

Botong Wang

Address	Van Vleck Hall, 480 Lincoln Drive, Madison, WI 53706	Office Phone	(608)262-2925
		Email	wang@math.wisc.edu

Education

2006 - 2012 PhD in Mathematics - Purdue University

2002 - 2006 BA in Mathematics - Peking University

Employment History

2021 - now University of Wisconsin-Madison, Department of Mathematics
Associate Professor

2017 - 2021 University of Wisconsin-Madison, Department of Mathematics
Assistant Professor

2016 - 2017 University of Wisconsin-Madison, Department of Mathematics
Visiting Assistant Professor

Fall 2015 KU Leuven, Department of Mathematics
Postdoctor

2012 - 2015 University of Notre Dame, Department of Mathematics
Visiting Assistant Professor

Awards, grants and fellowships

2023-2024 Simons fellowship

2022 Early Career Distinguished Alumni Award, Purdue University College of Science

2019-2023 Sloan fellowship

2017-2020 NSF grant DMS-1701305
Topology of Algebraic Varieties and Enumerative Combinatorial Geometry

2015-2017 Simons Travel Grant

2010-2011 Purdue Research Foundation Research Grant

2006-2007 Ross Fellowship, Purdue University

2002-2006 Mingde Scholarship, Peking University

2002 International Mathematics Olympiad Gold Medal (with perfect score)

Publications and Preprints

1. **Brylinski-Radon transformation and generic projections**, with Yongqiang Liu and Laurentiu Maxim,
arXiv:2307.00352
2. **Applications of singularity theory in applied algebraic geometry and algebraic statistics**, with Laurentiu Maxim and Jose Rodriguez,
To appear in Handbook of Geometry and Topology of Singularities, vol. VII .
3. **A new generic vanishing theorem on homogeneous varieties and the positivity conjecture for triple intersections of Schubert cells**, with Jörg Schürmann and Connor Simpson,
arXiv:2303.13833
4. **Cohomology of \mathbb{Z} -local systems on complex hyperplane arrangement complements**, with Yongqiang Liu and Laurentiu Maxim,
arXiv:2209.13193
5. **Linear optimization on varieties and Chern-Mather classes**, with with Laurentiu Maxim, Jose Rodriguez and Lei Wu,
To appear in Adv. Math.
6. **The Bergman fan of a polymatroid**, with Colin Crowley, June Huh, Matt Larson and Connor Simpson,
arXiv:2207.08764
7. **Logarithmic cotangent bundles, Chern-Mather classes, and the Huh-Sturmfels Involution conjecture**, with Laurentiu Maxim, Jose Rodriguez and Lei Wu,
To appear in Comm. Pure Appl. Math.
8. **Self-Covering, Finiteness, And Fibering Over A Circle**, with Lizhen Qin and Yang Su,
To appear in Trans. Amer. Math. Soc.
9. **Perverse sheaves on varieties with large fundamental groups**, with Donu Arapura,
To appear in J. Differential Geom.
10. **Non-abelian Mellin Transformations and Applications**, with Yongqiang Liu and Laurentiu Maxim,
Forum Math. Sigma 10 (2022), Paper No. e100, 17 pp.
11. **Alexander modules, Mellin transformation and variations of mixed Hodge structures**, with Eva Elduque, Moisés Herradón Cueto and Laurentiu Maxim,
Adv. Math. 411 (2022), Paper No. 108798, 27 pp.
12. **Hodge theory on Alexander invariants – a survey**, with Eva Elduque, Christian Geske, Moisés Herradón Cueto and Laurentiu Maxim,
Topology Appl. 313 (2022), Paper No. 107981
13. **Singular Hodge theory for combinatorial geometries**, with Tom Braden, June Huh, Jacob Matherne and Nicholas Proudfoot,
arXiv:2010.06088
14. **Aspherical manifolds, Mellin transformation and a question of Bobadilla-Kollár**, with Yongqiang Liu and Laurentiu Maxim,
J. Reine Angew. Math. 781 (2021), 1-18.
15. **A semi-small decomposition of the Chow ring of a matroid**, with Tom Braden, June Huh, Jacob Matherne and Nicholas Proudfoot,
Adv. Math. 409 (2022), Paper No. 108646.
16. **Mixed Hodge Structures on Alexander Modules**, with Eva Elduque, Christian Geske, Moisés Herradón Cueto and Laurentiu Maxim,
To appear in Mem. Amer. Math. Soc.

17. **A Morse theoretic approach to non-isolated singularities and applications to optimization**, with Laurentiu Maxim and Jose Rodriguez,
J. Pure Appl. Algebra 226 (2022), no. 3, Paper No. 106865, 23 pp.
18. **Defect of Euclidean distance degree**, with Laurentiu Maxim and Jose Rodriguez,
Adv. in Appl. Math. 121 (2020), 102101
19. **Lyubeznik numbers of irreducible projective varieties depend on the embedding**,
Proc. Amer. Math. Soc. 148 (2020), 2091-2096
20. **Perverse sheaves on semi-abelian varieties—a survey of properties and applications**, with
Yongqiang Liu and Laurentiu Maxim,
Eur. J. Math. 6 (2020), no. 3, 977-997.
21. **Euclidean distance degree of projective varieties**, with Laurentiu Maxim and Jose Rodriguez,
Int. Math. Res. Not. IMRN 2021, no. 20, 15788-15802.
22. **Euclidean distance degree of the multiview variety**, with Laurentiu Maxim and Jose Rodriguez,
SIAM J. Appl. Algebra Geom. 4(1) (2020), 28-48.
23. **Correlation bounds for fields and matroids**, with June Huh and Benjamin Schröter,
J. Eur. Math. Soc. 24 (2022), no. 4, 1335-1351.
24. **Perverse sheaves on semi-abelian varieties**, with Yongqiang Liu and Laurentiu Maxim,
Selecta Math. (N.S.) 27 (2021), no. 2, Paper No. 30, 40 pp.
25. **Numerical computation of braid groups**, with Jose Rodriguez,
arXiv:1711.07947
26. **Computing Euler obstruction functions using maximum likelihood degrees**, with Jose Rodriguez,
Int. Math. Res. Not. 2020, no. 20, 6699-6712.
27. **Mellin transformation, propagation, and abelian duality spaces**, with Yongqiang Liu and Laurentiu Maxim,
Adv. Math. 335 (2018), 231-260.
28. **On the length of perverse sheaves and D-modules**, with Nero Budur, Pietro Gatti and Yongqiang Liu,
Bull. Math. Soc. Sci. Math. Roumanie (N.S.) 62(110) (2019), no. 4, 355-369.
29. **Generic vanishing for semi-abelian varieties and integral Alexander modules**, with Yongqiang Liu and Laurentiu Maxim,
Math. Z. 293 (2019), 629-645.
30. **Topology of subvarieties of complex semi-abelian varieties**, with Yongqiang Liu and Laurentiu Maxim,
Int. Math. Res. Not. 2021, no. 14, 11169-11208
31. **Absolute sets and the Decomposition Theorem**, with Nero Budur,
Ann. Sci. École Norm. Sup. (4) 53 (2020), no. 2, 469-536.
32. **Algebraic surfaces with zero dimensional cohomology support locus**,
Taiwanese J. Math. 22 (2018), no. 3, 607-614.
33. **Cohomology jump loci of quasi-compact Kähler manifolds**, with Nero Budur,
Pure Appl. Math. Q. 16 (2020), no. 4, 981-999.
34. **Lefschetz classes on projective varieties**, with June Huh,
Proc. Amer. Math. Soc. 145 (2017), no. 11, 4629-4637.
35. **The monodromy theorem for compact Kähler manifolds and smooth quasi-projective varieties**, with Nero Budur and Yongqiang Liu,
Math. Ann. 371 (2018), no. 3-4, 1069-1086.

36. **Enumeration of points, lines, planes, etc.** with June Huh,
Acta Math. Volume 218, Number 2 (2017), 297-317.
37. **A Family of Compact Complex-Symplectic Calabi-Yau Manifolds that are Nonkähler,**
with Lizhen Qin,
Geom. Topol. Volume 22, Number 4 (2018), 2115-2144.
38. **Cohomology support loci of local systems,** with Nero Budur, Yongqiang Liu and Luis Saumell,
Michigan Math. J. 66 (2017), no. 2, 295-307.
39. **Maximum likelihood degree of Fermat hypersurfaces via Euler characteristics,**
Proc. Amer. Math. Soc. 144 (2016), no. 5, 3649-3655.
40. **Local systems on analytic germ complements,** with Nero Budur,
Adv. Math. 306 (2017), 905-928.
41. **Recent results on cohomology jump loci,** with Nero Budur,
Hodge Theory and L2-analysis, ALM 39, Higher Education Press and International Press (2017),
205-241.
42. **The maximum likelihood degree of mixtures of independence models,** with Jose Rodriguez,
SIAM J. Appl. Algebra Geom. 1 (2017), no. 1, 484-506.
43. **Rank one local systems and forms of degree one,** with Nero Budur and Youngho Yoon,
Int. Math. Res. Not. (2016), no.13, 3849-3855.
44. **Bounding the maximum likelihood degree,** with Nero Budur,
Math. Res. Lett. 22 (2015), no.6, 1613-1620.
45. **The signed Euler characteristic of very affine varieties,** with Nero Budur,
Int. Math. Res. Not. (2015), no.14, 5710-5714.
46. **Torsion points on the cohomology jump loci of compact Kähler manifolds,**
Math. Res. Lett. 23 (2016), no.2, 545-563.
47. **Cohomology jump loci of differential graded Lie algebras,** with Nero Budur,
Compos. Math. 151 (2015), no. 8, 1499-1528.
48. **Cohomology jump loci of quasi-projective varieties,** with Nero Budur,
Ann. Sci. École Norm. Sup. (4) 48 (2015), no. 1, 227-236.
49. **Filtered local systems and parabolic Higgs bundles,**
Ph.D Thesis, Purdue University. 2012
50. **Homomorphisms between the fundamental groups of Kähler manifolds,**
Proc. Amer. Math. Soc. 139 (2011), no. 5, 1599-1603.

Invited Talks

- Summer course at *Wuhan Univeristy*, August 2023
- PKU Mathematics Forum, *Peking University*, August 2023
- Kentucky-Ohio ALgebra Alliance (KOALA), *OSU*, Columbus Ohio, May 2023
- Colloquium, *University of Arizona*, April 2023
- Recent Breakthroughs in Mathematics, *Belgian Mathematical Society*, Brussels Belgium, March 2023
- Algebraic Aspects of Matroid Theory, *BIRS*, Banff, March 2023
- Algebraic geometry seminar, *University of Michigan*, February 2023

- Conference on Periods, Shafarevich Maps and Applications, *IMSA, University of Miami*, January 2023
- Optimization, Algebra, and Geometry Seminar (online), *Carnegie Mellon University*, November 2022
- Lectures at YMSC (online), *Tsinghua University*, November 2022
- Online seminar, *Chinese University of Hong Kong*, Hong Kong, October 2022
- Algebraic geometry seminar, *KU Leuven*, Leuven, Belgium, June 2022
- Summer school on nonabelian Hodge theory, *St Jacut*, France, June 2022
- Colloquium, *Purdue University*, April 2022
- AMS Sectional Meeting AMS Special Session on Optimization, Complexity, and Real Algebraic Geometry, *virtual meeting*, March 2022
- Geometry and topology seminar, *University of Wisconsin-Madison*, November 2021
- CA+ conference, *University of Minnesota*, October 2021
- Conference on Compactifications, configurations, and cohomology, *Northeastern University*, October 2021
- Workshop on D-modules, Group Actions, and Frobenius: Computing on Singularities, *ICERM*, online, August 2021
- Sokcho Algebraic Geometry conference, *Sokcho*, Korea, online, July 2021
- Algebraic geometry seminar, *Stony Brook University*, online, March 2021
- Geometry and Combinatorics Seminar, *Western Univerisity*, online, March 2021
- Seminar on Geometry and Arithmetic, *UCSB*, online, January 2021
- 10 lectures on matroid theory, *Suzhou University*, online, October-November 2020
- Combinatorics seminar, *University of Wisconsin-Madison*, February 2020
- Colloquium, *University of Michigan*, January 2020
- Special Session on Singularities and Characteristic Classes, *AMS-JMM joint meeting*, Denver. January 2020
- Algebraic topology seminar, *Princeton University*, November 2019
- Workshop on Topological and Analytical Methods in Singularity Theory, *CIMAT*, Guanajuato, Mexico. November 2019
- Leuven-PKU mini-conference, *BICMR*, Beijing, China. August 2019
- Workshop on Algebraic Geometry, *Fudan University*, Shanghai, China. July 2019
- Workshop on algebra, geometry and combinatorics, *KIAS*, Seoul, Korea, June 2019
- Tianyuan advanced seminar on Hodge theory, *Center for Applied Mathematics of Tianjin University*, Tianjin, China. May 2019
- Algebraic geometry conference, *BCAM*, Bilbao, Spain. May 2019
- Algebraic geometry seminar, *KU Leuven*, Leuven, Belgium, May 2019
- Geometry and topology seminar, *University of Massachusetts Amherst*, April 2019
- Algebraic geometry seminar, *Johns Hopkins University*, February 2019
- Algebra seminar, *Geogia Tech*, February 2019

- Workshop on D-modules and Hodge theory, *UIC*, November 2018
- WAGS (Western Algebraic Geometry Symposium), *University of Oregon*, October 2018
- Colloquium and Algebra Seminar, *Central Michigan University*, September 2018
- Algebraic geometry seminar, *Suzhou University*, Suzhou, China, August 2018
- Algebraic geometry seminar, *BICMR*, Beijing, China, August 2018
- Workshop on algebraic geometry, *Morningside Center for mathematics, Chinese Academy of Sciences*, Beijing, China, June 2018
- Algebraic geometry seminar, *East China Normal University*, Shanghai, China, June 2018
- Topology and Geometry, a conference dedicated to the memory of Stefan Papadima. *IMAR*, Bucharest, Romania, May 2018
- Workshop on Geometry and Physics, III *Sun Yat-sen University*, May 2018
- Algebra seminar at *University of Arkansas*, March 2018
- Algebraic geometry seminar at *Purdue University*, February 2018
- Hodge Theory, Moduli and Representation Theory Conference at *Stony Brook University*, August 2017
- Algebraic geometry seminar at *Shanghai center for mathematical sciences*, China, August 2017
- One week summer course at *Nanjing University*, China, July 2017
- Singularity theory conference at *East China Normal University*, China, July 2017
- Workshop on Hyperplane Arrangements and Singularities, *KIAS*, Korea, June 2017
- Workshop on Algebraic Varieties With a Special Emphasis on Calabi-Yau Varieties and Mirror Symmetry at *Fields Institute, Toronto*, March 2017
- Sepcial colloquium at *University of Toronto*, January 2017
- Algebraic geometry seminar and Colloquium at *UCSD*, January 2017
- Colloquium at *University of Wisconsin - Madison*, December 2016
- Colloquium at *Washington University in St. Louis*, November 2016
- Algebraic geometry seminar at *OSU*, November 2016
- Algebraic geometry seminar at *University of Wisconsin - Madison*, October 2016
- Conference “Young Researcher Symposium on Topology” at *Nanjing University*, China, August 2016
- Algebraic geometry seminar at *KAIST*, Korea, July 2016
- Algebraic geometry seminar at *IBS-CGP, Pohang*, Korea, July 2016
- Special session on “Algebraic geometry and singularities” in the Second Join Conference of the Belgian, Royal Spanish and Luxemburg Mathematical Societies at *University of La Rioja*, Spain, June 2016
- Algebraic geometry seminar at *University of Chicago*, April 2016
- Algebraic geometry seminar at *Princeton University*, April 2016
- Algebraic geometry seminar at *Purdue University*, March 2016
- Conference “Singularities in the Midwest, III” at *University of Wisconsin-Madison*, March 2016

- AMS Sectional meeting “Special Session on Topology and Combinatorics of Arrangements (in honor of Mike Falk)” at *Stony Brook University*, March 2016
- AMS Sectional meeting “Special Session on Singularities in Algebra, Geometry and Topology”, *Loyola University Chicago*, October 2015
- Workshop on “Geometry, Topology, and Combinatorics of Hyperplane Arrangements and Related Problems”, *University of Zaragoza*, Spain, September 2015
- Topology and Geometry seminar, *University of Wisconsin - Madison*, March 2015
- Special colloquim, *University of Wisconsin - Madison*, January 2015
- Algebraic geometry seminar, *University of Michigan*, February 2014
- Algebraic geometry and commutative algebra seminar, *University of Notre Dame*, January 2014
- Algebra seminar, *University of Nice*, France, October 2013
- Number Theory and Algebraic Geometry seminar, *KU Leuven*, Belgium, October 2013
- Algebraic geometry seminar, *UIC*, September 2013
- Joint meeting of AMS and RMS, *University of Alba Iulia*, Romania, June 2013
- Algebraic geometry seminar, *Purdue University*, February 2013
- Algebraic geometry and commutative algebra seminar, *University of Notre Dame*, October 2012
- Algebra seminar, *Wayne State University*, September 2012
- Workshop on surface group representations, *CRM, Barcelona*, Spain, May 2012
- Algebraic geometry seminar, *Purdue University*, October 2011
- Midwest Algebraic Geometry Graduate Conference, *University of Wisconsin-Madison*, October 2010
- Algebraic geometry seminar, *Purdue University*, September 2009

Conference organized

Matroids Day at the University of Wisconsin-Madison, November 2022

Conference on Hodge theory in Honor of Donu Arapura’s 60th Birthday at the University of Wisconsin-Madison (with Ajneet Dhillon, Kenji Matsuki and Deepam Patel), September 2019

Singularities in the Midwest, VI at the University of Wisconsin-Madison (with Laurentiu Maxim), March 2019

Special session on **Singularities in Geometry, Topology and Algebra** at the 2018 AMS-CMS Joint Meeting (with Rong Du, Yongqiang Liu and Laurentiu Maxim), Shanghai, China. June 2018

Singularities in the Midwest, V at the University of Wisconsin - Madison (with Laurentiu Maxim), March 2018

Singularities in the Midwest, IV at the University of Wisconsin - Madison (with Manuel Gonzalez Villa and Laurentiu Maxim), March 2017

Other services

- Chair of Putnam club committee;
- Graduate admission committee;
- Graduate student advising: Connor Simpson, Colin Crowley, Yiyu Wang;
- Referee for: (1) Ann. of Math. (2) J. Eur. Math. Soc. (3) Trans. Amer. Math. Soc. (4) Adv. Math. (5) Math. Ann. (6) Algebra and Number Theory. etc.
- Coordinator for 54th IMO (International Mathematical Olympiad) at Colombia, 2013.

Short Term Visits and Conferences

- **KIAS**, Seoul, Korea, July 2023
- **Suzhou University**, Suzhou, China, July 2019
- **IAS**, Princeton, USA, January 2019
- **USTC**, Hefei, China, July 2018
- **Oberwolfach**, Germany, July 2018
- **KIAS**, Seoul, Korea, July 2018
- **IAS**, Princeton, USA, November 2017
- **USTC**, Hefei, China, July 2017
- **Nanjing University**, Nanjing, China, July 2017
- **KIAS**, Seoul, Korea, June 2017
- **KIAS**, Seoul, Korea, August 2016
- **KU Leuven**, Leuven, Belgium, June 2016
- **Luminy**, France, May-June 2016
- **KU Leuven**, Leuven, Belgium, May-June 2015
- **KU Leuven**, Leuven, Belgium, May-June 2014
- **KU Leuven**, Leuven, Belgium, March 2014
- **Oberwolfach**, Germany, February 2014
- **KU Leuven**, Leuven, Belgium, October 2013