CURRICULUM VITAE

Y.-P. LEE

Academic Positions

- Professor of Mathematics, University of Utah, 2011-present.
- 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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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 (2015-18).

Publication and preprints

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*, (**with H.-W. Lin and C.-L. Wang**), accpted for publication in *Algebraic Geometry*, Feb 2016.
(24) *Invariance of quantum rings under ordinary flops: II*, (**with H.-W. Lin and C.-L. Wang**), accpted for publication in *Algebraic Geometry*, Feb 2016.
(25) *Invariance of quantum rings under ordinary flops: III* (**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**), accepted for publication in *Annales Scientifiques de l'École Normale Supérieure*, Feb 2016.

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) *$A + B$ theory in conifold transitions*, (**with H.-W. Lin and C.-L. Wang**), arXiv:1502.03277, submitted.
(2) *Quantum cohomology under birational maps and transitions*, (**with H.-W. Lin and C.-L. Wang**), submitted to Proceedings of String-Math 2015.
(3) *A product formula for log Gromov–Witten invariants*, (**with F. Qu**), submitted.

Students and Postdocs

Ph.D. students.

Former: Y. Iwao, C. Lai (Purdue), F. Qu (Beijing ICMR).

Current: H. Chen, H. Fan, E. Fu.

Masters student: Y. Wang.

Postdoctoral mentee.

Former:

- D. Arcara (Chair, Saint Vincent College),
- Y. Jiang (Associate Professor, University of Kansas),
- S. Marcus (Assistant Professor, The College of New Jersey),
- M. Shoemaker(Assistant Professor, Colorado State University at Fort Collins),
- N. Tarasca (Postdoc, University of Georgia at Athens)

Current: T. Mandel, Y. Tu.

Synergistic Activities

Recent 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 moduli and Gromov–Witten theory*, Utah, 2002-2016.
- *Postdoc seminar on Gromov–Witten and Derived Category*, Utah, 2006-2016.
- *Student seminar on Hodge theory*, Utah, 2015-2016.

Other Services to Mathematical Communities

- Journal papers refereed (10-15 each year).
- Grant proposals reviewed for NSF, NSA and numerous foreign granting agencies (ANR, NSERC, etc.).

Invited Long Term Visits

- National Center of Theoretical Sciences, Hsinchu.
- Taida Institute of Mathematical Sciences, Taipei.
- Institut Mittag-Leffler Program *Moduli Spaces*, Djursholm, 2007.
- MSRI Jumbo Program *Algebraic Geometry*, Berkeley, 2009.
- IBS Center for Geometry and Physics, Pohang, 2014.
- National Taiwan University, Taipei, 2016.

PRESENTATIONS

Seminar/Colloquium talks (in the U.S.). University of **Arizona**, **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**, **P**ark **C**ity **M**athematical **I**nstitute, **Princeton** University, **Stanford** University, **Stony Brook** University, **Texas A&M** University, **UCLA**, University of **Utah**, University of **Wisconsin**-Madison

Seminar/Colloquium talks (abroad). **A**cademia **S**inica (Taiwan), **C**hinese **U**niversity of **H**ong **K**ong, **É**cole **N**ormale **S**upérieure (France), **ETH**, Zürich (Switzerland), **I**nstitute of **M**athematical **S**cience (Hong Kong), **Imperial** College (UK), **Institut Fourier**, Univeristy of Grenoble (France), Institut **Mittag-Leffler** (Sweden), IBS **Center for Geometry and Physics** (Korea), **U**niversité **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 **U**niversity (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)

Conferences (since 2011).

- Invited talk in *Moduli of Curves and Gromov–Witten Theory*, Institut Fourier, 20th June - 8th July 2011.
- Invited talk in *Symplectic Geometry and Related Topics 2011*, Sichuan Univeristy 22-27 May 2011. (Declined)
- Invited talk in *Recent developments on Orbifolds*, Chern Institute of Mathematics in Tianjin, China on July 25-29, 2011.
- Invited lecture series in *2011 TIMS Summer School on Mirror Symmetry*, TIMS, Taipei, 7-10 June 2011.
- Invited lecture series in *Summer School on Moduli of curves and Gromov–Witten theory*, Institut Fourier, 20 June - 1 July 2011.
- Invited talk in *Conference on Gromov–Witten theory*, Institut Fourier, 4-8 July 2011.
- Invited lecture series in *Quantum Differential Equation Workshop*, Columbia University, 16-19 Sep 2011.
- Invited lecture series in *Conference on Givental formalism*, Ann Arbor, 3-4 Dec 2011.
- Lecture series in *TIMS 2013 Summer School on Mirror Symmetry and Gromov–Witten Theory'*, TIMS, Taipei, 17-21 June 2013.
- Invited lecture in workshop *Hamiltonian PDEs, Frobenius Manifolds and Geometry of Deligne Mumford Moduli Spaces*, SISSA, Trieste, 16-20 September 2013.
- Invited to *Cohomology of the moduli space of curves*, ETH, Zürich, 10-12 October 2013.
- Invited to *Summer School in Gromov-Witten Theory 2014*, Pingree Park, Colorado, 23 June - 4 July, 2014.

- Invited to *Thematic program in symplectic and contact topology and mirror symmetry*, Institute of Basic Science, Center of Geometry and Physics, Postech, September 2013 - August 2014.
- Invited lecture in *Invitation to Gromov-Witten theory*, Simons Center for geometry and physics, 30 Jan 2015.
- Invited to *Moduli spaces in Symplectic Topology and in Gauge Theory*, CIRM, Luminy, 1-5 June 2015.
- Invited lecture in *AMS Summer Institute in Algebraic Geometry*, Salt Lake City, 12 July - 1 August 2015.
- Invited lecture in *George Boole 200 Mathematical Sciences Conference*, University College Cork, Ireland, 17-28 August 2015.
- Invited to *Moduli Spaces in Geometry*, CIRM, Luminy, France, 26-30 October 2015.
- Invited lecture in *Complex Algebraic Geometry 2016*, UCSD, 15-18 Jan 2016.
- Invited lecture in *Flat connections, Higgs bundles and Painleve equations*, Taida Institute of Mathematical Sciences, 1-5 May 2016.
- Invited lecture in *Workshop on Gromov-Witten Theory*, Chendu, China,30 May - 3 June 2016.
- Invited to *Workshop on Global Mirror Symmetry*, Chern Institute of Mathematics, Tianjin, China, 6-10 June 2016.

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*