Bradley Dirks

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Positions

Institute for Advanced Study 2024-2025
Member, School of Mathematics *Princeton, NJ*

Stony Brook University 2023-2027
Simons Instructor *Stony Brook, NY*

NSF Mathematical Sciences Postdoctoral Research Fellow 2023-2027
Stony Brook University *Stony Brook, NY*

Education

University of Michigan 2018-2023
PhD in Mathematics *Ann Arbor, MI*

- Thesis: Using Mixed Hodge Modules to Study Singularities

University of California 2014-2018
BA and MA in Mathematics *Los Angeles, CA*

Teaching Experience

Instructor Spring 2024
Stony Brook University *Stony Brook, NY*

- MAT310: Linear Algebra

Graduate Student Instructor October 2018-Winter 2022
University of Michigan *Ann Arbor, MI*

- Math 105 (Precalculus), Math 115 (Calculus I), Math 116 (Calculus II)

Docent 2016 - 2018
LA Math Circle (now ORMC) *Los Angeles, CA*

Organizing

AIM Workshop "Higher Du Bois and higher rational singularities" October 28 - November 1, 2024
American Institute of Mathematics. See website *w/ Radu Laza*

Winter School on New Applications of Mixed Hodge Modules January 2024
Simons Center for Geometry and Physics. See website *w/ Christian Schnell*

Student Algebraic Geometry seminar Winter 2021-2023
University of Michigan *w/ Devlin Mallory in Winter 2021, w/ Saket Shah 2022-2023*

$\mathcal{D}$-modules and Representation Theory Minicourse Summer 2022
University of Michigan

Mixed Hodge Theory Minicourse Summer 2020
University of Michigan *w/ James Hotchkiss*

Variations of Hodge Structure Reading Group Winter 2020
University of Michigan *w/ James Hotchkiss*

Invited Talks

JHU Algebraic Geometry Seminar October 2024
Minimal Exponent for LCI Subvarieties *Johns Hopkins University*

Princeton University Algebraic Geometry Seminar September 2024
Minimal Exponent for LCI Subvarieties *Princeton University*

Birational Geometry Seminar 2024 May 2024
Recent Results on Minimal Exponent for LCI Subvarieties *Online*

CUNY Commutative Algebra and Algebraic Geometry Seminar March 2024
The minimal exponent for LCI subvarieties *Graduate Center of CUNY*

University of Utah Algebraic Geometry Seminar February 2024
The minimal exponent for LCI subvarieties *University of Utah*

Columbia University Algebraic Geometry Seminar January 2024
The minimal exponent for LCI subvarieties *Columbia University*

Winter School on New Applications of Mixed Hodge Modules January 2024
V-filtration and Hodge filtration in higher codimension *Simons Center for Geometry and Physics*

University of Toronto Algebraic Geometry Seminar November 2023
The minimal exponent for LCI subvarieties *University of Toronto*

Harvard/MIT Algebraic Geometry Seminar October 2023
The minimal exponent for LCI Subvarieties *Harvard University*

Birational Geometry Seminar 2023 May 2023
Higher du Bois and higher rational singularities for LCI varieties *Online*

MAGGC August 2022
V-filtrations of $\mathcal{D}$-modules *UIC*

Algebraic Geometry and Singularities Learning Workshop & Conference June 2022
Comparing V-filtration of an ideal with that of a general linear combination *UW Seattle*

Algebraic Geometry Seminar February 2022
The Structure of Monodromic Mixed Hodge modules *Stony Brook University*

DOCAS Seminar August 2021
Understanding the roots of b-functions *Online*

UConn Algebra Seminar April 2021
Minimal Exponents and a Conjecture of Teissier *Online*

Topology and Singularities Seminar in Madison March 2021
Minimal Exponents and a Conjecture of Teissier *Online*

Research Interests

Algebraic Geometry, Singularities, $\mathcal{D}$-modules, Hodge Theory

Preprints

Hirzebruch-Milnor classes of local complete intersections, minimal exponent, and applications to higher singularities
with Laurențiu Maxim and Sebastián Olano

- Submitted

A Hodge theoretic generalization of Q-homology manifolds
with Sebastián Olano and Debaditya Raychaudhury

- Submitted

Restrictions of Hodge modules using generalized V-filtrations
with Qianyu Chen and Sebastián Olano

- Submitted

Fourier transform and Radon transform for mixed Hodge modules

- Submitted

Some applications of Microlocalization for LCI subvarieties

- Submitted

Verdier specialization and restrictions of Hodge modules
with Qianyu Chen and Morihiko Saito

- Submitted

Publications

The minimal exponent of cones over smooth complete intersection projective varieties
with Qianyu Chen and Mircea Mustaţă

- To appear in Revue Roumaine Math. Pures Appl., volume in memory of Lucian Badescu

The minimal exponent and k-rationality for locally complete intersections
with Qianyu Chen and Mircea Mustaţă

- Journal de l'École Polytechnique **11**(2024)

Minimal exponents and V-filtrations of locally complete intersection singularities
with Qianyu Chen, Mircea Mustaţă and Sebastián Olano

- Journal für die reine und angewandte Mathematik (Crelle's journal) **811**(2024)

An introduction to V-filtrations *with Qianyu Chen and Mircea Mustaţă*

- Handbook of Geometry and Topology of Singularities, Volume VII

On V-filtration, Hodge filtration and Fourier Transform *with Qianyu Chen*

- Selecta Mathematica (New Series) **29**(2023)

Minimal exponents of hyperplane sections: a conjecture of Teissier *with Mircea Mustaţă*

- J. Eur. Math. Soc. **25** (2023),

The Hilbert series of Hodge ideals of hyperplane arrangements *with Mircea Mustaţă*

- Journal of Singularities **20** (2020)

Upper bounds for roots of B-functions, following Kashiwara and Lichtin *with Mircea Mustaţă*

- Publ. Res. Inst. Math. Sci. **58** (2022)

Awards

NSF Mathematical Sciences Postdoctoral Research Fellowship	National Science Foundation, 2023
Wirt and Mary Cornwell Prize	University of Michigan Mathematics Department, 2023
Rackham Predoctoral Fellowship	University of Michigan, Summer 2022-Winter 2023
Paul Daus Memorial Award	UCLA, 2018
Departmental Honors	UCLA Math Department, 2018
Summa Cum Laude	UCLA, 2018