

## Employment

- 2014 -present: Professor Yau Mathematical Sciences center, Tsinghua University.
- 2012 -2014: Assistant Professor Boston University.
- 2011 -2012: Postdoctoral Fellowship Northwestern University.
- **Visiting positions**
- 2019 -2020: Visiting fellow Institute for Advanced Study.
- 2014 -2015: Visiting fellow Perimeter Institute for Theoretical Physics.
- 2014 -2020: Affiliated Visiting Senior Scientist Kavli IPMU at University of Tokyo.
- **Service positions**
- 2020-2022, Vice chair Qiuzhen College, Tsinghua.
- 2017-2020, Vice chair Department of Mathematical Sciences, Tsinghua.

## Education

- Ph.D. in Mathematics, 2006-2011 Harvard University, Cambridge, U.S.
- M.Phil. in Mathematics, 2003-2005 University of Science and Technology of China, China
- B.Sc. in Mathematics, 1999–2003 University of Science and Technology of China, China

## Academic Interest

- Algebraic geometry and complex geometry: Calabi-Yau geometry, Landau-Ginzburg theory, mirror symmetry.
- Quantum field theory and string theory: Renormalization theory, Topological string, Supersymmetry/supergravity.

## Awards

- National Key Research and Development Program of China 2020YFA0713000 (PI), 2021-2025.
- NSF Beijing Key Project, Z180003 (co-PI) 2018.12-2021.12, Geometry and Category on Calabi-Yau manifolds
- NSFC Youth 11801300 (PI) 2019-2021, Geometric applications of quantum field theory and string theory
- Tsinghua Independent Research Grant (PI) 2015-2018, Geometry of quantum field theory and string theory
- NSF Grant DMS-1309118 (PI) 2013-2016, Geometric Aspects of Quantum Field Theory and Topological String.
- **Morningside Medal of Mathematics**: Gold Medal Award, 2016.

## Publications

1. *Regularized Integrals on Elliptic Curves and Holomorphic Anomaly Equations (with J. Zhou)*. To appear in **Commun. Math. Phys.**
2. *Vertex algebras and quantum master equation*. To appear in **J. Diff. Geom.**
3. *On the  $L^2$ -Hodge theory of Landau-Ginzburg models (with H. Wen)*. **Adv. Math.** 396 (2022) 108165
4. *Landau-Ginzburg mirror symmetry conjecture (with W. He, Y. Shen, R. Webb)*. **J. Eur. Math. Soc.** Volume 24, Issue 8, (2022), pp. 2915–2978
5. *Regularized Integrals on Riemann Surfaces and Modular Forms (with J. Zhou)*. **Commun. Math. Phys.** 388, pages 1403–1474 (2021)
6. *Geometry of Localized Effective Theories, Exact Semi-classical Approximation and the Algebraic Index (with Z. Gui, K. Xu)*. **Commun. Math. Phys.** 382, 441–483 (2021).

7. *Anomaly cancellation in the topological string* (with K. Costello). **Adv. Theo. Math. Phys.** Vol. 24, No. 7 (2020), pp. 1723-1771.
8. *Dispersionless Integrable Hierarchy via Kodaira-Spencer Gravity* (with W.He, X.Tang, P. Yoo). **Commun. Math. Phys.** 379, 327–352 (2020).
9. *Homotopy Algebras in Higher Spin Theory* (with K. Zeng). **Adv. Theo. Math. Phys.** Vol 24, Issue 3, 757-819 (2020)
10. *G-twisted braces and orbifold Landau-Ginzburg Models* (with W. He and Y. Li), **Commun. Math. Phys.** 373, no.1, 175–217 (2020).
11. *Calabi-Yau geometry, Primitive form and Mirror symmetry*, **Adv. Stud. Pure Math.** Primitive Forms and Related Subjects, page 237-268 (2019). Mathematical Society of Japan.
12. *Categorical primitive forms and Gromov-Witten invariants of An singularities* (with A. Caldararu and J. Tu). **Int Math Res Notices**, rnz315 (2019).
13. *Seiberg-Witten differential via primitive forms* (with D. Xie and S.-T. Yau), **Commun. Math. Phys** 367, no.1, 193-214 (2019).
14. *Effective Batalin-Vilkovisky quantization and geometric applications*, Proceedings of the 7th ICCM, Vol. I, 349–372, **Adv. Lect. Math.** 43. (2019).
15. *Unfolding of Orbifold LG B-Models: A Case Study* (with W. He and Y. Li), **PAMQ** 14.3 (2018): 443-465.
16. *Some Classical/Quantum Aspects of Calabi-Yau Moduli*. **Trends in Mathematics** , Birkhäuser, Cham. B-Model Gromov-Witten Theory, page 463-497 (2018).
17. *Mirror symmetry for unimodular exceptional singularities* (with C. Li, K. Saito and Y. Shen), **J. Eur. Math. Soc.** 19 (2017), no.4, 1189-1229.
18. *Batalin-Vilkovisky quantization and the algebraic index*(with Q.Li, R. Grady), **Adv. Math.** 317 (2017), 575-639.
19. *On the B-twisted topological sigma model and Calabi-Yau geometry* (with Q. Li), **J.Diff.Geom.** 102 (2016) no.3, 409-484.
20. *A mirror theorem between Landau-Ginzburg models*. **Nuclear Phys. B.**, 898 (2015).
21. *Renormalization and mirror symmetry*, **SIGMA** 8 (2012), 101
22. *Feynman graph integrals and almost modular forms*, **Commun. Number theory Phys**, 6, (2012)
23. *Picard-Fuchs Equations of Relative Periods and Abel-Jacobi Map for Calabi-Yau Hypersurfaces* (with B.H. Lian and S.T. Yau), **Amer. J. Math**, 134 (2012), no.5, 1345-1384
24. *On the spectrum of unitary finite-Euclidean graphs* (with L.A. Vinh), **Ars Combin.** 110 (2013), 275-287.
25. *Hamiltonian Formalism of the de-Sitter Invariant Special Relativity* (with M.L. Yan, N.C. Xiao and W. Huang), **Commun. Theor. Phys.** 48 :27-36, (2007)
26. *Baryonium with a phenomenological skyrmion-type potential* (with M.L. Yan, B. Wu and B.Q. Ma), **Phys. Rev. D**, 72 (2005) 0 34027
27. *Calabi-Yau geometry and higher genus mirror symmetry*, PhD Thesis (2011), Harvard University.

## Preprints

1. *Twisted supergravity and its quantization* (with K. Costello), **arXiv: 1606.00365 [hep-th]**
2. *Quantization of open-closed BCOV theory, I* (with K. Costello), **arXiv:1505.06703 [hep-th]**
3. *Primitive forms via polyvector fields* (with C. Li and K. Saito), **arXiv:1311.1659 [math.AG]**
4. *Variation of Hodge structures, Frobenius manifolds, and gauge theory*, **arXiv:1303.2782 [math.QA]**
5. *BCOV theory on the elliptic curve and higher genus mirror symmetry*, **arXiv:1112.4063 [math.QA]**

6. *Quantum BCOV theory on Calabi-Yau manifolds and the higher genus B-model* (with K. Costello), **arXiv:1201.4501 [math.QA]**
7. *Morphisms from Azumaya prestacks with a fundamental module to a projective variety: Topological D-strings as a master object for curves* (with C.H. Liu, R. Song and S.T. Yau), **arXiv:0809.2121 [math.AG]**

## Invited Talks

1. Jan 13, 2023: TSIMF 2023 Homological Algebra of the Infrared, Sanya, China.
2. Nov 2, 2022: The Greater Bay Area Geometry and Mathematical Physics Seminar
3. Aug 1, 2022: The 9th International Congress of Chinese Mathematicians, Beijing, China.
4. June 20-24, 2022: Online Workshop on Topology and QFT. University of Notre dame.
5. Mar 30, 2022: Joint Harvard-CUHK-YMSC Differential Geometry Seminar.
6. Mar 22-25, 2022: “Geometry, Representation Theory and Quantum Fields”, Osaka City University.
7. Nov 22–Dec 03 2021: String and M-Theory: The New Geometry of the 21st Century – II, NUS, Singapore.
8. Nov 22-26, 2021: Higher structures in geometry and physics, Chern Institute of Mathematics, Nankai University
9. **August 2-7, 2021: International Congress on Mathematical Physics (ICMP) 2021 (session Quantum Field Theory)**, Geneva, Switzerland.
10. **June 14-18, 2021: String-Math 2021 (Plenary talk)**, IMPA, Rio de Janeiro, Brazil.
11. May 14, 2021: TQFT Seminar, Instituto Superior Técnico, Lisbon, Portugal.
12. May 12, 2021: Hodge Seminar, Edinburgh Hodge Institute, Scotland.
13. May 3, 2021: Online Geometry and Physics Seminar, IASM at Zhejiang University, China.
14. Dec 27, 2020: ICCM Annual Meeting, USTC, China.
15. Oct 30, 2020: Wu Wen-tsün Lab Lecture, USTC, China.
16. Sep 20, 2020: “The 3rd Conference on Operad Theory and Related Topics”, Jilin University, China.
17. Apr 17, 2020: Zoom Mathematical Physics Seminar, Tsinghua University, China.
18. Dec 11, 2019: Colloquium, Columbia University, USA.
19. Dec 9, 2019: Workshop on Symplectic Geometry, NCG and Math Physics, Washington Univ. in St. Louis, USA.
20. Dec 2, 2019: Geometry, Symmetry and Physics Seminar, Yale, USA.
21. Nov 25, 2019: Geometry and Topology Seminar, UC Irvine, USA.
22. Nov 21, 2019: Geometry, Physics and Representation Theory Seminar, Northeastern, USA.
23. Nov 15, 2019: High Energy Theory Seminar Seminar, IAS, USA.
24. Nov 8, 2019: Lie Group/Quantum Mathematics Seminar, Rutgers, USA.
25. Oct 8, 2019: Colloquium, Rutgers- Newark, USA.
26. June 17-28, 2019: Lectures at summer workshop “QFT for Mathematicians”, Perimeter Institute, Canada.
27. June 14, 2019: “The mathematical foundations of conformal field theory and related topics” in honor of Yi-Zhi Huang’s 60th birthday., Nankai University, Tianjin, China.
28. **June 13, 2019: The 8th International Congress of Chinese Mathematicians (Plenary talk), Beijing, China.**
29. May 6-11, 2019: Deformation theory and homotopy algebras, Emei, China.
30. Apr 24 and Apr 26, 2019: Mathematical Physics Seminar and GAP Seminar, USTC, China.
31. Feb 17-24, 2019: BIRS Workshop on Quantum Field Theory and Factorization Algebras, Banff, Canada.

32. January 25-27, 2019: Workshop on Modular structures in Gromov-Witten theory and related topics , University of Michigan, USA.
33. Feb 14, 2019: Geometry Seminar, University of Oregon, USA.
34. **Jan 14-18, 2019: Between Topology and Quantum Field Theory in celebration of Dan Freed's 60th birthday, University of Texas at Austin, USA.**
35. Dec 10-14, 2018: Workshop on String and M-theory: the new geometry of the 21 century, IMS at NUS, Singapore.
36. Nov 24-26, 2018: Mini-Workshop on Hochschild Cohomology and Related Topics III, East China Normal University, China.
37. Nov 16, 2018: Colloquium at IMS, ShanghaiTech University, China.
38. **July 18-22, 2018: String-Math 2018 (Plenary talk), Tohoku University, Japan.**
39. May 10, 2018: 2018 Higher Structures and Symplectic Geometry, Tsinghua University, China.
40. Feb 8, 2018: Workshop on Factorisation Homology, Factorisation Algebras and the Cobordism Hypothesis, Saint-Etienne de Tienne, France.
41. Jan 29, 2018: Higher differential geometry seminar, MPIM, Bonn, Germany.
42. Jan 10-13, 2018: Simons Collaboration Workshop on Homological Mirror Symmetry, Harvard, USA.
43. Dec 7, 2017: Geometry Seminar, CNU, Beijing.
44. Nov 16-19, 2017: Gromov-Witten invariants and integrable hierarchies, USTC, China.
45. Nov 26, 2017: Wu Wen-tsün Lab Lecture, USTC, China.
46. Oct 30-Nov 4, 2017: East Asia Symplectic Conference 2017, Chengdu, China.
47. July 31-Aug 11, 2017: Geoquant 2017, Aarhus, Danmark.
48. **July 24-29, 2017: String-Math 2017 (Parallel talk), Hamburg, Germany.**
49. July 20-22, 2017: Flat connections in physics and geometry, Heidelberg, Germany.
50. July 3-7, 2017: Symposium in Geometry and Differential Equations, Beijing, China.
51. June 8, 2017: ICTS seminar, USTC, Hefei, China.
52. May 22-26, 2017: Homological mirror symmetry and higher genus invariants, Simons Center for Geometry and Physics, USA.
53. May 8-12, 2017: Quantum fields on manifolds with boundary and the BV formalism, Perimeter Institute, Canada.
54. **Apr 28-May 1, 2017: JDG conference on geometry and topology, Harvard, USA.**
55. **Apr 25-28, 2017: Developments of mathematics at IPMU: in honor of Kyoji Saito, Kavli IPMU, Japan.**
56. Apr 17-24, 2017: Gauge Equations, Geometry and Strings, ICMAT, Madrid, Spain.
57. Mar 13-17, 2017: Workshop on homological mirror symmetry, IAS, Princeton, USA.
58. Feb 6, 2017: Geometry and Physics seminar, IBS-CGP, Korea.
59. Jan 19, 2017: Ganita seminar, University of Toronto, Canada.
60. Jan 18, 2017: Mathematical Physics seminar, Perimeter Institute for theoretical physics, Canada.
61. Oct 31-Nov 4, 2016: BICMR/IBS-CGP joint Symplectic Geometry Workshop, Jeju, Korea.
62. **Aug 6-11, 2016: The 7th International Congress of Chinese Mathematicians, Beijing, China.**
63. **Aug 1-5, 2016: Strings 2016 (Parallel talk), Beijing, China.**
64. June 20-26, 2016: Retrospective Workshop for the Thematic Program on Calabi-Yau Varieties: Arithmetic, Geometry and Physics, Herstmonceux Castle, UK
65. May 8-14, 2016: Lecture series for "Factorization Algebras and Functorial Field Theories", MFO, Germany.

66. May 6-8, 2016: Simons Workshop on SYZ Mirror Symmetry and related topics, Harvard, USA.
67. Apr 24-30, 2016: Mini course on “BV quantization and geometric applications”, IBS-CGP, Korea.
68. Apr 5-12, 2016: MIST IV: Mathematics Inspired by String Theory, CUHK, Hong Kong.
69. Jan 1-4, 2016: Poisson Geometry and Mathematical Physics, Chern Institute of Mathematics, Tianjin.
70. **Dec 31, 2015: Strings-Math 2015 (Plenary talk), Sanya, China.**
71. Dec 27, 2015: Workshop on Mathematics Physics, Dec 27, Sanya, China.
72. Nov 24, 2015: 2015 Annual Conference of Chinese Mathematical Society, CNU, Beijing.
73. Nov 14, 2015: Geometry and Physics seminar, Shanghai Jiaotong University, Shanghai
74. July 13-July 18,, 2015: “Uniformization, Riemann-Hilbert Correspondence, Calabi-Yau manifold, and Picard-Fuchs Equation”, Mittag-Leffler Institute, Sweden
75. July 6-10, 2015: GAP XII-Derived Algebraic Geometry, IBS-CGP, Pohang, Korea
76. March 28, 2015: Tianyuan workshop in algebraic geometry, AMSS, Beijing.
77. Mar 23, 2015: Symplectic geometry and mathematical physics, BICMR, China.
78. March 7, 2015: Beijing Geometry and Physics Colloquium, Peking University
79. Feb 7-8, 2015: Lecture series-Introduction to perturbative field theory, Morningside Center, CAS, Beijing.
80. Jan 20, 2015: String/Math Seminar, Perimeter Institute, Canada
81. Aug 26, 2014: China annual complex analysis conference, USTC, Hefei.
82. Oct 20, 2014: Geometry seminar, Lehigh University, USA.
83. Oct 6, 2014: Informal mathematical physics seminar, Columbia University, USA.
84. Sep 29-Aug 3, 2014: Homological methods in quantum field theory, Simons center for geometry and physics, USA.
85. Sep 18, 2014: Seminar on mathematical physics, Morningside Center for Mathematics, CAS, Beijing.
86. **Aug 5, 2014: 60 years of Calabi conjecture-Workshop in Honor of Professor Shing-Tung Yau on the occasion of his 65th birthday, Tsinghua University**
87. June 8-15, 2014: Lecturer for Research Training Group 1670, University of Hamburg, Germany
88. May 19-23, 2014: Representation Theory, Integrable Systems, and Quantum Fields, Northwestern University, USA
89. April 1, 2014: Algebraic geometry seminar, Princeton, USA
90. Mar 3-7, 2014: Workshop on B-model aspect of Gromov-Witten theory, University of Michigan
91. Feb 10-14, 2014: Lecturer: Primitive forms and related subjects, Kavli IPMU, Japan
92. Nov 25, 2013: Geometry and Physics seminar, University of Michigan, USA
93. July 22, 2013: Invited seminar, Kavli IPMU, Japan
94. **July 16, 2013: The Sixth International Congress of Chinese Mathematicians, Taipei**
95. Apr 12-14, 2013: Mini-course for FRG Workshop on Gromov-Witten theory, Columbia University, USA
96. Mar 11, 2013: Geometry and Physics seminar, University of Michigan, USA
97. Jan 29, 2013: Differential geometry seminar, Harvard University, USA
98. Nov 30, 2012: Everytopic Seminar, Brandeis University, USA
99. Nov 27, 2012: GAP Seminar, Penn State University, USA
100. Sep 14-17, 2012: Boston-Keio Summer Workshop on Geometry, Boston University, USA
101. Aug 27, 2012: FRG Workshop: Generalized Geometry, String Theory, and Deformations, Harvard, USA
102. August 20-24, 2012: The Conference of Mirror Symmetry and Related Topics, KMUST, China
103. July 27-Aug 20, 2012: Summer course, MSC at Tsinghua University, China

104. August 10, 2012: Math Literature Seminar, MSC at Tsinghua University, China
105. July 18, 2012: Workshop on the mathematical aspects of quantum field theory, USTC, China
106. June 26, 2012: Geometry and Physics of the Landau-Ginzburg Model, IPMU, Japan
107. June 18, 2012: Quantization and Mathematics: An Undergraduate Conference, Northwestern University, USA
108. Mar 19, 2012: Geometry and Physics Seminar, University of Michigan, USA
109. Feb 18, 2012: Hong Kong Geometry Colloquium, Hong Kong
110. Feb 17,20, 2012: Geometry and Physics Seminar, HK Chinese Univ, Hong Kong
111. Feb 8,11, 2012: Geometry Seminar, HKUST, Hong Kong
112. Dec 9, 2011: Geometry Seminar, Boston University, USA
113. Nov 3, 2011: Felix Klein Seminar, University of Notre Dame, USA
114. Aug 3, 2011: Workshop on Chiral Differential Operators, Northwestern University, USA
115. July 19, 2011: Seminar on QFT, MIT, US
116. May 5, 2011: Mirror Symmetry Seminar, Simons Center for Geometry And Physics, Stonybrook
117. Mar 4, 2011: Algebraic Geometry Seminar, University of Wisconsin, USA
118. Feb 22, 2011: Differential Geometry Seminar, Harvard University, USA
119. Oct 14, 2010: Geometry/Physics Seminar, Northwestern University, USA
120. Sep 28, 2010: Differential Geometry Seminar, Harvard University, USA
121. Dec 4 2009: Differential Geometry Seminar, Harvard University, USA

## Professional Services

- Editor for: Communications in Number theory and Physics.
- Member of American Mathematical Society
- Reviewer for: Math Reviews of American Mathematical Society
- Referee for: Journal of European Mathematical Society, Astérisque, Journal of Differential Geometry, Compositio Mathematica, Communications in Mathematical Physics, International Mathematics Research Notices, Communications in Analysis and Geometry, Pure and Applied Mathematics Quarterly, Asian Journal of Mathematics.
- Co-organier for: June 13, 2019: The 8th International Congress of Chinese Mathematicians, Beijing, China.
- Co-organier: Feb 17-24, 2019: BIRS Workshop on Quantum Field Theory and Factorization Algebras, Banff, Canada.
- Co-organier: Aug 1-5, 2016: Strings 2016, Tsinghua University, China.
- Co-organier: July 24-28, 2016: Summer School on String Theory, Quantum Field Theory and Geometry of Spacetime, Tsinghua University, China.
- Co-organier: Jan 6-14, 2016: Thematic Program: Mathematics of Quantum Field Theory, IBS-CGP, Korea.
- Co-organier: Dec 31 2015- Jan 4 2016: String-Math 2015, Sanya, China.
- Co-organier: Sep 29-Oct 3, 2015: Homological Methods in Quantum Field Theory, SCGP, USA.
- Co-organier Feb 10-14, 2014: Primitive forms and related subjects, Kavli-IPMU, Japan.

## Teaching and Mentorship

### • Post-doc mentorship

- Jingyue Chen (2015-2018), work at Capital Normal University
- Weiqinag He (2015-2018), work at Sun Yat-sen University
- Hao Wen (2016-2019), work at Nankai University
- Xinxing Tang (2017-2021) work at Beijing Inst. of Math. Sci. App. (BIMSA)
- Jiawei Zhou (2019-2022) work at Beijing Inst. of Math. Sci. App. (BIMSA)
- Hongfei Shu (2021-present)
- Yong Li (2022-present)

### • Graduate mentorship

- Yifan Li (2014-2019). Thesis: “**Algebraic Approaches to Landau-Ginzburg Orbifolds**”.
- Zhengping Gui (2016-2021). Thesis: “**Chiral deformation theory of 2d conformal field theory**”
- Minghao Wang (2018-current)
- Gongwang Yan (2018-current)
- Xiaoxiao Yang (2019-current)
- Peng Yang (2020-current)
- Tianqin Zhu (2020-current)

### • Undergraduate thesis advisor

- Chenjing Bu (2021, Oxford)
- Keyou Zeng (2018, Perimeter Institute)
- Kai Xu (2018, Harvard)
- Shaoyun Bai (2017, Princeton)
- Yuxuan Yang (2017, Harvard)
- Zhengping Gui (2016, Tsinghua)
- Weifeng Sun (2016, Harvard)

### • Teaching (Tsinghua)

- Spring 2023: *Electro-magnetism* (new undergraduate course for Qiuzhen College, 4 credits)
- Fall 2022: *Classical Mechanics* (new undergraduate course for Qiuzhen College, 4 credits)
- Spring 2021: *Algebraic Topology* (graduate course. 4 credits)
- Fall 2020: *Mathematical Analysis-I* (undergraduate. 5 credits)
- Spring 2020: *Algebraic Topology* (graduate course. 4 credits)
- Spring 2019: *Noncommutative geometry* (new graduate course, 4 credits)
- Spring 2019: *Mathematical Examples* (new undergraduate course for Yau Elite class, 2 credits)
- Fall 2018: *Geometry and Symmetry* (new undergraduate course for Yau Elite class, 3 credits)
- Spring 2018: *Algebraic Topology* (graduate course, evaluation top 5 % at Tsinghua, 4 credits)
- Fall 2017: *Topics in mathematical physics-supersymmetry* (new graduate course, 4 credits)
- Fall 2017: *Topology* (undergraduate, 3 credits)
- Fall 2015: *Linear algebra* (undergraduate, 4 credits)
- Spring 2015: *Topics in quantum field theory and geometric applications* (YMSC graduate, 4 credits)
- Summer 2014: *Introduction to deformation quantization* (YMSC graduate, 2 credits)
- Summer 2013: *Topics in quantum field theory* (YMSC graduate, 2 credits)