Yu-Wei Fan

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Education

Harvard University
Ph.D., Mathematics, 2014-2019

> *Advisor*: Shing-Tung Yau
> *Thesis*: Mirror Symmetry, Autoequivalences, and Bridgeland Stability Conditions

Taiwan University
B.S., Mathematics, 2008-2012

Employment

Tsinghua University
Assistant Professor (tenure track), 2021.12-present

University of California, Berkeley
Morrey Visiting Assistant Professor, 2019.08-2021.11

Awards and Grants

- National Natural Science Foundation of China, Young Scientists Fund, 2025–2027
- ICCM Medal of Mathematics, Silver Medal, 2022 [1] [2]
- ICCM Best Thesis Award, Gold Medal, 2022
- AMS-Simons Travel Grant, 2019-2021

Research Interests

Algebraic geometry, dynamical systems, symplectic geometry, and mathematical physics

Publications and Preprints

(1) Fourier-Mukai numbers of K3 categories of very general special cubic fourfolds.
Israel Journal of Mathematics, accepted, with K.-W. Lai.

(2) Stokes matrices and exceptional isomorphisms.
Mathematische Annalen, Vol. 390 (2024), pp. 4041–4086, with J. P. Whang.

(3) Shifting numbers of abelian varieties via bounded t-structures.
manuscripta mathematica, Vol. 174 (2024), pp. 775–784.

(4) Asymptotic shifting numbers in triangulated categories.
Advances in Mathematics, Vol. 428 (2023), 109163, with S. Filip.

(5) New rational cubic fourfolds arising from Cremona transformations.
Algebraic Geometry, Vol. 10, No. 4 (2023), pp. 432–460. with K-W. Lai.

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[1] Formally the *Morningside Awards*, which is awarded to exceptional mathematicians of Chinese descent under the age of 45 for their seminal achievements in mathematics and applied mathematics.
[2] Quote on the award: *"for his important contributions in the moduli space of Calabi–Yau manifolds and its dynamics"*

(6) Contractibility of space of stability conditions on the projective plane via global dimension function.
Mathematical Research Letters, Vol. 30, No. 1 (2023), pp. 51–87. with C. Li, W. Liu, and Y. Qiu.

(7) Counting special Lagrangian classes and semistable Mukai vectors for K3 surfaces.
Geometriae Dedicata, Vol. 217 (2023), 89, with J. S. Athreya and H. Lee.

(8) Attractor mechanisms of moduli spaces of Calabi-Yau 3-folds.
Journal of Geometry and Physics, Vol. 185 (2023), 104724, with A. Kanazawa.

(9) Systolic inequalities for K3 surfaces via stability conditions.
Mathematische Zeitschrift, Vol. 300 (2022), pp. 301–323.

(10) On pseudo-Anosov autoequivalences.
Advances in Mathematics, Vol. 384 (2021), 107732, with S. Filip, F. Haiden, L. Katzarkov, and Y. Liu.

(11) Categorical polynomial entropy.
Advances in Mathematics, Vol. 383 (2021), 107655, with L. Fu and G. Ouchi.

(12) Weil–Petersson geometry on the space of Bridgeland stability conditions.
Communications in Analysis and Geometry, Vol. 29, No. 3 (2021), pp. 681–706, with A. Kanazawa and S.-T. Yau.

(13) Mirror of Atiyah flop in symplectic geometry and stability conditions.
Advances in Theoretical and Mathematical Physics, Vol. 22, No. 5 (2018), pp. 1149–1207, with H. Hong, S.-C. Lau, and S.-T. Yau.

(14) Entropy of an autoequivalence on Calabi–Yau manifolds.
Mathematical Research Letters, Vol. 25, No. 2 (2018), pp. 509–519.

(15) An invitation to categorical dynamical systems.
Ergodic Theory and Dynamical Systems, Proceedings of the Workshops University of North Carolina at Chapel Hill 2021.

(16) Stokes matrices, character varieties, and braids.
Proceedings of the 2020 ICCM Annual Meeting.

(17) Nielsen realization problem for Bridgeland stability conditions on generic K3 surfaces.
Submitted, with K.-W. Lai. arXiv:2302.12663

(18) On entropy of $\mathbb{P}$-twists.
Submitted. arXiv:1801.10485

(19) A space of stability conditions that is not a length space.
Preprint. arXiv:2412.04777

Selected Conference/Workshop Talks

- The 2024 Annual International Congress of Chinese Mathematicians, Shanghai, January 2025
- HSE/BIMSA conference on Algebraic Geometry and Mathematical Physics, November 2024
- Workshop on Calabi–Yau geometry, ShanghaiTech University, October 2024
- Conference on Geometry and Moduli, Zhejiang University, July 2024

- The 2023 Annual International Congress of Chinese Mathematicians, Shanghai, January 2024
- Algebraic Geometry Workshop, University of Science and Technology of China, November 2023
- International Congress of Basic Science, Beijing, July 2023
- Conference on Algebraic Geometry and Related Topics, Nanjing University, May 2023
- Homological Algebra of the Infrared, TSIMF Sanya, January 2023
- AMS Spring Eastern Sectional Meeting (Special Session on Mirror Symmetry and Enumerative Geometry), Brown University, March 2021
- ICCM annual meeting, University of Science and Technology of China, December 2020
- Hodge Theory and Rationality, Institute of the Mathematical Sciences of the Americas, Miami, October 2020
- Workshop on Birational Geometry, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, June 2020 *(canceled due to COVID-19)*
- Moduli on Chestnut Hill, Boston College, March 2020
- Homological Mirror Symmetry and Topological Recursion, Miami, January 2020
- Homological Mirror Symmetry and Self Organized Criticalities, Institute of the Mathematical Sciences of the Americas, Miami, September 2019
- Aspects of Mirror Symmetry, Chiba University, July 2019
- PIMS Postdoctoral Training School on Stochastic Dynamics and Hodge Theory, University of Alberta, March 2019
- Holomorphic Differentials in Mathematics and Physics, Simons Center, February 2019
- AMS Grad Student Conference in geometry and topology, Brown University, April 2018
- BU–Keio Workshop, Boston University, June 2017
- RTG/FRG Mirror Symmetry Conference for Young Researchers, University of Michigan, May 2017

Selected Seminar Talks

- BIMSA AG Seminar, January 2025
- Southern University of Science and Technology, August 2024
- Morningside Center, Symplectic Geometry and Mathematical Physics Seminar, June 2024
- The Greater Bay Area Geometry and Mathematical Physics Seminar, April 2024
- Northeast Normal University, October 2022
- Capital Normal University, April 2022
- New Directions in Group Theory and Triangulated Categories, November 2021
- Geometric Group Theory in East Asia Webinar, October 2021
- IBS Center for Geometry and Physics, Symplectic Monday, June 2021
- Zhejiang University, June 2021

- University of British Columbia, Algebra and Algebraic Geometry seminar, February 2021
- Algebraic Geometry in East Asia Seminar, December 2020
- Symplectic Zoominar (CRM-Montreal, Princeton/IAS, Tel Aviv, Paris), November 2020
- UC Irvine, Differential Geometry Seminar, October 2020
- Rutgers University–Newark, Colloquium, October 2020
- National University of Singapore, Topology and Geometry Seminar, September 2020
- ICCM Math Physics Seminar, July 2020
- UC Santa Barbara, Seminar on Geometry and Arithmetic, May 2020
- Harvard University, CMSA Mathematical Physics Seminar, April 2020
- Kyoto University, Algebraic Geometry Seminar, January 2020
- Southeast University, Nanjing, China, December 2019
- UC Berkeley, Northern California Symplectic Geometry Seminar, November 2019
- MSRI, Learning seminar on stability conditions, November 2019
- National Taiwan University, NCTS Seminar in Algebraic Geometry, June 2019
- UMass Amherst, Valley Geometry Seminar, April 2019
- Harvard University, Differential Geometry Seminar, April 2019
- Boston College, NT & AG Seminar, January 2019
- Harvard University, Student/Postdoc Symplectic Geometry Seminar, October 2018
- Columbia University, Symplectic Geometry, Gauge Theory, and Categorification Seminar, September 2018
- Tsinghua University, Beijing, Geometric Representation Seminar, June 2018
- Kavli IPMU, Mathematics-String Seminar, May 2018
- TIMS, Taiwan, Algebraic Geometry Seminar, May 2018
- Brown University, Algebra and Algebraic Geometry Seminar, May 2018
- Kansas State University, M-seminar, April 2018
- Harvard University, Mirror Symmetry Seminar, March 2018
- Boston University, Geometry and Physics Seminar, February 2018
- University of Missouri, Geometry and Topology Seminar, November 2017
- Harvard University, CMSA Algebraic Geometry Seminar, September 2017
- Harvard University, CMSA Mathematical Physics Seminar, September 2017
- IHES, Séminaire Mathjeunes, June 2017
- University of Vienna, June 2017

Teaching

At Tsinghua University:
- Spring 2025: *Algebra* 2 (undergraduate course)
- Fall 2024: *Topics in Derived Categories* (graduate course)

- Spring 2024: *Algebra 0* (undergraduate course)
- Fall 2023: *Ordinary Differential Equations* (undergraduate course)
- Spring 2023: *Mathematics from examples* (undergraduate course)
- Fall 2022: *Geometry and Symmetry* (undergraduate course)
- Spring 2022: *Categories and dynamical systems* (topic course)

At UC Berkeley:
- Fall 2021: *Honors Linear Algebra and Differential Equations* (undergraduate course)
- Spring 2021: *Introduction to Analysis* and *Introduction to Complex Analysis* (undergraduate courses)
- Fall 2020: *Honors Linear Algebra and Differential Equations* (undergraduate course)
- Spring 2020: *Introduction to Analysis* (undergraduate course)
- Fall 2019: *Honors Linear Algebra and Differential Equations* and *Introduction to Analysis* (undergraduate courses)

At Harvard University:
- Spring 2019: *Theoretical multivariable calculus and real analysis*, CA (undergraduate course)
- Fall 2018: *Symplectic Manifolds and Lagrangian Submanifolds*, CA (topic course)
- Fall 2017: *Multivariable Calculus* (undergraduate course)
- Fall 2016: *Multivariable Calculus*, Coach (undergraduate course)

Mentoring

Undergraduate thesis mentored:
- Jie Fu (2025)

Service

Seminars (co-)organized:
- YMSC–BIMSA Geometry and Dynamics Seminar, 2023–present
- YMSC Seminar on Algebraic and Complex Dynamics, 2022-2023
- Harvard University, Yau's student seminar, 2016-2017
- Harvard University, Trivial Notions Seminar, 2015-2016

Conferences (co-)organized:
- Workshop on Mirror Symmetry and Stability, Harvard University, March 2019

Reviewing:
- Reviewer for articles submitted to: *Duke Mathematical Journal, Journal of Differential Geometry, Advances in Mathematics, Algebraic Geometry, Bulletin of the London Mathematical Society, Mathematical Research Letters, Journal of the Mathematical Society of Japan, manuscripta mathematica, Geometriae Dedicata, Experimental Mathematics, Contributions to Algebra and Geometry*
- Reviewer for proposals submitted to: *U.S.-Israel Binational Science Foundation*

- Reviewer for *MathSciNet* and *zbMATH*