

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

University of Utah Telephone: +1.801.581.5275
Department of Mathematics E-mail: yplee@math.utah.edu
155 S 1400 E RM 233 URL: <http://www.math.utah.edu/~yplee>
Salt Lake City, UT 84112-0090

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 distinguished paper award (for Pub. (25)).
- 2018 ICCM best paper award (for Pub. (29)).

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: 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) *On Gromov–Witten theory of projective bundles*, (with **H. Fan**), accepted for publication by Mich. J. Math..
- (31) *Towards a quantum Lefschetz hyperplane theorem in all genera*, (with **H. Fan**), accepted for publication by Geometry and Topology.

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) *Variations on the theme of quantum Lefschetz*, (with **H. Fan**), arXiv:1812.01732.
- (2) *Quantum flips*, (with **H.-W. Lin and C.-L. Wang**), preprint.

STUDENTS AND POSTDOCS

Ph.D. students.

Former: Y. Iwao, C. Lai (National Taiwan U.), F. Qu Wuhan U), H. Fan (ETH, Zurich)

Current: Y. Chou, E. Fu, H. Chen.

former Masters student: Y. Wang.

Postdoctoral mentees.

- D. Arcara (Chair, Saint Vincent College),
- Y. Jiang (Associate Professor, University of Kansas),
- S. Marcus (Assistant Professor, The College of New Jersey),
- T. Mandel (Postdoc, University of Edinburgh),
- M. Shoemaker (Assistant Professor, Colorado State University at Fort Collins),
- N. Tarasca (Postdoc, University of Georgia at Athens)
- 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.
- *Postdoc seminar on cohomological field theory*, Utah, 2017-present.
- *Student seminar on Gromov–Witten theory*, Utah, 2017-present.
- *Through the looking-glass: mirror symmetry and quantum cohomology*, Berkeley, 12-14 May 2018.

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.).

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**, **Park City Mathematical Institute**, **Princeton** University, **Stanford** University, **Stony Brook** University, **Texas A&M** University, **UCLA**, University of **Utah**, University of **Wisconsin-Madison**

Seminar/Colloquium talks (abroad). Academia Sinica (Taiwan), Chinese University of Hong Kong, École Normale Supérieure (France), **ETH**, Zürich (Switzerland), Institute of **Mathematical Science** (Hong Kong), **Imperial** College (UK), **Institut Fourier**, University of Grenoble (France), **Université Pierre et Marie Curie** (Paris VI), Institut de Mathématiques de **Jussieu** (France), **Korean Institute of Advanced Study** (Korea), **National Center for Theoretical Sciences** (Taiwan), **National Central University** (Taiwan), **National Cheng Kung University** (Taiwan), **National Taiwan University** (Taiwan), **National Tsing Hua University** (Taiwan), **Pohang University of Science and Technology** (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 University 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.
- Invited lecture in *NCTS Min-workshop on Algebraic Geometry*, Taipei, 16 Dec 2016.
- Invited lecture in *Workshop in Algebraic Geometry*, Sun Moon Lake, 18-19 March 2017.
- Invited lecture in *Gromov-Witten theory, Hodge theory and Mirror Symmetry*, TIMS and Taidong, 24-30 May 2017.
- Invited lecture in *Workshop on higher genus invariants*, ETH, Zürich, 8-12 Jan, 2018.
- Invited lecture in *Crossing the walls 2018*, Snowbird workshop, 21 May - 1 June, 2018.
- Invited lecture in *2018 Georgia Topology Conference on Mirror Symmetry*, University of Georgia at Athens, 6-10 June 2018.

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*