CURRICULUM VITAE

Y.-P. LEE

ACADEMIC POSITIONS

- Distinguished Research Fellow, Academia Sinica, 2020-.
- Director of Institute of Mathematics, Academia Sinica, 2020-2023.
- Professor of Mathematics, University of Utah, 2011-.
- Associate Professor of Mathematics, University of Utah, 2006-2011.
- Assistant Professor of Mathematics, University of Utah, 2003-6.
- Visiting Research Mathematician, Princeton University, 2002-3.
- Junior Fellow, *Conformal Field Theory and Applications*, IPAM, Fall 2001.
- Hedrick Assistant Professor, UCLA, 1999-2002.

CONTACT INFORMATION

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Academia Sinica	Fax: +886.2.2368.9771
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Taipei 106319, TAIWAN	

EDUCATION

- Ph.D. in mathematics: May 1999, University of California at Berkeley.
  Thesis advisor: Alexander Givental.

CURRENT RESEARCH INTERESTS

My current research interests are in the general areas of *algebraic geometry* and *mathematical physics*. More specifically I am working on *Gromov–Witten theory* and its relations with and applications to birational geometry, Hodge theory, *K*-theory, symplectic topology, integrable systems, representation theory, and mirror symmetry.

GRANTS AND AWARDS

- NSF grant DMS-0072547 (2000-3).
- NSF grant DMS-0305895 (2003-6).
- AMS Centennial Research Fellowship (2005-7).
- NSF grant DMS-0600688 (2006-10).
- NSF grant PHY-0652421 (2007).
- NSF grant DMS-0901098 (2009-13).
- NSF grant DMS-1162590 (2012-17).
- NSF grant DMS-1500601 (2015-19).
- 2017 ICCM disntinguished paper award (for Pub. (25)).
- 2018 ICCM best paper award (for Pub. (29)).
- MoST grant 109-2115-M-001-010-MY3 (2020/7-2023/7).
- NSTC grant (2023/8-2026/7)

Publication.

(1) *A formula for Euler characteristics of tautological line bundles on the Deligne-Mumford spaces*, IMRN **1997** No. 8.

(2) *Quantum Lefschetz hyperplane theorem*, Invent. Math. **145** (2001), no. 1, 121–149.

(3) *Virtual fundamental classes of zero loci*, (**with D. Cox and S. Katz**), Advances in algebraic geometry motivated by physics (Lowell, MA, 2000), 157–166, Contemp. Math., **276**, Amer. Math. Soc., Providence, RI, 2001.

(4) *Quantum K-theory on flag manifolds, finite-difference Toda lattices and quantum groups*, (**with A. Givental**), Invent. Math. **151**, (2003) 193-219.

(5) *Quantum K-Theory I: Foundations*, Duke Math. J. **121** (2004), no. 3, 389-424.

(6) *A reconstruction theorem in quantum cohomology and quantum K-theory*, (**with R. Pandharipande**), Amer. J. Math. **126** (2004), no. 6, 1367–1379.

(7) *Witten's conjecture and Virasoro conjecture up to genus two*, in Gromov-Witten theory of spin curves and orbifolds, 31–42, Contemp. Math., 403, Amer. Math. Soc., Providence, RI, 2006.

(8) *Tautological equations in genus 2 via invariance conjectures*, (**with D. Arcara**), Bull. Inst. Math. Acad. Sin. (N.S.) 2 (2007), no. 1, 1–27.

(9) *Invariance of tautological equations I: conjectures and applications*, J. Eur. Math. Soc. (JEMS) 10 (2008), no. 2, 399–413.

(10) *On independence of generators of the tautological rings*, (**with D. Arcara**), Compos. Math. **144** (2008), no. 6, 1497-1503.

(11) *Notes on axiomatic Gromov–Witten theory and applications*, Algebraic geometry— Seattle 2005. Part 1, 309–323, Proc. Sympos. Pure Math., 80, Part 1, Amer. Math. Soc., Providence, RI, 2009.

(12) *Algebraic structures on the topology of moduli spaces of curves and maps* (**with R. Vakil**), Surv. Differ. Geom., 14, Int. Press, Somerville, MA, 2009.

(13) *Tautological equation in $\overline{M}_{3,1}$ via invariance conjectures,*(**with D. Arcara**), Canad. Math. Bull. **52** (2009), no. 2, 161-174.

(14) *Invariance of tautological equations II: Gromov–Witten theory*, J. Amer. Math. Soc. 22 (2009), no. 2, 331–352.

(15) *The quantum orbifold cohomology of weighted projective space* (**with T. Coates, A. Corti, and H.-H. Tseng**), Acta Math. 202 (2009), no. 2, 139–193.

(16) *Flops, motives and invariance of quantum rings* (**with H.-W. Lin and C.-L. Wang**), Ann. of Math. **172** (2010), no. 1, 243–290.

(17) *Invariance of Gromov–Witten theory under a simple flop*, (**with Y. Iwao, H.-W. Lin and C.-L. Wang**), J. Reine Angew. Math. **663** (2012), 67–90.

(18) *Analytic continuations of quantum cohomology*, (**with H.-W. Lin and C.-L. Wang**), proceedings ICCM 2010, AMS/IP Studies in Advanced Mathematics, Volume 51, 2012.

(19) *Algebraic cobordism of bundles on varieties*, (**with R. Pandharipande**), J. Eur. Math. Soc. (JEMS) **14** (2012), no. 4, 1081–1101.

(20) *Introduction to Gromov–Witten theory and crepant transformation conjecture*, Proceedings of Summer School at Institut Fourier.

(21) *Orbifold Euler characteristics of universal cotangent line bundles on $\overline{M}_{1,n}$*, (**with F. Qu**), Proc. Amer. Math. Soc. **142** (2014), no. 2, 429–440.

(22) *A Mirror Theorem for the Mirror Quintic*, (**with M. Shoemaker**), Geom. Topol. **18** (2014), no. 3, 1437-1483.

(23) *Invariance of quantum rings under ordinary flops I: Quantum corrections and reduction to local models*, (**with H.-W. Lin and C.-L. Wang**), Algebr. Geom. 3 (2016), no. 5, 578-614.

(24) *Invariance of quantum rings under ordinary flops II: A quantum Leray–Hirsch theorem*, (**with H.-W. Lin and C.-L. Wang**), Algebr. Geom. 3 (2016), no. 5, 615-653.

(25) *Invariance of quantum rings under ordinary flops III: A quantum splitting principle*, (**with H.-W. Lin, F. Qu and C.-L. Wang**), Cambridge J. Math. **4** (2016), no. 3, 333-401.

(26) *A proof of the Landau-Ginzburg/Calabi-Yau correspondence via the crepant transformation conjecture*, (**with N. Priddis and M. Shoemaker**), Annales Scientifiques de l'École Normale Supérieure (4) **49** (2016), no. 6, 1403-1443.

(27) *Quantum Cohomology under Birational Maps and Transitions*, (**with H.-W. Lin and C.-L. Wang**), String-Math 2015, 149-168, Proc. Sympos. Pure Math., 96, Amer. Math. Soc., Providence, RI, 2017.

(28) *A product formula for log Gromov–Witten invariants*, (**with F. Qu)**), J. Math. Soc. Japan 70 (2018), no. 1, 229-242.

(29) *Towards $A + B$ theory in conifold transitions*, (**with H.-W. Lin and C.-L. Wang**), J. Differential Geom. 110 (2018), no. 3, 495-541.

(30) *Towards a quantum Lefschetz hyperplane theorem in all genera*, (**with H. Fan**), Geom. Topol. 23 (2019), no. 1, 493-512.

(31) *On Gromov-Witten theory of projective bundles*, (**with H. Fan**), Michigan Math. J. 69 (2020), no. 1, 153-178.

(32) *Variations on the theme of quantum Lefschetz*, (**with H. Fan**), Singularities, mirror symmetry, and the gauged linear sigma model, 171-181, Contemp. Math., 763, Amer. Math. Soc., [Providence], RI, (2021)

(33) *Quantum flips I: local models* (**with H.-W. Lin and C.-L. Wang**), in the *Dubrovin Memorial Volume* Integrability, quantization, and geometry. II., 303-352, Proc. Sympos. Pure Math., 103.2, Amer. Math. Soc., Providence, RI, (2021).

(34) *Virasoro constraints for moduli of weighted pointed stable curves*, (**with Y.-C. Chou**), J. Lond. Math. Soc. (2) 106 (2022), no. 3, 2050-2074.

(35) *The log product formula in quantum K-theory*, (**with L. Herr and Y.-C. Chou**), Math. Proc. Cambridge Philos. Soc. 175 (2023), no. 2, 225-252.

Theses.

(1) *Quantum K-theory*, PhD thesis in mathematics, Berkeley, 1999.

(2) *The quadrupole moment of Delta and Hyperion calculated on the constituent quark shell model in large oscillator basis* (**with W.-C. Chang**), Bachelor thesis in physics, reported in the annual meeting of Taiwanese Physical Society, 1992.

Preprints.

(1) *Gopakumar–Vafa invariants as quantum K-invariants on Calabi–Yau threefolds*, (**with Y.-C. Chou**), arXiv:2212.13432, submitted to the Bumsig Kim Memorial Volume.

(2) *Quantum K-invariants and Gopakumar–Vafa invariants I. The quintic threefold*, (**with Y.-C. Chou**), arXiv:2211.00788, submitted.

(3) *Quantum K-invariants and Gopakumar–Vafa invariants II. Calabi–Yau threefolds at genus zero*, (**with Y.-C. Chou**), arXiv:2305.08480, submitted

(4) *Higher genus quantum K-theory*, (with **Y.-C. Chou** and **L. Herr**), arxiv:2305.10137, submitted.

Graduate students.

Former PhD students: Y. Iwao, C. Lai (associate professor, NCKU), F. Qu (associate professor, ECNU), H. Fan (postdoc, ETH, Zürich), E. Fu (postdoc, Yau Math Center, Beijing), H. Chen (postdoc, UC Santa Barbara), Y.C. Chou (postdoc, Academia Sinica)

Former Masters student: Y. Wang, C. Koparkar

Postdoctoral mentees.

Current:

- Ryota Mikami
- You-Cheng Chou
- Nawaz Sultani
- Kuan-Wen Lai

Former postdocs:

- D. Arcara (Chair, Saint Vincent College),
- Y. Jiang (professor, University of Kansas),
- S. Marcus (assistant professor, The College of New Jersey),
- T. Mandel (TT assistant professor, University of Oklahoma),
- M. Shoemaker(associate professor, Colorado State University at Fort Collins),
- N. Tarasca (TT assistant professor, Virginia Commonwealth University)
- L. Herr (postdoc, Leiden University, the Netherlands)

PRESENTATIONS AND RESEARCH VISITS

Seminar/Colloquium talks (in the U.S.). University of **Arizona**, University of California, **Berkeley**, **Boston** University, **CalTech**, University of **Chicago**, **Columbia** University, **Georgia Tech**, **UIUC**, **IPAM**, University of **Minnesota**, **MSRI**, University of **Michigan**, **Northwestern** University, University of **Notre Dame**, **Ohio State** University, University of **Oregon**, **P**ark **C**ity **M**athematical Institute, **Princeton** University, **Stanford** University, **Stony Brook** University, **Texas A&M** University, **UCLA**, University of **Utah**, University of **Wisconsin**-Madison

Seminar/Colloquium talks (outside the U.S.). **A**cademia **S**inica (Taiwan), **C**hinese University of **H**ong **K**ong, **É**cole **N**ormale **S**upérieure (France), **ETH**, Zürich (Switzerland), **H**igher **S**chool of Economics, Faculty of Mathematics (Russia), **H**ong **K**ong **U**niversity of **S**cience and Technology, **IBS**, Center of Geometry and (Korea), **I**nstitute of **M**athematical **S**cience (Hong Kong), **Imperial** College (UK), **Institut Fourier**, Univeristy of Grenoble (France), Université **P**ierre et **M**arie **C**urie (Paris VI), Institut de Mathématiques de **Jussieu** (France), **K**orean **I**nstitute of **A**dvanced **S**tudy (Korea), **N**ational **C**enter for **T**heoretical **S**ciences (Taiwan), **N**ational **C**entral **U**niversity (Taiwan), **N**ational **C**heng **K**ung University (Taiwan), **N**ational **T**aiwan **U**niversity (Taiwan), **N**ational **T**sing **H**ua **U**niversity (Taiwan), **Po**hang University of **S**ience and **Tech**nology (Korea), University of **Toronto** (Canada)

Conference invited lectures (2013-2024).

- *Hamiltonian PDEs, Frobenius Manifolds and Geometry of Deligne Mumford Moduli Spaces*, SISSA, Trieste, 16-20 September 2013.
- *Cohomology of the moduli space of curves*, ETH, Zürich, 10-12 October 2013.
- *Summer School in Gromov-Witten Theory 2014*, Pingree Park, Colorado, 23 June - 4 July, 2014.
- *Thematic program in symplectic and contact topology and mirror symmetry*, Institute of Basic Science, Center of Geometry and Physics, Postech, September 2013 - August 2014.
- *Invitation to Gromov-Witten theory*, Simons Center for geometry and physics, 30 Jan 2015.
- *Moduli spaces in Symplectic Topology and in Gauge Theory*, CIRM, Luminy, 1-5 June 2015.
- *AMS Summer Institute in Algebraic Geometry*, Salt Lake City, 12 July - 1 August 2015.
- *George Boole 200 Mathematical Sciences Conference*, University College Cork, Ireland, 17-28 August 2015.
- *Moduli Spaces in Geometry*, CIRM, Luminy, France, 26-30 October 2015.
- *Complex Algebraic Geometry 2016*, UCSD, 15-18 Jan 2016.
- *Flat connections, Higgs bundles and Painleve equations*, Taida Institute of Mathematical Sciences, 1-5 May 2016.
- *Workshop on Gromov-Witten Theory*, Chendu, China, 30 May - 3 June 2016.
- *Workshop on Global Mirror Symmetry*, Chern Institute of Mathematics, Tianjin, China, 6-10 June 2016.
- *NCTS Min-workshop on Algebraic Geometry*, Taipei, 16 Dec 2016.
- *Workshop in Algebraic Geometry*, Sun Moon Lake, 18-19 March 2017.
- *Gromov–Witten theory, Hodge theory and Mirror Symmetry*, TIMS and Taidong, 24-30 May 2017.
- *Workshop on higher genus invariants*, ETH, Zürich, 8-12 Jan, 2018.
- *Crossing the walls 2018*, Snowbird workshop, 21 May - 1 June, 2018.
- *2018 Georgia Topology Conference on Mirror Symmetry*, University of Georgia at Athens, 6-10 June 2018.
- *Quantum K-theory and related topics*, KIAS, 5-9 November 2018.
- *SYZ Mirror Symmetry and Enumerative Geometry*, AMS Sectional Meeting at the University of Hawaii at Manoa in Honolulu, Hawaii, 22-24 March 2019.
- *Higher Genus Gromov-Witten Invariants of Calabi-Yau Threefolds*, BICMR, Peking University, 8-12 April 2019.
- *Inaugural Conference,* Institute of the Mathematical Sciences of the Americas, University of Miami, 6-8 September 2019.
- *Homological Mirror Symmetry Workshop* of the Institute of the Mathematical Sciences of the Americas, University of Miami, 9-13 September 2019.
- *Moduli and Invariants*, Oaxaca, Mexico, 17-22 November 2019.
- *Mirror Symmetry and Related Topics*, Miami, 27-31 January 2020.
- *Taiwanese Mathematical Society Annual Meeting*, plenary lecture, 5-6 December 2020.
- *Homological Mirror Symmetry and Application*, 19-22 January 2021 (online, declined).
- *Bumsig Kim Memorial Conference*, 19-23 September 2022, KIAS, Seoul.
- *PRIMA 2022*, 4-9 December, 2022, Vancouver.

- *Gauged Linear Sigma Models*, Simons Center for Geometry and Physics, 22-26 May 2023.
- *Higher structures in enumerative geometry*, Institut Henri Poincaré, Paris, 12-16 June 2023.
- *Concerto in quantum K-theory*, IASM, Zhejiang University, 5-6 July 2023.
- *Birational geometry and quantum invariants*, Simons Center for Geometry and Physics, 30 Oct – 3 Nov, 2023.
- *International conference on Gromov–Witten theory*, Sun Yat-sen University, Guangzhou, China, 18-22 December 2023.
- *Conference on Gauged Symplectic Invariants and Related Topics*, Guanzhou, China, 25-29 December 2023. (declined)
- *BrAG 2024*, The Sixth British Algebraic Geometry Meeting, University of Sheffield, 10-12 April 2024.

Invited research visits in 2018-19 and in 2022.
- Academia Sinica, Taiwan.
- ETH, Zürich, Switzerland.
- Institut Fourier, Grenoble, France.
- Institute of the Mathematical Sciences of the Americas, Miami, USA
- Peking University, China
- University of Miami, USA.
- Higher School of Economics, Moscow, Russia.
- Institute of Basic Science, Center of Geometry and Physics, South Korea.
- KIAS, South Korea.
- Leiden University.
- National Taiwan University, Taiwan.
- Sun Yat-Sen University, Guanzhou, China.

Invited research visits in Fall 2022.
- ETH, Zürich, Switzerland.
- Leiden University, the Netherlands.

SYNERGISTIC ACTIVITIES

Summer School Lectures.
- *Summer School on Mirror Symmetry*, TIMS, 7-10 June 2011.
- *Moduli of Curves and Gromov–Witten Theory*, Institut Fourier, 20th June - 8th July 2011.
- *Summer School in Gromov-Witten Theory*, Pingree Park, Colorado, 23 June - 4 July, 2014.
- *Summer course in Algebraic Geometry*, Taida Institute of Mathematical Sciences, 1 July - 6 September, 2016.

Conferences/Seminars Organization.
- *Seminar in Conformal Field Theory*, IPAM, Fall 2001.
- *String Geometry seminar*, joint seminar of Utah math and physics departments, Fall, 2003 – 2005.
- *NCTS Workshop in Algebraic Geometry*, 22 June – 9 July, 2004.
- *WAGS Fall 2005*, University of Utah, 3-4 Dec 2005.
- *NCTS Workshop in Algebraic Geometry*, NCTS, Hsinchu, Taiwan, 7-12 July 2006.

- *Special Session on Mathematics Motivated by Physics*, 2006 Fall AMS Western Section Meeting, Salt Lake City, UT, 7-8 October 2006.
- *WAGS Fall 2006* University of Utah, 11-12 Nov 2006.
- *Derived Categories*, a Vigre minicourse, University of Utah, 4-15 June 2007.
- *Derived Categories in Mathematics and Physics*, AMS Summer Research Conferences, Snowbird Resort, 16-22 June 2007.
- *2011 TIMS Summer School on Mirror Symmetry*, TIMS, Taipei, 7-10 June 2011.
- *TIMS 2013 Summer School on Mirror Symmetry and Gromov–Witten Theory'*, TIMS, Taipei, 17-21 June 2013.
- *Postdoc seminar on Gromov–Witten and Derived Category*, Utah, 2006-2016.
- *Through the looking-glass: mirror symmetry and quantum cohomology*, Berkeley, 12-14 May 2018.
- *Postdoc seminar on cohomological field theory*, Utah, 2017-2019.
- *Postdoc working seminar on moduli and Gromov–Witten theory*, Utah, 2002-2020.
- *Bumsig Kim Memorial Conference*, 19-23 September 2022, KIAS, Seoul.
- *Enumerative Geometry in East Asia*, Institute of Mathematics, Academia Sinica, 25-29 December 2023.

COMMITTEE SERVICES IN UTAH (2016-2019)

- 2015-2016: *library committee (chair), graduate committee*
- 2016-2017: *sabbatical leave*
- 2017-2018: *graduate committee, instructorship committee, Five-Year Tenured Faculty Review and Untenured Faculty Review Committee*
- 2018-2019: *instructorship committee (chair), 5-year TFR and UFR committee, College of Science Executive Council Committee* (served a one year term to replace Ken Bromberg)
- 2019-2020: *instructorship committee, 5-year TFR and UFR committee*

OTHER SERVICES TO MATHEMATICAL COMMUNITIES

- Chief editor, Bulletin of the Institute of Mathematics, Aademia Sinica (new serires).
- Journal papers refereed (6-12 each year).
- Grant proposals reviewed for granting agencies (**US**: NSF, NSA; **EU**: ERC, **FR**: ANR, **CA**: NSERC, **TW**: MoST, **HK**: RGC, etc.).

TEACHING

UCLA.

- 1999-2000: *Calculus and Analytic Geometry I and II, Ordinary Differential Equations, Linear Algebra.*
- 2000-2001: *Calculus of Several Variables I and II, Foundations of Geometry, Complex Analysis for Applications.*
- 2001-2002: Advanced course in *Geometry and Physics, Linear Algebra and Applications, Combinatorics.*

Princeton University.

- 2002-2003: Advanced course in *Frobenius Manifolds and Gromov–Witten Theory*, co-taught with Prof. Pandharipande.

University of Utah.

- 2003-4: *Calculus I, Complex Geometry.*
- 2004-5: *Algebraic Geometry I and II.*
- 2005-6: *Topics in Algebraic Geometry.*
- 2006-7: *Algebraic Geometry I, Quantitative Analysis.*
- 2007-8: *Topics in Algebraic Geometry, Complex Geometry.*
- 2008-9: *Calculus I, Linear Algebra*
- 2009-2010: *Algebraic Geometry II*
- 2010-2011: *PDE for engineers, Gromov–Witten theory, Applied Complex Variables*
- 2011-1012: *Algebraic Geometry I, II, Linear Algebra*
- 2012-2013: *Algebraic Geometry III, PDE for Engineers, Foundations of Analysis I*
- 2013-2014: *Modern Algebra I, II, Honors Linear Algebra*
- 2014-2015: *Algebraic Geometry I, II, Honors Linear Algebra*
- 2015-2016: *Applied Complex Variables, Complex Analysis, Topics in Algebraic Geometry*
- 2017-2018: *Honors Linear Algebra, Complex Geometry, Discrete Mathematics*
- 2018-2019: *Honors Complex Variables, Topics in Algebraic Geometry, Modern Algebra II*
- 2019-2020: *Honors Linear Algebra, Complex Geometry, Complex Analysis*
- 2021: *Honors Linear Algebra, PDE for Engineers*
- 2022: *Introduction to Algebraic Geomtry, Complex Geometry reading*