, February 2014

*Positivity of Linear Series and Vector Bundles*, Banff International Research Station, February 2014

*Workshop on Birational geometry and stability*, Vietnam Institute of Advanced Study, January 2014

*Algebraic Geometry Seminar*, ETH Zürich, December 2013

*Cambridge-Oxford Warwick (COW) algebraic geometry meeting*, Cambridge, November 2013

*Mathematics colloquium*, University of Sheffield, October 2013

*University College London/King's College Geometry Seminar*, October 2013

*Algebraic Geometry Seminar*, Ohio State University, August 2013

*Workshop on Higher Categories and Topological Quantum Field Theories*, ESI Vienna, June 2013

*The Geometry of Topological D-branes, Categories and Applications*, ESI Vienna, June 2013

*Algebraic Geometry Seminar*, University of Cambridge, April 2013

*2013 Texas Algebraic Geometry Symposium*, University of Texas Austin, April 2013

*Glasgow-Liverpool-Edinburgh-Newcastle Algebraic Geometry seminar*, Liverpool, February 2013

*Moduli Spaces and Mathematical Physics*, Workshop at CIMAT Guanajuato, Mexico, February 2013

*UK-Japan Mathematical Forum, Algebraic and Symplectic Geometry*, Keio University, January 2013

*Derived category, Mirror Symmetry, McKay correspondence seminar*, IPMU Tokyo, Japan, January 2013

*Seminario di Geometria Algebrica*, University of Milano/Politecnico di Milano, December 2013, two talks

11 talks in 2012 (including Oxford, HSE Moscow, Steklov Institute Moscow, MPI Bonn, Northeastern, MIT, UIC)

12 talks in 2011 (including Chern Institute Tianjin, Zhejiang University Hangzhou, Isaac Newton Institute, Oxford)