

Tsung-Ju Lee

Curriculum Vitae

Education

- 2011–2016 Ph.D in Mathematics, National Taiwan University, Taipei 10617, Taiwan
2005–2009 Bachelor in Mathematics, National Taiwan University, Taipei 10617, Taiwan

Dissertation

- Title Geometry arising from periods of Calabi–Yau degenerations and transitions.
Supervisors Professor Chin-Lung Wang and Professor Hui-Wen Lin.

Research Interests

Algebraic geometry, complex geometry, Calabi–Yau geometry.

Working Experience

- 2023.9–Present Assistant Professor, Department of Mathematics, National Cheng Kung University, Tainan 70101, Taiwan
2018.12–2023.8 Postdoctoral Fellow, Center of Mathematical Sciences and Applications at Harvard University, Cambridge, MA 02138, USA, Mentor: Professor Shing-Tung Yau
2018.9–2018.12 Visiting Scholar, Center of Mathematical Sciences and Applications at Harvard University, Cambridge, MA 02138, USA
2018.2–2018.8 Postdoctoral Fellow, National Taiwan University, Taipei 10617, Taiwan, Menter: Professor Chin-Lung Wang
2016.11–2017.10 Airman (Military Services), Ministry of National Defense, New Taipei City, Taiwan

Awards

- 2020 American Mathematics Society Simons Travel Grant
2010 NTU Excellent Teaching Assistant Award
NTU Outstanding Teaching Assistant Awards

- 2009 Spring, Introduction to Partial Differential Equations (Math major).
- 2010 Spring, Calculus II.
- 2010 Fall, Introduction to Abstract Algebra (Math major).
- 2014 Spring, Linear Algebra (Math major).

Research Works

Published

- [1] Tsung-Ju Lee, A Hodge theoretic criterion for finite Weil–Petersson degenerations over a higher dimensional base, *Mathematical Research Letters* 25 (2018), no. 2, 617–647.
- [2] Tsung-Ju Lee and Hui-Wen Lin, Tautological systems under the conifold transition on $G(2,4)$, *Asian Journal of Mathematics* 23 (2019), no. 3, 501–526.
- [3] Tsung-Ju Lee and Dingxin Zhang, A -hypergeometric systems and relative cohomology, *International Journal of Mathematics* 31 (2020), no. 13, 2050113.
- [4] Tsung-Ju Lee, Bong H. Lian, and Shing-Tung Yau, On Calabi–Yau fractional complete intersections, *Pure and Applied Mathematics Quarterly* 18 (2022), no. 1, 317–342.
- [5] Siu-Cheong Lau, Tsung-Ju Lee, and Yu-Shen Lin, On the complex affine structures of SYZ fibration of del Pezzo surfaces, *Advances in Theoretical and Mathematical Physics* 26 (2023), No. 4, 921–955.
- [6] Tsung-Ju Lee and Yu-Shen Lin, Period domains for gravitational instantons, *Transactions of the American Mathematical Society* 376 (2023), 5461–5501.
- [7] Tsung-Ju Lee, A note on periods of Calabi–Yau fractional complete intersections, *Mathematische Zeitschrift* 304 (2023), No. 4, 60.
- [8] Siu-Cheong Lau, Tsung-Ju Lee, and Yu-Shen Lin, SYZ mirror symmetry for del Pezzo surfaces and affine structures, *Advances in Mathematics*, 439 (2024), 109488.
- [9] Shinobu Hosono, Tsung-Ju Lee, Bong H. Lian, and Shing-Tung Yau, Mirror symmetry for double cover Calabi–Yau varieties, *Journal of Differential Geometry*, 127, No. 1 (2024), pp. 409–431.
- [10] Tsung-Ju Lee, Bong H. Lian, and Dingxin Zhang, On a conjecture of Huang–Lian–Yau–Yu, *Communications in Analysis and Geometry*, 31, No. 6 (2023), pp. 1341–1352.

Preprints

- [1] Tsung-Ju Lee, Mirror duality between Calabi–Yau fractional complete intersections (June 13, 2022), contributing to Proceedings of 2020 ICCM annual meeting. Available at [arXiv:2206.06571](https://arxiv.org/abs/2206.06571).
- [2] Tsung-Ju Lee and Dingxin Zhang, Twisted GKZ hypergeometric functions and relative cohomology (Feb. 17, 2023), submitted. Available at [arXiv:2302.08430](https://arxiv.org/abs/2302.08430).
- [3] Tsung-Ju Lee, Bong H. Lian and Mauricio Romo, Non-commutative resolutions as mirror of singular Calabi–Yau varieties (Jul. 05, 2023), submitted. Available at [arXiv:2307.02038](https://arxiv.org/abs/2307.02038).
- [4] Tsung-Ju Lee, Finite distance problem on the moduli of non-Kähler Calabi–Yau $\partial\bar{\partial}$ -threefolds (Apr. 29, 2024), submitted. Available at [arXiv:2404.19125](https://arxiv.org/abs/2404.19125).

In preparation

- [1] Shinobu Hosono, Tsung-Ju Lee, Bong H. Lian, and Shing-Tung Yau, Mirror symmetry on double cover Calabi–Yau varieties II.
- [2] Tsung-Ju Lee, Toric degenerations and tautological systems for complete flag manifolds of type A .

Activities Organized

- 2024.07 Geometry crossing singularities, co-organized with Wu-yen Chaung, and Chin-Lung Wang, TIMS National Taiwan University, Taipei, 10617 Taiwan
- 2023.06 Calabi–Yau varieties with small parameters, co-organized with You-Cheong Chou, Chin-Lung Wang, and Sz-Sheng Wang, TIMS National Taiwan University, Taipei, 10617 Taiwan
- 2022.11 Representation Theory, Calabi–Yau manifolds, and Mirror symmetry, co-organized with An Huang, Siu-Cheong Lau, and Andrew Linshaw, CMSA Harvard University, Cambridge, MA 02138 USA
- 2022.9–2023.6 Algebraic Geometry in String Theory seminar, co-organized with Chuck Doran and Mauricio Romo, CMSA Harvard University, Cambridge, MA 02138 USA
- 2021.9–2022.6 Algebraic Geometry in String Theory seminar, co-organized with Yun Shi, CMSA Harvard University, Cambridge, MA 02138 USA
- 2020.9–2021.6 Mathematical Physics seminar, co-organized with Yoosik Kim and Yang Zhou, CMSA Harvard University, Cambridge, MA 02138 USA
- 2019.12 Recent Advances in Mirror Symmetry - a conference in honor of Professor Shing-Tung Yau's 70th Birthday, co-organized with Bong Lian, Tsinghua Sanya International Mathematics Forum, Sanya, Hainan, China

Invited Talks

- 2024 On periods of Calabi–Yau fractional complete intersections in Mirror Symmetry and Related Topics, KIAS, Seoul, South Korea
- 2024 On periods of Calabi–Yau fractional complete intersections in 2023 ICCM meeting, Shanghai, China
- 2023 $\partial\bar{\partial}$ -lemma for certain non-Kähler Calabi–Yau threefolds in East Asian Symplectic Conference 2023, Jeju, South Korea
- 2022 On the solutions to GKZ D-modules with fractional parameters, in Calabi–Yau manifolds and mirror symmetry - Past, Present, and Future -, Gakushuin University, Tokyo, Japan
- 2022 Mirror symmetry and Calabi–Yau fractional complete intersections, in Online Geometry and Physics Seminar, Institute for Advanced Study in Mathematics at Zhejiang University, Zhejiang, China
- 2021 Mirror duality between Calabi–Yau fractional complete intersections, in Simons Collaboration on Homological Mirror Symmetry Annual Meeting 2021, Simons Foundation, New York 10010, USA
- 2021 On the complex affine structures of the SYZ fibration of del Pezzo surfaces of degree 9, in Special Session on Mirror Symmetry and Enumerative Geometry, AMS Spring Eastern Sectional Meeting, Brown University, Providence, RI 02912, USA
- 2020 Mirror duality and fractional complete intersection Calabi–Yau spaces, in ICCM, University of Sciences and Technology, Hefei, Anhui, China
- 2020 Mirror symmetry for singular Calabi–Yau varieties, in Mirror symmetry, gauged linear sigma models, matrix factorizations, and related topics, CMSA Harvard, Cambridge, MA 02138, USA

- 2019 On a conjecture of Huang–Lian–Yau–Yu, in Recent Advances in Mirror Symmetry - a conference in honor of Professor Shing-Tung Yau's 70th Birthday, TSIMF, Sanya, Hainan, China
- 2019 A-hypergeometric systems and relative cohomology, in Geometry and Physics seminar, Boston University, Boston, MA 02215, USA
- 2018 Tautological systems under the conifold transitions arising from toric degenerations of $SL_4(\mathbb{C})/P$, in GAP conference, University of Science and Technology of China, Hefei, Anhui, China
- 2017 Tautological systems under the conifold transition on $G(2,4)$, in Gromov–Witten Theory, Hodge Theory and Mirror Symmetry, Taida Institute for Mathematical Sciences, Taipei 10617, Taiwan
- 2014 The Weil–Petersson metric on the Calabi–Yau moduli, in Calabi–Yau Geometry and Mirror Symmetry Conference, National Taiwan University, Taipei 10617, Taiwan

Conferences and Workshops Attendance

- 2024 Mirror Symmetry and Related Topics, KIAS, Seoul, South Korea
- 2024 2023 ICCM meeting, Shanghai, China
- 2023 East Asian Symplectic Conference 2023, Jeju, South Korea
- 2022 SMaSH: Symposium for Mathematical Sciences at Harvard, Harvard University, Cambridge, MA 02138, USA
- 2022 Deformation of Geometric Structures in Current Mathematics: A Celebration of the Works of Masatake Kuranishi, Harvard University, Cambridge, MA 02138, USA
- 2021 Simons Collaboration on Homological Mirror Symmetry Annual Meeting 2021, Simons Foundation, New York, NY 10010, USA
- 2021 (Virtual) AMS Spring Eastern Sectional Meeting (formerly at Brown University 2020), Brown University, Providence, RI 02912, USA
- 2020 (Virtual) International Consortium of Chinese Mathematicians, University of Sciences and Technology, Hefei, Anhui, China
- 2020 Mirror symmetry, gauged linear sigma models, matrix factorizations, and related topics, CMSA Harvard, MA 02138 USA
- 2018 GAP conference, University of Science and Technology of China, China
- 2017 Gromov–Witten Theory, Hodge Theory and Mirror Symmetry, TIMS at National Taiwan University, Taiwan
- 2016 Flat connections, Higgs bundles and Painlevé equations, TIMS at National Taiwan University, Taiwan
- 2015 AMS Summer Institute in Algebraic Geometry, Utah University, United States
- 2014 East Asia Core Doctoral Forum on Mathematics, Kyoto University, Japan
- 2014 Calabi–Yau Geometry and Mirror Symmetry Conference, National Taiwan University, Taiwan
- 2013 Higher dimensional algebraic geometry conference, Tokyo University, Japan
- 2013 Advances in log geometry and higher genus Gromov–Witten theory, TIMS at National Taiwan University, Taiwan

- 2012 Algebraic Geometry and Theoretical Physics, Warwick University, United Kingdom
- 2011 Minimal models and extremal rays, Research Institute for Mathematical Sciences at Kyoto University, Japan