

# Tsung-Ju Lee

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## 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

2018.12–2023.08 **Postdoctoral Fellow**, *Center of Mathematical Sciences and Applications at Harvard University*, Cambridge, MA 02138, USA,  
Mentor: Professor Shing-Tung Yau

2018.09–2018.12 **Visiting Scholar**, *Center of Mathematical Sciences and Applications at Harvard University*, Cambridge, MA 02138, USA

2018.02–2018.08 **Postdoctoral Fellow**, *National Taiwan University*, Taipei 10617, Taiwan, Mentor: 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).

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## 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.
- [11] Tsung-Ju Lee and Dingxin Zhang, *Twisted GKZ hypergeometric functions and relative cohomology*, Mathematische Annalen (2024). DOI: <https://doi.org/10.1007/s00208-024-03058-6>

### 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, 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.
- [3] 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.

## 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*.

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## Activities Organized

- 2024.07 **Geometry corssing singularities**, *co-organized with Wu-yen Chaung, and Chin-Lung Wang*, TIMS National Taiwan University, Taipei, 10617 Taiwan
- 2023.06 **Calabi–Yau varities 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 Linshow*, CMSA Harvard University, Cambridge, MA 02138 USA
- 2022.09–2023.06 **Algebraic Geometry in String Theory seminar**, *co-organized with Chuck Doran and Mauricio Romo*, CMSA Harvard University, Cambridge, MA 02138 USA
- 2021.09–2022.06 **Algebraic Geometry in String Theory seminar**, *co-organized with Yun Shi*, CMSA Harvard University, Cambridge, MA 02138 USA
- 2020.09–2021.06 **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

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## Invited Talks

- 2024 Mirror duality between singular Calabi–Yau varieties: the trivial nef-partition case in *The 1st cross-strait symplectic geometry conference*, IGP USTC, Hefei, China
- 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 The 1st cross-strait symplectic geometry conference, IGP USTC, Hefei, China
- 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, 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