Jun Li

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Research Interest:

Symplectic topology and dynamics, formal verification(LEAN4), AI for Math reasoning and education

Employment

2022- **Assistant Professor (tenure-track)**, *University of Dayton*, Dayton, Ohio.

2017-2021 **Post-Doctoral Assistant Professor**, *University of Michigan*, Ann Arbor.

Education

June 30, 2017 **Ph.D. in Mathematics**, *University of Minnesota-Twin Cities*, Minneapolis.
Advisor: Tian-Jun Li

2007-2011 **B.S. in Mathematics**, *Shandong University*, Jinan, China.

Grants and Awards

2024- NSF LEAPS grant, DMS-2418927, Sole PI, ($156,571.00)

2022-2023 Project NExT fellow

2019-2023 AMS-Simons travel grant ($5000)

2020 Level I teaching technology innovation grant ($5000), University of Michigan

2016-2017 NSF research assistant (PI: T-J Li), University of Minnesota

2011-2012 First-year Graduate Student Fellow, University of Minnesota

2009-2011 National Scholarship for Excellent Students, Shandong University

Publication and Preprints

published/submitted

[12] Chambers in symplectic cone and stability of $Symp$ for non-minimal ruled surfaces, With Olguta Buse (preprint 2023, 29 pages),

[11] Almost Kahler cone and J-tame inflation, With Olguta Buse, (preprint 2024, 25 pages, **AMS Contemperoty Math Series,** in revision)

[10] Stability of the symplectomorphism group of rational surfaces, With Sílvia Anjos, Tian-Jun Li, and Martin Pinsonnault, **Math Annalen,** Volume 389, pages 85–119, (2024)

[9] Stratification of almost complex structures on 4-manifolds, With Tian-Jun Li and Weiwei Wu, **Rivista di Matematica**, 2022, 19 pages

[8] Symplectic Torelli groups of rational surfaces, With Tian-Jun Li and Weiwei Wu (preprint 2022, 65 pages)

[7] Symplectic isotopy on non-minimal ruled surfaces, With Olguta Buse, (2020, 24 pages) **Math. Zeitschrift** Volume 304, article number 44, (2023)

[6] Symplectic (-2)-spheres and symplectomorphism group of small rational 4-manifolds II, With Tian-Jun Li and Weiwei Wu (53 pages), **Transactions of AMS**, 2022 375(2) pp. 1357–1410

[5] Penner's Pseudo-Anosov constructions via half twists, With Anthony Morales*, Zijian Rong*, Wendy Wang*, Bradley Zykoski, Becca Winarski, preprint 2020 (*stands for an undergraduate co-author)

[4] Symplectic (-2)-spheres and symplectomorphism group of small rational 4-manifolds I, With Tian-Jun Li, **Pacific Journal of Math**, 2020, 304(2):561 - 606

[3] Topology of symplectomorphism groups and ball-swappings, With Weiwei Wu (20 pages), **ICCM Proceeding** 2018,445–464, Int. Press, Boston, MA

[2] The Symplectic mapping class group of $\mathbb{C}P^2\#n\overline{\mathbb{C}P^2}$, $n \leq 4$, With Tian-Jun Li and Weiwei Wu, **Michigan Math. J.**, 64.2 (2015), pp. 319 - 333

[1] The Proof that Leap-frog Schemes of Nonlinear Hamiltonian System is Symplectic Scheme, With Xiufeng Wang and Lei Zhang, **China Sci. Info.**, 2010 (pp.1-6, vol.19)

[0] Symplectomorphism group of rational 4-manifolds, Ph.D Thesis, 2017, University of Minnesota

Preprints, available at https://lijungeometry.github.io/papers.html

[13] Circle actions and isotopy on moduli space of polygons, With Daniel Burns (preprint 2024, 16 pages)

[14] Isotopy of symplectic surfaces in ruled surfaces, With Richard Hind, preprint 2024

[15] Lagrangian $\mathbb{R}P^2$'s in a fixed $\mathbb{Z}/2$ homology class, Jun Li (preprint 2022, 5 pages)

[16] On rank of $\pi_1(Ham)$ of rational surfaces, With Tian-Jun Li and Weiwei Wu (preprint 2023, 16 pages)

[17] Formalising the Frechet spaces and Smale's sphere mapping theorem, Jun Li, In preparation.

Work in progress

[18] Symplectic dynamics of divisor complements, With Tian-Jun Li and Weiwei Wu, In preparation.

[19] Homotopy groups of $Diff(X^4)$ vs $Symp(X^4, \omega)$ via family Seiberg-Witten theory, With Hokuto Konno and Weiwei Wu, In preparation.

Synergistic Activities

Fall 2024 **Founder**, *Experimental Math Lab at University of Datyon*.

Fall 2024 **Reviewer**, *NSF grant panel*.

May 2023 **Co-editor**, *AMS Contemporary Mathematics book series, Proceeding of Qualitative symplectic geometry*, With Olguta Buse and Richard Hind.

Apr 2023 **Co-organizer**, *Qualitative symplectic geometry, AMS sectional meeting special section*, With Olguta Buse and Richard Hind, Cincinnati.

Apr 2020 **Co-organizer**, *Computational aspect of symplectic geometry, AMS sectional meeting special section*, With Olguta Buse and Richard Hind, Purdue University.

May 2019 **Organizer**, *FRG Workshop on symplectic packing/isotopy*, With Tian-Jun Li and Yongbin Ruan, U of Michigan, Ann Arbor.

2020- **Reviewer**, *Math Review*.

2019- **Referee**, *for Journal of Topology, IMRN, Selecta. Math, Proceeding of Royal Society Edinburgh, A*.

2015-2017 **Organizer**, *Symplectic and low dimensional topology student seminar*, U of Minnesota.

Teaching

Instructor, University of Dayton

Fall 2024 Math 218, Multivariable Calculus

Spring 2024 Math 471, Topology, **with LEAN math prover**

Spring 2024 Math 219, Differential Equations for Engineering

Fall 2023 Math 310, IBL-linear Algebra

Fall 2023 Math 168 Calculus

Spring 2023 Math 342, Set Theory and Logic, **with introduction to LEAN math prover**

Spring 2023 Math 129 Calculus

Fall 2022 Math 168 Calculus

Fall 2022 Math 129 Business Calculus

Instructor, University of Michigan

Spring 2021 Math 590, Introduction to Topology

Fall 2020 Math 214, Applied Linear Algebra, (supported by technology innovation grant)

Spring 2020 Math 217, Linear Algebra and Intro to Proof (IBL)

Fall 2019 Math 636, Topics in Differential Geometry (Graduate Course)

Fall 2019 Math 217, **Manager/coordinator** of Canvas webpage (300-people course)

Spring 2019 Math 433, Intro to Differential Geometry

Spring 2019 Math 217, Linear Algebra and Intro to Proof (IBL)

Fall 2018 Math 217, Linear Algebra and Intro to Proof (IBL)

Spring 2018 Math 433, Intro to Differential Geometry

Fall 2017 Math 115, Calculus I

Recitation Instructor or TA, University of Minnesota

Spring 2017 Math 4707, Combinatorics and Graph Theory, **course assistant**

Spring 2016 Math 2263, Multi-variable Calculus

Fall 2015 Stat 3021, Introduction to Probability and Statistics, **course assistant**

Spring 2015 Math 2373, CSE Honor Differential Equation and Linear Algebra

Fall 2014 Math 2263, Multi-variable Calculus

Spring 2014 Math 1372, CSE Honor Calculus II

Fall 2013 Math 1372, CSE Honor Calculus II

Spring 2013 Math 1271, Calculus I

Fall 2012 Math 1271, Calculus I

2014-2015 **Grader** for Math 8301 Manifold and Topology (Graduate Course)

Undergraduate Research and Mentoring

Spring/Summer REU

Spring 2025 **Mentor**, supervised students: Gabriel Gray, on the project "Formal method in function spaces with LEAN"

Spring 2024 **Mentor**, supervised students: Gabriel Gray, Joey Kopp, Jonathan West, William Hach on the project "Topology on Infinite Dimensional Spaces."

Spring 2023 **Mentor**, supervised students: Ethan Shade, Sarah Herr, Kailey Peppard, Joseph Kop on the project " Lean Theorem Prover: The Lean, Mean, Math-Proving Machine."

Summer 2020 **Co-Mentor**, With Prof. Jun Zhang (Professor of Math and Psychology) in the Mind, Machine, Mathematics lab, supervised students: Chenxi Fan, Yifan Lu on the project "Fisher-Rao information metric for location scale family of probability distributions."

Undergraduate Research at Laboratory of Geometry at Michigan, LOG(M)

Fall 2019 **Mentor**, LOG(M) project: Curves in surfaces and mapping class groups

LOG(M) is a vertically integrated research experience for undergraduates. Each project is proposed and supervised by a faculty mentor and the undergraduates are advised by the faculty mentor and a graduate student.

Faculty Mentor: **Jun Li**, Becca Winarski

Graduate Assistant: Bradley Zykoski

Students: Anthony Morales, Robin Rong, Wendy Wang

We explore mathematical techniques to construct certain classes of mappings that's important on surfaces, and use Python to visualize/implement these constructions. As of Nov 2019, we reached the state of art on constructing pseudo-Anosov mapping classes in sphere braid groups.

Other mentor experience

Fall 2020 **Advisor** Independent study (3 credits course Math 399), University of Michigan, mentor of Robin Rong, topic: Statistical behavior of dynamical system and entropy

Mar 2020 **Ph.D. thesis defence committee member**, *for Daniel Irvine*, University of Michigan.

Fall 2019 **Mentor** Michigan Postdoc-Graduate Mixer, mentor of Daniel Irvine

2018-2019 **Mentor** for Math Modelling Contest, 2 teams

Supervising undergraduate students to build model and write code in Sage and Matlab to solve real world problems and write essays.

Educational Outreach

Spring 2023 Speaker for Math Club, University of Dayton

Spring 2021 **Instructor for Wolverine Pathway**, University of Michigan

This is a program for under-served middle and high school students in the Ypsilanti and Southfield school districts. The goal of the program is to offer a pathway to college. Students who complete the rigorous program and are accepted to UM receive a full-tuition scholarship. I had a student in this program in my class Math 217

Mar. 2019 **Volunteer for Wolverine Express**, K-12 outreach, University of Michigan

Wolverine Express is a high school visitation program in which a diverse team of U-M faculty, staff and students travel to high schools located across the state of Michigan to promote college access, readiness and success.

Sept 2018 **Volunteer for Math Mondays** in Ypsilanti high schools, Michigan.

Fall 2016 **Volunteer for Math Festival** University of Minnesota.

Pedagogical Training

2022 Project NExT workshops, Philadelphia, PA.

2020 Training for online instruction, University of Michigan, Ann Arbor, MI.

2019 Inquiry Based Learning (IBL) Workshop,University of Michigan, Ann Arbor, MI.

A three day workshop focused on managing an IBL classroom.

2018 IBL Workshop,University of Michigan, Ann Arbor, MI.

2017 Teacher Training,University of Michigan, Ann Arbor, MI.

Aug 2011 TA/International Graduate training program, University of Minnesota

Selected Conference/Seminar Talks

Aug. 2024 **Conference in honor of Y. Karshorn, F. Lalonde and J. Wistemann**, *Toronto*.

May. 2024 **UMass-Amherst**, *Geometry&Topology seminar*.

Nov. 2023 **UIUC**, *Geometry&Topology seminar*.

Jan. 2023 **JMM special session:symplectic geometry and integrable systems**, *Boston*.

Apr. 2022 **AMS central sectional meeting**, *(Virtual)*.

Mar. 2022 **Michigan State University**, *Geometry&Topology seminar*.

Jun. 2021 **Low-dimensional topology and symplectic geometry weekend**, *(Virtual)*.

Apr. 2021 **University of Dayton**, *Colloquium (Virtual)*.

Jan. 2021 **Rutgers University-Newark**, *Colloquium (Virtual)*.

Nov. 2020 **Minnesota State University**, *Colloquium (Virtual)*.

Jul. 2020 **Online Zoominar**, *Quantum and Floer theory Seminar*.

Jun. 2020 **Bowdoin College**, *Special Colloquium*.

Apr. 2020 **AMS central sectional meeting**.
Online Special Session on Computational aspects of Symplectic Topoloty

Nov. 2019 **Columbia University**, *Symplectic Geometry, Gauge and Categorification Seminar*.

Nov. 2019 **AMS Fall Western Sectional Meeting**.
Special Session on Symplectic Geometry and Low Dimensional Topoloty

Oct. 2019 **University of Georgia**, *Geometry Seminar*.

May 2019 **36th Annual workshop on Geometric Topology**, *Milwaukee*.

Apr 2019 **Workshop on quantitative geometry and topology**, *Ohio State*, lighting talk.

Mar. 2019 **Indiana-Purdue**, *Geometry/Modern Analysis Seminar*.

July 2018 **IST, Lisbon, Portugal**, *Geometria em Lisboa Seminar*.

May 2018 **Mini-workshop on Symplectic Symmetry and J-hol Curves**, *Minneapolis*.

Mar. 2018 **SUNY, Binghamton**, *Topology Seminar*.

Nov. 2017 **University of Notre Dame**, *Felix Klein Geometry Seminar*.

Oct. 2017 **University of Michigan-Ann Arbor**, *Geometry Seminar*.

Mar. 2017 **Shandong University**, *Department talk*.

Mar. 2017 **Beijing Normal University**, *Geometry Seminar*.

Nov. 2016 **University of Minnesota**, *Differential Geometry and Symplectic Topology Seminar*.

Nov. 2016 **University of Iowa**, *Joint Geometry and Topology Seminar*.

Oct. 2016 **AMS Fall Central Sectional Meeting**.
Special Session on Symplectic Geometry and Contact Geometry

Sep. 2016 **Minnesota State University**, *Department Colloquium*.

Mar. 2016 **University of Minnesota**, *Differential Geometry and Symplectic Topology Seminar*.

Apr. 2016 **AMS Spring Central Sectional Meeting**.
Special Session on Low Dimensional and Symplectic Topology

Dec. 2015 **Shandong University**, *Geometry/Topology Seminar*.

Aug. 2013 **Conference on the Topology and Invariants of Smooth 4-Manifolds**, *UMN*.

University/Department Service

2024 **Sabbatical committee**, *UD Math Department*.

2024 **Honor thesis Mentor**, *University of Dayton*.

2024 **Advisor for Stander Symposium Presentations**, *University of Dayton*.

2023 **Algebra Search Committee**, *UD Math Department*.

2023 **Advisor for Undergraduate Math Day Presentations** , *University of Dayton*.

2023 **GSSF review committee**, *University of Dayton*.

2022 **Sabbatical committee**, *UD Math Department*.

2022 **Student Poster Session**, *UD Math Department*.

2022-2023 **Statistics Search Committee**, *UD Math Department*.

Jan 2019 **Graduate admission reviewer**, University of Michigan.

May 2018 **Ph.D Written Prelim committee**, *Topology exam*, University of Michigan.

Aug 2015 **Instructor**, *TA/International Graduate training program*, University of Minnesota.

Membership and associations

2017- Member, the network to advance Faculty of Color at University of Michigan

2011- Member, American Mathematics Society

Other activities and skills

Software LaTeX LEAN, Matlab, Python, Sage, R

Language English, Chinese, French (Reading)