

Dr Joseph Allen Waldron

Research Interests

My research concerns the birational classification of algebraic varieties. In particular I study the log minimal model program and related questions in positive and mixed characteristics.

Employment

2020- **Michigan State University**, *Tenure-track Assistant Professor*.

2017-2020 **Princeton University**, *Instructor*.

Postdoctoral position involving independent research and 2:1 teaching.

2016-2017 **École Polytechnique Fédérale de Lausanne (EPFL)**, *Postdoctoral Researcher*.

Postdoctoral position in the research group of Zolt Patakfalvi

Education

2013–2016 **PhD**, *University of Cambridge*.

Supervisor: Prof. Caucher Birkar

Thesis: On the log minimal model program for 3-folds in positive characteristic

2012-2013 **MMath (Part III)**, *University of Cambridge*.

- Distinction

2009-2012 **BA**, *University of Cambridge*.

- 3rd year: 1st Class
- 2nd year: 1st Class
- 1st year: 1st Class

Articles

Published

- [1] Lena Ji and Joe Waldron. Structure of geometrically non-reduced varieties. *arXiv: 1909.04014*, to appear in *Trans. Amer. Math. Soc.*, 2021.
- [2] Zolt Patakfalvi and Joe Waldron. Singularities of general fibers and the LMMP. *arXiv:1708.04268*, to appear in *Amer. J. Math.*, 2020.
- [3] Omprokash Das and Joe Waldron. On the abundance problem for 3-folds in characteristic $p > 5$. *Math. Z.*, 292(3-4):937–946, 2019.
- [4] Joe Waldron. The LMMP for log canonical 3-folds in characteristic $p > 5$. *Nagoya Math. J.*, 230:48–71, 2018.

- [5] Joe Waldron. Finite generation of the log canonical ring for 3-folds in char p . *Math. Res. Lett.*, 24(3):933–946, 2017.
- [6] Caucher Birkar and Joe Waldron. Existence of Mori fibre spaces for 3-folds in char p . *Adv. Math.*, 313:62–101, 2017.
- [Preprints](#)
- [7] Stefano Filipazzi and Joe Waldron. Connectedness principle in characteristic $p > 5$. *arXiv: 2010.08414*, 2020.
- [8] Lukas Brantner and Joe Waldron. Purely inseparable Galois theory I: the fundamental theorem. *arXiv: 2010.15707*, 2020.
- [9] Bhargav Bhatt, Linqun Ma, Zsolt Patakfalvi, Karl Schwede, Kevin Tucker, Joe Waldron, and Jakub Witaszek. Globally $+$ -regular varieties and the minimal model program for threefolds in mixed characteristic. *arXiv: 2012.15801*, 2020.
- [10] Linqun Ma, Karl E. Schwede, Kevin Tucker, Joe Waldron, and Jakub Witaszek. An analogue of adjoint ideals and plt singularities in mixed characteristic. *arXiv: 1910.14665*, 2019.
- [11] Omprokash Das and Joe Waldron. On the log minimal model program for 3-folds over imperfect fields of characteristic $p > 5$. *arXiv: 1911.04394*, 2019.

Awards, Prizes and Fellowships

Spring 2019 **McDuff Postdoctoral Fellowship.**

Endowed fellowship providing a 5-month stipend to attend the MSRI program “Birational Geometry and Moduli Spaces”.

2013-2016 **EPSRC PhD Studentship.**

Cambridge Undergraduate and Postgraduate Prizes.

- Smith-Rayleigh-Knight Essay Prize
- Colton Prize
- Braithwaite Prize

Talks

March 2020 Northwestern Algebraic Geometry Seminar

Dec 2019 UCLA Algebra Seminar

July 2019 Del Pezzo Surfaces and Fano Varieties Workshop, HHU Düsseldorf

April 2019 MSRI Seminar

April 2018 Rutgers Algebra Seminar

March 2018 Columbia Algebraic Geometry Seminar

March 2018 Johns Hopkins Algebraic Geometry Seminar

January 2018 University of Utah Algebraic Geometry Seminar

August 2017 Simons Conference on Birational Geometry, Simons Foundation, New York

April 2017 Workshop on Singularities, Linear Systems and Fano Varieties, NCTS, Taipei

June 2016 EDGE Days, University of Edinburgh

Feb 2016 Workshop on Birational Geometry, University of Warwick
Dec 2015 Princeton University Algebraic Geometry Seminar

Teaching Experience

- 2020- **Michigan State University.**
- Fall 2020: Honors Multivariable Calculus
- 2017-2020 **Princeton University.**
- Courses for mathematics majors.
 - Fall 2019: Algebraic geometry
 - Spring 2018: Reading course on Shafarevich's "Basic Algebraic Geometry"
 - Courses for 1st and 2nd year undergraduates who are not mathematics majors.
 - Fall 2017, Fall 2018: Multivariable Calculus;
 - Spring 2018, Spring 2020: Linear Algebra with Applications;
- 2016-2017 **École Polytechnique Fédérale de Lausanne.**
- Teaching assistant, with duties involving preparing homework sheets, solutions sets and running exercise sessions.
 - Spring 2017: Algebraic geometry;
 - Fall 2016: Rings and modules;
- 2013-2016 **University of Cambridge.**
- Supervisions for Queens' College. These are two on one sessions designed to discuss the student's homework solutions and questions about the course:
 - 2nd year Linear Algebra
 - 2nd year Geometry
 - Examples classes for Queens' College. These are lecture style classes intended to explain and correct common mistakes on homework problems, held immediately before supervisions.
 - 2nd year Linear Algebra
 - Maths Café: Voluntary weekly sessions in which PhD students made themselves available to help undergraduates with homework problems on any topic.

Administrative Experience

- 2018-2020 Organiser of Princeton Algebraic Geometry seminar
2015 Student volunteer at British Mathematical Colloquium, Cambridge
2014-2015 Organiser of Cambridge Junior Geometry Seminar

Languages

English Native
French Intermediate

IT

Experience of LaTeX, Python, Matlab