

# JAKUB WITASZEK

## EDUCATION

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- 2014– 2018 **Imperial College London**, PhD (Supervisor: Prof. Paolo Cascini), Mathematics  
2012– 2014 **Bonn University, Germany**, MSc (Supervisor: Prof. Daniel Huybrechts), Mathematics  
2009 – 2012 **Warsaw University, Poland**, BSc (Supervisor: Prof. Jaroslaw Wisniewski), Mathematics

## APPOINTMENTS

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- 2022 – NOW **Princeton University**, Assistant Professor  
2019 – 2022 **University of Michigan, Ann Arbor**, D.J. Lewis Postdoctoral Assistant Professor  
JAN/2019 – MAY/2019 **Mathematical Sciences Research Institute, Berkeley**, Postdoctoral Fellow  
2018 – 2019 **Institute for Advanced Study, Princeton**, Postdoctoral Fellow (Member)

## MAJOR ACHIEVEMENTS, SCHOLARSHIPS, AND GRANTS

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- 2021–2024 **NSF Research Grant**, *The Minimal Model Program in Positive and Mixed Characteristics*  
2018 **Doris Chen Award**, Imperial College London  
2012–2014 **Bonn International Graduate School scholarship**  
2011–2012 **Scholarship of the Minister of Science and Higher Education**, Poland  
2009 **50th International Mathematics Olympiad**, Bremen – bronze medal  
2009 **60th Polish Mathematics Olympiad** – 4th place, silver medal

## PUBLICATIONS

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- 2023 **Relative semiampleness in mixed characteristic**  
[Duke Mathematical Journal](#), to appear (Witaszek)  
2023 **Globally  $+$ -regular varieties and the MMP for 3-folds in mixed characteristic**  
[Publications Mathématiques de l'IHÉS](#)  
(Bhatt-Ma-Patakfalvi-Schwede-Tucker-Waldron-Witaszek)  
2022 **On the relative Minimal Model Program for 4-folds in positive and mixed characteristic**  
[Forum of Mathematics, PI](#) (Hacon-Witaszek)  
2022 **The Du Bois complex of a hypersurface and the minimal exponent**  
[Duke Mathematical Journal](#) (Mustata-Olano-Popa-Witaszek)

- 2022 **An analog of adjoint ideals and PLT singularities in mixed characteristic**  
[Journal of Algebraic Geometry](#), (Ma-Schwede-Tucker-Waldron-Witaszek)
- 2021 **Keel's base point free theorem and quotients in mixed characteristic**  
[Annals of Mathematics](#) (Witaszek)
- 2021 **Tamely ramified morphisms of curves and Belyi's theorem in positive characteristic**  
[International Mathematics Research Notices](#) (Kedlaya-Litt-Witaszek)
- 2021 **The Minimal Model Program for threefolds in characteristic five**  
[Duke Mathematical Journal](#) (Hacon-Witaszek)
- 2021 **Global Frobenius Liftability II: Surfaces and Fano threefolds**  
[Annali della Scuola Normale Superiore di Pisa](#) (Achinger-Witaszek-Zdanowicz)
- 2021 **On the canonical bundle formula and log abundance in positive characteristic**  
[Mathematische Annalen](#) (Witaszek)
- 2021 **On the relative Minimal Model Program for threefolds in low characteristics**  
[Peking Mathematical Journal](#) (Hacon-Witaszek)
- 2021 **Global Frobenius Liftability I**  
[Journal of the European Mathematical Society](#) (Achinger-Witaszek-Zdanowicz)
- 2019 **On the rationality of Kawamata log terminal singularities in positive characteristic**  
[Algebraic Geometry](#) (Hacon-Witaszek)
- 2018 **Klt del Pezzo surfaces which are not globally F-split**  
[International Mathematics Research Notices](#) (Cascini-Tanaka-Witaszek)
- 2017 **On log del Pezzo surfaces in large characteristic**  
[Compositio Mathematica](#) (Cascini-Tanaka-Witaszek)
- 2017 **On the base point free theorem and Mori dream spaces for log canonical threefolds over the algebraic closure of a finite field**  
[Mathematische Zeitschrift](#) (Nakamura-Witaszek)
- 2017 **Effective bounds on singular surfaces in positive characteristic**  
[Michigan Mathematical Journal](#) (Witaszek)
- 2015 **On the basepoint-free theorem for log canonical threefolds over the algebraic closure of a finite field**  
[Algebra and Number Theory](#) (Martinelli-Nakamura-Witaszek)
- 2015 **The degeneration of the Grassmannian into a toric variety and the calculation of the eigenspaces of a torus action**  
[Journal of Algebraic Statistics](#) (Witaszek)

## PREPRINTS

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2023 **Test ideals in mixed characteristic: a unified theory up to perturbation**

[arXiv](#) (Bhatt-Ma-Patakfalvi-Schwede-Tucker-Waldron-Witaszek)

2023 **Quasi-F-splittings in birational geometry II**

[arXiv](#) (Kawakami-Takamatsu-Tanaka-Witaszek-Yobuko-Yoshikawa)

2022 **Quasi-F-splittings in birational geometry**

[arXiv](#) (Kawakami-Takamatsu-Tanaka-Witaszek-Yobuko-Yoshikawa)

2022 **Lifting globally F-split surfaces to characteristic zero**

[arXiv](#) (Bernasconi-Brivio-Kawakami-Witaszek)

2021 **Resolution and alteration with ample exceptional divisor**

[arXiv](#) (Kollár-Witaszek)

## PROFESSIONAL ACTIVITIES AND EDUCATIONAL OUTREACH

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### Organising:

- Learning workshop on  $p$ -adic Hodge theory (Princeton, October 2023)
- Learning workshop on Hodge modules and Hodge ideals (Princeton, March 2023)
- Learning workshop on Crystalline Cohomology (Princeton, November 2022)
- Algebraic Geometry seminar (Princeton, 2022–now)
- Learning seminar on Deligne-Du Bois singularities (Michigan, Autumn 2020)
- Learning seminar on derived splinters and the direct summand conjecture (London, 2018)
- Postgraduate school *New advances in Fano manifolds* (Cambridge, December 2017)

**Academic service:** PhD admission committee (Princeton, 2023-2024)

**Research mentoring:** co-supervising two graduate students (Princeton, 2022-), supervising an undergraduate student at summer program for mathematics majors (Princeton, 2023), undergraduate reading seminar on scheme theory (Princeton 2023-2024)

**Non-research mentoring:** three graduate students (Michigan, 2019-2021)

**Referee:** Algebraic Geometry, Compositio Mathematica, Duke Mathematical Journal, European Journal of Mathematics, Journal of Algebra, Journal of London Mathematical Society, Manuscripta Mathematica, Mathematische Annalen, Selecta Mathematica

**Grant referee:** European Research Council starting grant (EU), Panelist for National Science Foundation (US), National Science Centre (Poland)

## Outreach:

- Princeton University Mathematics Competition, *Commutators in mathematics*, talk for high school students (Princeton, 2023)
- Michigan Math and Science Scholars, *Cryptography and Number Theory* for high school students (Michigan, June 14 - July 2 in 2021)
- Participating in a workshop on Inquiry Based Learning (flipped classroom) (Michigan, 2020)
- U(M) Undergraduate Math Club, talk: *Algebraic curves and classical geometry* (Michigan, 2019)
- Polish Children's Fund outreach program (Poland, 2010-2013)
  - volunteering, tutoring, and evaluating applications
  - holding week-long workshops: *Algebraic curves and Cayley-Bacharach theorem*, *Introduction to group theory*, *Vectors in geometry*
- *Stanisław Staszic High School* in Warsaw: teaching at a math circle; organising three, week-long, workshops in mathematics and computer science; organising outreach lectures given by undergraduate students and university faculty (Poland, 2008-2011)

## TEACHING

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2024	<i>Honors Linear Algebra</i> , lecturer, Fall term, Princeton University
2023	<i>Algebra I</i> , lecturer, Fall term, Princeton University
2023	<i>Linear Algebra with Applications</i> , lecturer, Spring term, Princeton University
2022	<i>Multivariable Calculus</i> , lecturer, Fall term, Princeton University
2021	<i>Abstract Algebra</i> , inquiry-based learning instructor, Fall term, University of Michigan
2020	<i>Linear Algebra</i> , inquiry-based learning instructor, Fall term, University of Michigan
2020	<i>Algebraic Geometry 2</i> , for graduate students, lecturer, Winter term, University of Michigan
2019	<i>Linear Algebra</i> , inquiry-based learning instructor, Fall term, University of Michigan
2017	<i>Real analysis</i> , demonstrating and marking, Autumn trimester, Imperial College London
2016	<i>Algebra 2</i> , demonstrating and marking, Autumn trimester, Imperial College London
2016	<i>Real analysis</i> , demonstrating and marking, Autumn trimester, Imperial College London
2016	<i>Analysis</i> , demonstrating and marking, Spring trimester, Imperial College London
2015	<i>Linear algebra</i> , demonstrating, Autumn trimester, Imperial College London
2015	<i>Galois theory</i> , marking, Autumn trimester, Imperial College London
2015	<i>Analysis</i> , demonstrating, Spring trimester, Imperial College London
2015–2017	Invigilating and 2nd-marking, Imperial College London

## INVITED RESEARCH TALKS

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- 2024 Colloquium, Polish National Academy of Science, Warsaw  
*Interplay between complex and analytic singularities*
- 2023 Algebraic Geometry seminar, University of Warsaw  
*Singularities in mixed characteristic via the Riemann-Hilbert correspondence*
- 2023 Algebraic Geometry seminar, Harvard University  
*Singularities in mixed characteristic via the Riemann-Hilbert correspondence*
- 2023 KUMUNU, conference in commutative algebra at University of Missouri, Columbia  
*Singularities in mixed characteristic via the Riemann-Hilbert correspondence*
- 2023 Fellowship of the Ring, worldwide commutative algebra seminar  
*Singularities in mixed characteristic via the Riemann-Hilbert correspondence*
- 2023 FRG Special Month, University of Michigan  
*Singularities in mixed characteristic via the Riemann-Hilbert correspondence*
- 2023 Algebraic Geometry and Cohomology in Mixed Characteristic conference at Northwestern University  
*Singularities in mixed characteristic via the Riemann-Hilbert correspondence*
- 2023 Algebraic Geometry seminar, Tokyo University  
*Singularities in mixed characteristic via the Riemann-Hilbert correspondence*
- 2023 Algebraic Geometry seminar, Kyoto University  
*Singularities in mixed characteristic via the Riemann-Hilbert correspondence*
- 2023 Algebraic Geometry seminar, Stony Brook University  
*Singularities in mixed characteristic via the Riemann-Hilbert correspondence*
- 2023 Algebraic Geometry seminar, Columbia University  
*Singularities in mixed characteristic via the Riemann-Hilbert correspondence*
- 2023 Algebraic Geometry seminar, University of Utah  
*Quasi-F-splittings*
- 2022 Midwest Arithmetic Geometry and Number Theory Conference, UIC, Chicago  
*Quasi-F-splittings*
- 2022 AGNES Fall, UMass Amherst  
*Classification of algebraic varieties in mixed characteristic*
- 2022 Algebraic Geometry seminar, Princeton University  
*Quasi-F-splittings*
- 2022 Recent Advances in Classical Algebraic Geometry, ICM satellite conference, Cracow  
*Quasi-F-splittings*
- 2022 Advances in Mixed Characteristic Commutative Algebra and Geometric Connections, Oaxaca  
*Quasi-F-splittings*

- 2022 London Geometry and Topology seminar, Imperial College  
*Quasi-F-splittings*
- 2022 Algebraic Geometry seminar, EPFL  
*Quasi-F-splittings*
- 2022 MPS Conference on Higher Dimensional Geometry, Simons Foundation, NYC  
*Classification of algebraic varieties in positive and mixed characteristic*
- 2022 Algebraic Geometry seminar, University of Michigan  
*Relative semiampleness in mixed characteristic*
- 2021 Algebraic Geometry seminar, Northwestern  
*Classification of algebraic varieties in positive and mixed characteristic*, colloquium talk
- 2021 Special Month on Singularities and K-stability, University of Utah  
*Mixed characteristic vanishing theorems and application IV*, part of lecture series
- 2021 Workshop on birational geometry, Moscow  
*Global  $+$ -regularity and the Minimal Model Program for arithmetic threefolds*
- 2021 Zoom Algebraic Geometry Seminar  
*Relative semiampleness in mixed characteristic*
- 2021 Algebraic geometry seminar, UC San Diego  
*Global  $+$ -regularity and the Minimal Model Program for arithmetic threefolds*
- 2021 Number theory seminar, UC Irvine  
*On applications of arithmetic geometry in commutative algebra and algebraic geometry*
- 2021 Algebraic geometry seminar, Princeton University  
*Global  $+$ -regularity and the Minimal Model Program for arithmetic threefolds*
- 2020 Algebraic geometry seminar, Hannover  
*Relative four-dimensional Minimal Model Program in positive characteristic*
- 2020 Algebraic geometry in East Asia  
*On the four-dimensional MMP for singularities and families in positive characteristic*
- 2020 Algebraic geometry seminar, University of Michigan  
*Keel's base point free theorem and quotients in mixed characteristic*
- 2020 Algebraic geometry seminar, Tokyo University  
*Keel's base point free theorem and quotients in mixed characteristic*
- 2020 Singularities and Arithmetics conference, Tohoku University, Sendai  
*Adjunction for mixed characteristic singularities*
- 2019 Western Algebraic Geometry Symposium, University of Utah  
*Keel's base point free theorem and quotients in mixed characteristic*
- 2019 New postdoctoral researchers talks, University of Michigan  
*The geometry of mixed characteristic varieties*
- 2019 Birational geometry and Moduli Spaces seminar, MSRI, Berkeley  
*Birational geometry in large and low characteristic*

- 2018 Algebraic geometry seminar, John Hopkins University  
*On the Minimal Model Program in low characteristics*
- 2018 Algebraic geometry seminar, Columbia University  
*Liftability of the Frobenius morphism and images of toric varieties*
- 2018 Algebraic geometry seminar, Stony Brook University  
*Liftability of the Frobenius morphism and images of toric varieties*
- 2018 Algebraic geometry seminar, Princeton University  
*On the Minimal Model Program in low characteristics*
- 2018 New members talks, Institute for Advanced Study  
*Classification of algebraic varieties*
- 2018 London-Tokyo workshop in birational geometry, Imperial College London  
*Log non-vanishing conjecture for threefolds in positive characteristic*
- 2018 Algebraic geometry seminar, EPFL, Lausanne  
*On the canonical bundle formula in positive characteristic*
- 2018 Algebraic geometry seminar, University of Warsaw  
*On the canonical bundle formula in positive characteristic*
- 2017 Workshop on birational geometry, Higher School of Economics, Moscow  
*Liftability of the Frobenius morphism and images of toric varieties*
- 2017 Geometry & Topology seminar, Imperial College London  
*Liftability of the Frobenius morphism and images of toric varieties*
- 2017 Algebraic geometry seminar, University of Utah  
*Liftability of the Frobenius morphism and images of toric varieties*
- 2016 Edge days, University of Edinburgh  
*Birational geometry over the algebraic closure of a finite field*
- 2016 Tokyo-Princeton algebraic geometry conference, Princeton University  
*Global  $F$ -regularity of projective surfaces and liftability to the second Witt vectors*
- 2016 Workshop on birational geometry, Warwick University  
*Frobenius splittings in birational geometry*
- 2016 Oberseminar: Algebra, Zahlentheorie und Algebraische Geometrie, Freiburg University  
*Frobenius splittings in birational geometry*
- 2016 Seminar IMPANGA, IMPAN, Warsaw  
*Frobenius splittings in birational geometry*
- 2015 Seminar Algebra & Geometry, Basel University  
*Effective bounds on positive characteristic singular surfaces*
- 2015 Postgraduate Conference in Complex Geometry, Cambridge University  
*Effective bounds on positive characteristic singular surfaces*
- 2015 Géométrie Algébrique en Liberté, Leuven  
*Base point freeness of line bundles in positive characteristic*

2014 Workshop in Birational Geometry and Fano Varieties, Imperial College London

*On base point free theorem for log canonical threefolds over  $\overline{\mathbb{F}}_p$*

2014 University of Tokyo

*The degeneration of the Grassmannian into a toric variety and the eigenspaces of a torus action*

## OTHER ACTIVITIES AND SKILLS

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2012-2014 Experience in using *Mathematica, Magma, Macaulay2, and Sage*

2012 Undgraduate research school, Weizmann Institute of Science, Israel – eight weeks

2011 Internship at Google, *Software Engineer*, London – three months