

# Yi Liu

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## Personal

Born on December 24, 1983.

Citizen of P. R. China.

## Research Interests

Topology of 3-manifolds, hyperbolic geometry

## Education

B.S. Mathematics, Peking University, China, 2006

Ph.D. Mathematics, University of California at Berkeley, 2012

Dissertation Advisor: Ian Agol

## Employment

July 2015—present, Associate Professor, Beijing International Center for Mathematical Research, Peking University

September 2012—June 2015, Taussky–Todd Instructor, Department of Mathematics, California Institute of Technology

## Awards, Honors, and Grants

The Recruitment Program of Global Youth Experts of China (2016)

NSF Grant No. DMS-1308836, Principle Investigator (2013–2016)

Herb Alexander Prize for Outstanding Dissertation (2012)

## Invited Talks

Knot groups onto hyperbolic knot groups. *The Eighth Annual Graduate Student Topology and Geometry Conference*, Ann Arbor, MI, April 2010.

Presentation length and drillings. *Summer Workshop on 3-Manifold Topology*, Changchun, China, July 2010.

Factorizing homomorphisms through extended Dehn fillings. *Wasatch Topology Conference*, Park City, UT, December 2010.

Presentation length and Simon's conjecture. Plenary talk. *The Seventh East Asian School of Knots and Related Topics*, Higashi Hiroshima, Japan, January 2011.

Virtual positivity of representation volumes. *The Joint Los Angeles Topology Seminar*, Pasadena, CA, February 2013.

Bounded quasi-Fuchsian subsurfaces in closed hyperbolic 3-manifolds. *MSRI Hot Topics Workshop: Surface subgroups and cube complexes*, Berkeley, CA, March 2013.

Introduction on Virtual Haken Conjecture. Short course. *Summer School and Conference: Low Dimensional Topology*, Dalian, China, July 2013.

Bounded quasi-Fuchsian surfaces in closed hyperbolic 3-manifolds. Plenary Talk. *A Satellite Conference of Seoul ICM: Knots and Low Dimensional Manifolds*, Busan, Korea, August 2014.

## Teaching Experience

Spring 2016, Introduction to hyperbolic geometry, Instructor, Peking University

Spring 2015, MATH 151c Algebraic and differential topology, Instructor, Caltech

Winter 2015, MATH 191 Virtual properties of 3-manifolds, Instructor, Caltech

Spring 2014, MATH 151c Algebraic and differential topology, Instructor, Caltech

Winter 2014, MATH 151b Algebraic and differential topology, Instructor, Caltech

Fall 2013, MATH 151a Algebraic and differential topology, Instructor, Caltech

Spring 2013, MATH 151c Algebraic and differential topology, Instructor, Caltech

Winter 2013, MATH 151b Algebraic and differential topology, Instructor, Caltech

Spring 2012, MATH 053 Multivariable calculus, Graduate Student Instructor (GSI), UC Berkeley

Spring 2009, MATH 054 Linear algebra and differential equations, GSI, UC Berkeley

Fall 2008, MATH 001B Calculus II, GSI, UC Berkeley

Spring 2008, MATH 001B Calculus II, GSI, UC Berkeley

Fall 2007, MATH 054 Linear algebra and differential equations, GSI UC Berkeley

Spring 2007, MATH 001B Calculus II, GSI, UC Berkeley

Fall 2006, MATH 185 Complex Analysis, Reader, UC Berkeley

## Research Papers

All the papers below are submitted to refereed journals.

*Immersing quasi-Fuchsian surfaces of odd Euler characteristic in closed hyperbolic 3-manifolds*, submitted, 29 pages, 2016. Preprint available at arXiv:1603.07069.

Joint with Pierre Derbez, Hongbin Sun, and Shicheng Wang, *Controlled virtual volume representations and efficient virtual dominations*, submitted, 26 pages, 2016. Preprint available at arXiv:1603.03558.

*Degree of  $L^2$ -Alexander torsion for 3-manifolds*, Invent. Math. (2016): doi:10.1007/s00222-016-0680-6.

*A characterization of virtually embedded subsurfaces in 3-manifolds*, Trans. Amer. Math. Soc. (2016): <http://dx.doi.org/10.1090/tran/6707>.

Joint with Pierre Derbez and Shicheng Wang, *Chern-Simons theory, surface separability, and volumes of 3-manifolds*, J. Topol. **8** (2015), 933–974: doi:10.1112/jtopol/jtv023.

Joint with Vladimir Markovic, *Homology of curves and surfaces in closed hyperbolic 3-manifolds*, Duke Math. J. **164** (2015), 2723–2808.

Joint with Yi Ni, Hongbin Sun, and Shicheng Wang, *On slope genera of knotted tori in the 4-space*, Pacific J. Math. **261** (2013), no. 1, 117–144.

*Virtual cubulation of nonpositively curved graph manifolds*, J. Topol. **6** (2013), 793–822: doi:10.1112/jtopol/jtt010.

*A Jørgensen-Thurston theorem for homomorphisms*, Algebr. Geom. Topol. **12** (2012), 1301–1311.

*Finiteness of nonzero degree maps between three-manifolds*, submitted, 23 pages, 2011. Preprint available at arXiv:1107.5855.

Joint with Ian Agol, *Presentation length and Simon's conjecture*. J. Amer. Math. Soc. **25** (2012), 151–187.

Joint with Fan Ding, Shicheng Wang, and Jiangang Yao, *Extending  $T^p$  automorphisms over  $\mathbb{R}^{p+2}$  and realizing DE attractors*, Discrete Contin. Dyn. Syst. **32** (2012), 1639–1655.

Joint with Fan Ding, Shicheng Wang, and Jiangang Yao, *Spin structure and codimension-two homeomorphism extensions*, Math. Res. Lett. **19** (2012), 345–357.