

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 (2015-19).
- 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**), to appear in *String–Math proceedings*, AMS Proceedings of Symposia in Pure Mathematics.
- (28) *A product formula for log Gromov–Witten invariants*, (with **F. Qu**), to appear in Journal of the Mathematical Society of Japan.
- (29) *Towards $A + B$ theory in conifold transitions*, (with **H.-W. Lin and C.-L. Wang**), to appear in Journal of Differential Geometry.
- (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) *Quantum flips*, (with **H.-W. Lin and C.-L. Wang**), preprint.

STUDENTS AND POSTDOCS

Ph.D. students.

Former: Y. Iwao, C. Lai (National Taiwan University), F. Qu (Beijing ICMR), H. Fan (ETH, Zurich)

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

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*