

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 Awards**
 - 2009 Spring, Introduction to Partial Differential Equations (Math major).
 - 2009 Fall, Introduction to Abstract Algebra (Math major).
 - 2010 Spring, Calculus II.
 - 2010 Fall, Introduction to Abstract Algebra (Math major).
 - 2014 Spring, Linear Algebra (Math major).**NTU Outstanding Teaching Assistant Award**
Awarded in 2010 Spring

Research Works

Published

- [1] Tsung-Ju Lee, *A Hodge theoretic criterion for finite Weil–Peterson 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.

Accepted

- [1] Tsung-Ju Lee, Bong H. Lian, and Dingxin Zhang, *On a conjecture of Huang–Lian–Yau–Yu* (May 2, 2020), to appear in *Communications in Analysis and Geometry*. Available at arXiv:2005.00676v1.
- [2] Shinobu Hosono, Tsung-Ju Lee, Bong H. Lian, and Shing-Tung Yau, *Mirror symmetry for double cover Calabi–Yau varieties* (March 16, 2020), to appear in *Journal of Differential Geometry*. Available at arXiv:2003.07148v1

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.
- [2] Tsung-Ju Lee and Dingxin Zhang, *Twisted GKZ hypergeometric functions and relative cohomology* (Feb. 17, 2023), submitted. Available at arXiv: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.

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*.
- [3] Tsung-Ju Lee, *Finite distance problem on the moduli of Calabi–Yau $\partial\bar{\partial}$ -threefolds*.

Activities Organized

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2/4

- 2022.11 **Representation Theory, Calabi–Yau manifolds, and Mirror symmetry**, co-organized with An Huang, Siu-Cheong Lau, and Andrew Linshow, Harvard CMSA, Cambridge, MA 02138 USA
- 2022.9–2023.6 **Algebraic Geometry in String Theory seminar**, co-organized with Chuck Doran and Mauricio Romo, Harvard CMSA, Cambridge, MA 02138 USA
- 2021.9–2022.6 **Algebraic Geometry in String Theory seminar**, co-organized with Yun Shi, Harvard CMSA, Cambridge, MA 02138 USA
- 2020.9–2021.6 **Mathematical Physics seminar**, co-organized with Yoosik Kim and Yang Zhou, Harvard CMSA, 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