

# FAN YE

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## RESEARCH INTERESTS

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Low-dimensional topology, especially knot theory, gauge theory and Floer homology

## EMPLOYMENT

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Benjamin Peirce Fellow, Harvard University, advised by Peter Kronheimer 07/2022-now

## EDUCATION

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Ph.D. in DPMMS, University of Cambridge, supervised by Jacob Rasmussen 10/2019-06/2022  
B.S. in School of Mathematical Sciences (SMS), Peking University 09/2015-06/2019

## FUNDINGS

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AMS-Simons Travel Grant 07/2024-06/2026

## PUBLICATIONS AND PREPRINTS

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- [12] **Instanton 2-torsion and Dehn surgeries** *Joint with Zhenkun Li, submitted, arXiv:2508.03394.*
- [11] **2-torsion in instanton Floer homology** *Joint with Zhenkun Li, Adv. Math. 472:Paper No. 110289, 55 (2025). DOI:10.1016/j.aim.2025.110289, arXiv:2405.16252.*
- [10] **Knot surgery formulae for instanton Floer homology II: applications**  
*Joint with Zhenkun Li, Math. Ann. 391:6291–6371 (2025). DOI: 10.1007/s00208-024-03074-6.*
- [9] **Guts of nearly fibered knots** *Joint with Zhenkun Li, accepted by Algebr. Geom. Topol., arXiv:2208.05382.*
- [8] **Knot surgery formulae for instanton Floer homology I: the main theorem**  
*Joint with Zhenkun Li, Geom. Topol. 29(5): 2269–2342 (2025). DOI:10.2140/gt.2025.29.2269, arXiv:2206.10077.*
- [7] **Small Dehn surgery and  $SU(2)$**  *Joint with John A. Baldwin, Zhenkun Li, and Steven Sivek, Geom. Topol. 28(4): 1891–1922 (2024). DOI:10.2140/gt.2024.28.1891, arXiv:2110.02874.*
- [6]  **$SU(2)$  representations and a large surgery formula**  
*Joint with Zhenkun Li, submitted, arXiv:2107.11005.*
- [5] **An enhanced Euler characteristic of sutured instanton homology**  
*Joint with Zhenkun Li, IMRN 2024(4): 2873–2936 (2023). DOI:10.1093/imrn/rnad066, arXiv:2107.10490.*
- [4] **Instanton Floer homology, sutures, and Euler characteristics**  
*Joint with Zhenkun Li, Quantum Topol. 14 (2): 201–284 (2023). DOI:10.4171/QT/182, arXiv:2101.05169.*
- [3] **Sutured instanton homology and Heegaard diagrams**  
*Joint with John A. Baldwin and Zhenkun Li Compos. Math. 159(9), 1898–1915 (2023). DOI:10.1112/S0010437X23007303, arXiv:2011.09424.*
- [2] **Instanton Floer homology, sutures, and Heegaard diagrams**  
*Joint with Zhenkun Li, J. Topol. 15(1): 39–107 (2022). DOI:10.1112/topo.12218, arXiv:2010.07836.*

[1] **Constrained knots in lens spaces**

*Algebr. Geom. Topol.* 23(3): 1097–1166 (2023). DOI:10.2140/agt.2023.23.1097, arXiv:2007.04237.

[0] **Ph.D. Thesis, New techniques in calculation of sutured instanton Floer homology:**

*by Heegaard diagrams, Euler characteristics, and Dehn surgery formulae*

DOI:10.17863/CAM.85094.

## CONFERENCES AND TALKS

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Seminar talk, University of Miami	04/2024
Seminar talk, Princeton University	04/2024
Seminar talk, Ohio State University (OSU)	02/2024
Seminar talk, University of Maryland (UMD)	02/2024
Seminar talk, Washington University in St. Louis (WUSTL)	01/2024
Seminar talk, University of Illinois Urbana-Champaign (UIUC)	10/2023
Seminar talk, Boston College	09/2023
Seminar talk, Harvard University	09/2023
Seminar talk, Academy of Mathematics and Systems Science, CAS, Beijing	07/2021
Seminar talk, Institute of Mathematics of the Polish Academy of Sciences	07/2021
Seminar talk, Max Planck Institute for Mathematics (MPIM), Bonn	06/2023
Seminar talk, California Institute of Technology (Caltech)	05/2023
Conference talk, Massachusetts Institute of Technology (MIT)	05/2023
Seminar talk, Brown University	05/2023
Conference talk, University of Miami	04/2023
Seminar talk, Stony Brook University	10/2022
Seminar talk, Peking University	04/2022
Seminar talk, Morningside Center of Mathematics Chinese Academy of Sciences	04/2022
Seminar talk, University of Warsaw	12/2021
Seminar talk, Gauge Theory Virtual	11/2021
Seminar talk, Massachusetts Institute of Technology (MIT)	11/2021
Seminar talk, California Institute of Technology (Caltech)	10/2021
Seminar talk, Peking University	10/2021
Seminar talk, Princeton University	09/2021
Summer School on 4-manifolds, Georgia Tech	07/2021
Group report, Summer Trisectors Workshop	06/2021
Conference talk, NCNGT2021	06/2021
Seminar talk, Peking University	06/2021
Seminar talk, Stanford University	03/2021
Seminar talk, Peking University	03/2021

## TEACHING EXPERIENCE

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Harvard Math231A, algebraic topology	Fall 2024
Harvard Math285Z, sutured 3-manifolds and Floer homology (topic course)	Spring 2023
Harvard Math230A, differential geometry	Fall 2023
Harvard Math21A, multi-variable calculus	Spring 2022
Harvard Math230A, differential geometry	Fall 2022

## SYNERGISTIC ACTIVITIES

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Minicourses, Beijing International Center for Mathematical Research (BICMR)	10/2021
Co-organizer for Harvard Gauge theory and Topology seminar	09/2022-Now

Referee for Forum Math. Pi., J. Differ. Geom., J. Topol., Quantum Topol., Math. Res. Lett., Algebr. Geom. Topol., J. Knot Theory Ramif.