

Curriculum Vitae

Name: Chiu-Chu Melissa Liu

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Major Professional Interests. Algebraic Geometry, Symplectic Geometry

Education.

Institution	Years	Major	Degree & Date
National Taiwan University	1992-1996	Mathematics	BS, June 1996
Harvard University	1997-2002	Mathematics	PhD, June 2002

PhD thesis advisor: Shing-Tung Yau

Pre-doctoral Awards, Honors, and Fellowships.

- James K. Whittemore Scholarship at Harvard University, 1997-1998
- Joseph Leonard Walsh Fellowship at Harvard University, 1998-1999

Postdoctoral Awards, Honors, and Fellowships.

- Junior Fellowship, Society of Fellows, Harvard University, 2002-2005
- Alfred P. Sloan Research Fellowship, 2007-2009
- Morningside Silver Medal, The 4th International Congress of Chinese Mathematicians, 2007

Employment.

- Junior Fellow, Society of Fellows, Harvard University, 2002 – 2005
- Assistant Professor, Northwestern University, 2005 – 2006
- Associate Professor, Northwestern University, 2006 – 2008 (with tenure)
- Associate Professor, Columbia University, 2006 – present (tenured since July 2008)

Teaching Experience.

I. Undergraduate level:

- (1) Course Assistant of *Applied Mathematics 106. Applied Algebra and Combinatorics*, Fall 1997, Harvard University
- (2) Teaching Fellow of *Mathematics 21b. Linear Algebra and Differential Equations*, Spring 1998, Harvard University
- (3) Course Assistant of *Mathematics 274. Mathematical Aspects of String Theory*, Fall 1999, Harvard University (Instructor: Cumrun Vafa)
- (4) Teaching Fellow of *Mathematics 21a. Multivariable Calculus*, Fall 2000, Fall 2001, Spring 2002, Harvard University
- (5) Instructor of *Mathematics 290-3. MENU: Linear Algebra and Multivariable Calculus*, Spring 2006, Northwestern University
- (6) Instructor of *Math V1201. Calculus III*, Fall 2006, Columbia University
- (7) Instructor of *Math V1202. Calculus IV*, Spring 2007, Columbia University
- (8) Instructor of *Mathematics 321-2. MENU: Real Analysis*, Winter 2008, Northwestern University

- (9) Instructor of *Mathematics 321-3. MENU: Real Analysis*, Spring 2008, Northwestern University
- (10) Instructor of *Math V3007. Complex Variables*, Spring 2009, Columbia University
- (11) Instructor of *Math V4045. Algebraic Curves*, Spring 2009, Spring 2011, Columbia University

II. Graduate level:

- (1) Instructor of *Mathematics 441-1. Geometry and Topology*, Fall 2005, Northwestern University
- (2) Instructor of *Mathematics 516-1. Topics in Mathematical Physics*, Spring 2006, Northwestern University
- (3) Instructor of *Mathematics 445. Complex Manifolds*, Winter 2008, Northwestern University
- (4) Instructor of *Math G4402. Modern Geometry*, Fall 2009, Fall 2010, Fall 2011, Columbia University
- (5) Instructor of *Math G4403. Modern Geometry*, Spring 2010, Spring 2011, Spring 2012, Columbia University
- (6) Instructor of *Math G6480. Gromov-Witten Theory*, Fall 2011, Columbia University

Publications.

I. Published papers:

- (1) Sheldon Katz, Chiu-Chu Melissa Liu, *Enumerative geometry of stable maps with Lagrangian boundary conditions and multiple covers of the disc*, *Advances in Theoretical and Mathematical Physics* **5** (2001), no. 1, 1–49.
- (2) Chiu-Chu Melissa Liu, Shing-Tung Yau, *Positivity of quasilocal mass*, *Physical Review Letters* **90** (2003), no. 23, 231102.
- (3) Nan-Kuo Ho, Chiu-Chu Melissa Liu, *Connected components of the space of surface group representations*, *International Mathematical Research Notices* **2003**, no. 44, 2359–2372.
- (4) Chiu-Chu Melissa Liu, Kefeng Liu, Jian Zhou, *A proof of a conjecture of Mariño-Vafa on Hodge integrals*, *Journal of Differential Geometry* **65** (2003), no. 2, 289–340.
- (5) Chiu-Chu Melissa Liu, Kefeng Liu, Jian Zhou, *On a proof of a conjecture of Mariño-Vafa on Hodge integrals*, *Mathematical Research Letters* **11** (2004), no. 2, 259–272.
- (6) Nan-Kuo Ho, Chiu-Chu Melissa Liu, *On the connectedness of moduli spaces of flat connections over Compact Surfaces*, *Canadian Journal of Mathematics* **56** (2004), no. 6, 1228–1236.
- (7) Chiu-Chu Melissa Liu, Shing-Tung Yau, *Liu and Yau reply: “Comment on: Positivity of Quasilocal mass”*, *Physical Review Letters* **92** (2004), no. 25, 259002.
- (8) Nan-Kuo Ho, Chiu-Chu Melissa Liu, *Connected components of the space of surface group representations II*, *International Mathematical Research Notices* **2005**, no.16, 959–979.
- (9) Nan-Kuo Ho, Chiu-Chu Melissa Liu, *On the connectedness of the spaces of surface group representations*, *Noncommutative geometry and physics*, 199–214, World Sci. Publ., Hackensack, NJ, 2005.

- (10) Chiu-Chu Melissa Liu, Shing-Tung Yau, *Positivity of quasi-local mass II*, Journal of the American Mathematical Society **19** (2006), no. 1, 181–204.
- (11) Chiu-Chu Melissa Liu, Kefeng Liu, Jian Zhou, *Mariño-Vafa formula and Hodge integral identities*, Journal of Algebraic Geometry **15** (2006), 379–398.
- (12) Dagan Karp, Chiu-Chu Melissa Liu, Marcos Mariño, *The local Gromov-Witten invariants of configurations of rational curves*, Geometry and Topology **10** (2006), 115–168.
- (13) Chiu-Chu Melissa Liu, *Formulae of one-partition and two-partition Hodge integrals*, Geometry and Topology Monographs **8** (2006), 105–128.
- (14) Chiu-Chu Melissa Liu, Kefeng Liu, Jian Zhou, *A formula of two-partition Hodge integrals*, Journal of the American Mathematical Society **20** (2007), no.1, 149–184.
- (15) Nan-Kuo Ho, Chiu-Chu Melissa Liu, *Yang-Mills connections on nonorientable surfaces*, Communications in Analysis and Geometry **16** (2008), no.3, 617–679.
- (16) Jun Li, Chiu-Chu Melissa Liu, Kefeng Liu, Jian Zhou, *A mathematical theory of the topological vertex*, Geometry & Topology **13** (2009), 527–621.
- (17) Nan-Kuo Ho, Chiu-Chu Melissa Liu, *Yang-Mills connections on orientable and nonorientable surfaces*, Memoirs of the American Mathematical Society **202** (2009), no.949.
- (18) Nan-Kuo Ho, Chiu-Chu Melissa Liu, Daniel Ramras *Orientability in Yang-Mills theory over nonorientable surfaces*, Communications in Analysis and Geometry **17** (2009), no.5, 903–954.
- (19) Elizabeth Gasparim, Chiu-Chu Melissa Liu, *The Nekrasov conjecture for toric surfaces*, Communications in Mathematical Physics **293**, 661–700 (2010).
- (20) Chiu-Chu Melissa Liu, *Gromov-Witten invariants of toric Calabi-Yau three-folds*, Handbook of geometric analysis, Vol. 2, 139–159, Adv. Lect. Math. (ALM) **13**, Higher Education Press, 2010.
- (21) Chiu-Chu Melissa Liu, *Lectures on the ELSV formula*, Transformation Groups and Moduli Spaces fo Curves, 195–216, Adv. Lect. Math. (ALM) **16**, Higher Education Press, 2010.
- (22) Chiu-Chu Melissa Liu, *Gromov-Witten theory of Calabi-Yau 3-folds*, 497–512, Proceedings of the International Congress of Mathematicians, Hyderabad, India, 2010.
- (23) Bohan Fang, Chiu-Chu Melissa Liu, David Treumann, Eric Zaslow, *The Coherent-Constructible Correspondence and Homological Mirror Symmetry for Toric Varieties*, 3–37, Geometry and Analysis Vol. 2, Adv. Lect. Math (ALM) **18**, Higher Education Press, 2010.
- (24) Bohan Fang, Chiu-Chu Melissa Liu, David Treumann, Eric Zaslow, *The coherent-constructible correspondence and Fourier-Mukai transforms*, Acta Math. Sin. (Engl. Ser.) **27** (2011), no.2, 275–308.
- (25) Nan-Kuo Ho, Chiu-Chu Melissa Liu, *Anti-perfect Morse stratification*, Selecta Math. (N.S.) **17** (2011), no. 2, 505–532.
- (26) Bohan Fang, Chiu-Chu Melissa Liu, David Treumann, Eric Zaslow, *A categorification of Morelli’s theorem*, Invent. Math. **186** (2011), no.1, 79–114.

- (27) Bohan Fang, Chiu-Chu Melissa Liu, David Treumann, Eric Zaslow, *T-duality and homological mirror symmetry of toric varieties*, Adv. Math. **229** (2012), 1873-1911.

II. Accepted papers:

- (28) Chiu-Chu Melissa Liu, *Localization in Gromov-Witten theory and orbifold Gromov-Witten theory*, arXiv:1107.4712, to appear in *Handbook of Moduli*.

III. Preprints:

- (29) Chiu-Chu Melissa Liu, *Moduli of J-holomorphic curves with Lagrangian boundary conditions and open Gromov-Witten invariants for an S^1 -equivariant pair*, Thesis (Ph.D.)-Harvard University, 2002, arXiv:math.SG/0210257.
- (30) Bohan Fang, Chiu-Chu Melissa Liu, David Treumann, Eric Zaslow, *The coherent-constructible correspondence for toric DM stacks*, arXiv:0911.4711v2.
- (31) Bohan Fang, Chiu-Chu Melissa Liu, *Open Gromov-Witten invariants of toric Calabi-Yau 3-folds*, arXiv:1103.0693.
- (32) Chiu-Chu Melissa Liu, Florent Schaffhauser, *Yang-Mills equations over Klein surfaces*, arXiv:1109.5164.

Peer-Review and Related Activities.

- Referee of
 - (1) Advances in Theoretical and Mathematical Physics,
 - (2) Communications in Analysis and Geometry,
 - (3) Communications in Mathematical Physics,
 - (4) Communications in Number Theory and Physics,
 - (5) Geometriae Dedicata,
 - (6) Geometry and Topology,
 - (7) International Mathematical Research Notices,
 - (8) Journal of Algebraic Geometry,
 - (9) Journal of the American Mathematical Society,
 - (10) Journal of Differential Geometry,
 - (11) Journal of Symplectic Geometry,
 - (12) Mathematical Research Letters,
 - (13) Proceedings of the American Academy of Sciences,
 - (14) Science in China Series A: Mathematics,
 - (15) Selecta Mathematica,
 - (16) Transactions of the American Mathematical Society.
- Reviewer of *Mathematical Reviews*.

Invited Presentations.

- (1) Research Program of IAS/PCMI Summer Session 2001, July 10, 2001
- (2) Gauge Theory and Topology Seminar at Harvard University, October 26, 2001
- (3) Differential Geometry Seminar at UIUC (University of Illinois at Urbana-Champaign), November 27, 2001
- (4) Seminar in Geometry and Physics at IPAM (Institute of Pure and Applied Mathematics), UCLA (University of California at Los Angeles), November 29, 2001

- (5) Mathematics Colloquium at UCLA (University of California at Los Angeles), November 29, 2001
- (6) Symplectic Geometry Seminar at Columbia University, December 14, 2001
- (7) Symplectic Geometry Seminar at MIT, December 2, 2002
- (8) Geometry/Physics Seminar at Northwestern University, January 23, 2003
- (9) Workshop on Geometry of Lagrangian Submanifolds at IPAM, April 15, 2003
- (10) Workshop on Symplectic Geometry and String Theory at IPAM, June 2, 2003
- (11) Workshop on Mathematical Physics at Center of Mathematical Sciences, Zhejiang University, Hangzhou, China, July 12, 2003
- (12) Differential Geometry Seminar at MIT, September 15, 2003
- (13) Colloquium at Rice University, November 6, 2003
- (14) Algebraic Geometry Seminar at UIUC (University of Illinois at Urbana-Champaign), November 11, 2003
- (15) Colloquium at Northwestern University, November 13, 2003
- (16) BIRS Workshop: The Interaction of Finite Type and Gromov-Witten Invariants, November 15 - 20, 2003 (three lectures)
- (17) Pacific Northwest String Seminar: Mathematical Aspects of Open-Closed String Dualities, University of Washington, December 4, 2003
- (18) Workshop on Floer Theory and Related Topics at Kyoto University, Kyoto, Japan, December 8-10, 2003 (three lectures)
- (19) Algebraic Geometry Seminar at Stanford University, January 23, 2004
- (20) Geometry Seminar at Harvard University, February 16, 2004
- (21) Gauge Theory and Topology Seminar at Harvard University, March 19, 2004
- (22) Algebra-Geometry-Singularities-Combinatorics Seminar at Northeastern University, March 22, 2004
- (23) Geometry, Representation, and Moduli Seminar at Princeton University, March 31, 2004
- (24) Geometry and Topology of String Theory Conference at Northwestern University, May 26, 2004
- (25) Harvard/MIT Algebraic Geometry Seminar, October 26, 2004
- (26) Texas Geometry and Topology Conference at Texas A&M University, October 31, 2004
- (27) Fellowship of the Ring Seminar at Brandeis University, November 5, 2004
- (28) Informal Symplectic Semester, November 10, 2004
- (29) UIUC Algebraic Geometry Seminar, November 16, 2004
- (30) Caltech Mathematical Colloquium, December 7, 2004
- (31) The Third International Congress of Chinese Mathematicians, Hong Kong, December 22, 2004 (45-minute invited talk)
- (32) AMS Special Session on Analysis Problem in Modern Physics, Atlanta, January 6, 2005 (20-minute talk)
- (33) Deformation Theory Seminar at University of Pennsylvania, February 16, 2005
- (34) Math-Physics Joint Seminar at University of Pennsylvania, February 18, 2005
- (35) Topics in Mathematical Physics at MIT, March 8, 2005

- (36) Workshop on Donaldson-Thomas Invariants at University of Illinois at Urbana-Champaign, March 20, 2005
- (37) Geometric Analysis Seminar at Princeton University, April 1, 2005
- (38) FRG Workshop "Algebraic Geometry, Symplectic Geometry and Theoretical Physics: a conference celebrating the contribution of women researchers", University of Pennsylvania, May 7, 2005
- (39) Symplectic Geometry and Physics Reunion I at UCLA, May 26, 2005
- (40) 2005 AMS Summer Institute on Algebraic Geometry at University of Washington, Seattle, July 26, 2005
- (41) Algebraic Geometry Seminar at University of Chicago, October 19, 2005
- (42) Symplectic Geometry Seminar at University of Toronto, February 6, 2006
- (43) Geometry Seminar at University of Michigan, March 7, 2006
- (44) Representation Theory, Geometry & Combinatorics Seminar at University of California at Berkeley, March 22, 2006
- (45) Workshop on New Developments in the Geometry and Physics of Gromov-Witten Theory at MSRI, May 24, 2006
- (46) Math Colloquium at Lehigh University, September 12, 2006
- (47) Topology/Geometry Seminar at Rutgers University, October 10, 2006
- (48) Analysis Seminar at UCLA (University of California at Los Angeles), October 27, 2006
- (49) Geometry and Analysis Seminar at Columbia University, November 2, 2006
- (50) Joint New York Symplectic Geometry Seminar at Columbia University, December 8, 2006
- (51) Geometry/Physics Seminar at Northwestern University, January 4, 2007
- (52) Differential Geometry Seminar at University of California at Irvine, March 14, 2007
- (53) Algebra, Geometry and Physics Seminar at Stonybrook University, April 25, 2007
- (54) Research Seminar, Women in Mathematics 2007: Algebraic Geometry and Group Actions at Institute for Advanced Study, May 15, 2007
- (55) Research workshop – Toric Degenerations, Tropical Geometry and Mirror Symmetry at Warwick Mathematics Institute, September 18, 2007
- (56) Algebraic Geometry Seminar at University of Illinois at Chicago, October 18, 2007
- (57) Workshop on Gauge Theory and Representation Theory, Institute of Advanced Study, November 29, 2007
- (58) The Fourth International Congress of Chinese Mathematicians, Zhejiang University, China, December 22, 2007 (plenary talk)
- (59) The 15th South California Geometric Analysis Seminar, February 3, 2008
- (60) Summer school on Geometry of Teichmuller spaces and moduli spaces of curves, Zhejiang University, July 14-20, 2008
- (61) Geometric Analysis: Present and Future, An international conference to celebrate the birthday of Shing-Tung Yau, Harvard University, September 1, 2008
- (62) Symplectic Geometry and Gauge theory Seminar, Columbia University, October 17, 2008
- (63) Topology and Geometry Seminar, Rutgers University, November 4, 2008

- (64) Research Seminar in Mathematics, Northeastern University, November 18, 2008
- (65) Math-Physics Joint Seminar, University of Pennsylvania, February 9, 2009
- (66) Colloquium, Brown University, February 18, 2009
- (67) Geometry and Physics Seminar, University of Michigan, March 16, 2009
- (68) NTU Math Month, National Taiwan University, July 6, 2009
- (69) Seminar on Pure Mathematics, Hong Kong University of Science and Technology, July 21, 2009
- (70) IMS Geometry Lecture Series, The Institute of Mathematical Sciences, Chinese University of Hong Kong, July 22 & 23, 2009
- (71) Workshop on Algebraic Structures in the Theory of Holomorphic Curves, MSRI, November 20, 2009
- (72) Differential Geometry Seminar, Harvard University, November 24, 2009
- (73) Geometry, Symmetry, and Physics Seminar, Rutgers University, February 18, 2010
- (74) Connections in Geometry and Physics 2010, Perimeter Institute for Theoretical Physics, Waterloo, Canada, May 8, 2010
- (75) Hodge Theoretic Reflections on the String Landscape, International Centre for Mathematical Sciences, Edinburgh, Scotland, June 14, 2010
- (76) International Congress of Mathematicians 2010, Hyderabad, India, August 27, 2010 (45-minute invited talk)
- (77) The Fifth Yamabe Symposium: Geometry and Low Dimensional Topology, University of Minnesota, October 9, 2010
- (78) Colloquium, Department of Mathematics, University of Illinois at Chicago, October 29, 2010
- (79) Colloquium, Department of Mathematics, Rutgers-Newark, November 16, 2010
- (80) The Fifth International Congress of Chinese Mathematicians, Tsinghua University, Beijing, December 18, 2010 (45-minute invited talk)
- (81) Great Lakes Geometry Conference 2011, Ohio State University, March 6, 2011
- (82) 2011 Spring AMS Central Sectional Meeting, University of Iowa, Iowa City, IA, March 18, 2011 (50-minute invited address)
- (83) FRAGMENT Seminar, Colorado State University, April 14, 2011
- (84) Workshop on Sheaf-Theoretic Methods in Symplectic Topology, IAS, Thursday, May 12, 2011
- (85) Workshop on Equivariant Quantum Cohomology, Mirror Symmetry, and Symplectic Geometry, Simons Center for Geometry and Physics, May 19, 2011
- (86) String-Math 2011, UPenn, Philadelphia, June 7, 2011
- (87) Algebraic Geometry Seminar, Taida Institute of Mathematical Sciences, Taipei, August 9, 2011
- (88) Conference on Vector Bundles and Real Algebraic Curves, Universidad de Los Andes, Bogotá, Colombia, September 26-30, 2011.
- (89) BIRS Workshop: New Recursion Formulae and Integrability for Calabi-Yau Spaces, BIRS, October 16-20, 2011.
- (90) Second Conference of Tsinghua Sanya International Mathematics Forum, Sanya, China, December 19-21, 2011.