Junrong Yan

Curriculum Vitae

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Education

2017–2022 **Ph.D.**, *Department of Mathematics*, University Of California, Santa Barbara.
Advisor: Xianzhe Dai

2013–2017 **B.S in Mathematics**, *School of Mathematical Sciences*, Nankai University.

Employment

2024–Current **Zelevinsky Postdoctoral Fellow**, *Department of Mathematics*, Northeastern University.
Mentor: Maxim Braverman

2022–2024 **Boya Postdoctoral Fellow**, *Beijing International Center for Mathematical Research*, Peking University.
Mentor: Xiaobo Liu

Awards and Grants

2018 Wilder Award at UCSB

2021 Grade Student Travel Grant to JMM

2022 Boya Postdoctoral Fellowship at PKU

2023 General Program in China Postdoctoral Science Foundation

2024 Zelevinsky Postdoc Travel Grant

Research Interests

Analysis Global analysis on noncompact manifolds; spectral theory of elliptic, Dirac, and Schrödinger operators; heat-kernel asymptotics; Weyl laws and Tauberian theory; Witten deformation.

Mathematical Physics Mathematical aspects of quantum field theory; Feynman graph integrals and renormalization; holomorphic field theory; mirror symmetry; Landau–Ginzburg models; BCOV theory; CY/LG correspondence.

Geometry and Topology Differential and comparison geometry; index theory; Morse theory; analytic torsion and torsion forms; gluing formulas; higher torsion.

Papers

Published or accepted

[1] Xianzhe Dai and Junrong Yan. *Witten deformation for noncompact manifolds with bounded geometry*, Journal of the Institute of Mathematics of Jussieu, 2023, 38 pages

[2] Xianzhe Dai and Junrong Yan. *Witten deformation on non-compact manifold: heat kernel expansion and local index theorem*, 2023, Math. Z., 28 pages

[3] Xinxing Tang and Junrong Yan. *CY/LG correspondence for Weil-Petersson metrics and tt structures*, Journal of Geometry and Physics, 2025, 34 pages

[4] Fagui Li and Junrong Yan. *A first eigenvalue estimate for embedded hypersurfaces in positive Ricci curvature manifolds*. Differential Geometry and its Applications, 2026, 10 pages

[5] Junrong Yan. *Witten deformation for non-Morse Functions and gluing formula for analytic torsions*, To appear in CAG, 39 pages

Preprint

[1] Junrong Yan. *A new analytic proof of gluing formula for analytic torsion forms*, arXiv:2301.02591, 2023, 40 pages

[2] Martin Puchol and Junrong Yan. *Generalized Morse Functions, Excision and Higher Torsions*. arXiv:2407.17100, 2024, 107 pages

[3] Xianzhe Dai and Junrong Yan. *Weyl Law for Schrödinger Operators on Noncompact Manifolds, Heat Kernel, and Karamata-Hardy-Littlewood Theorem*. arXiv:2504.15551, 2025, 28 pages

[4] Maxim Braverman, Ahmad Reza Haj Saeedi Sadegh and Junrong Yan. *A Gluing Formula for the $\mathbb{Z}_2$-valued Index of Odd Symmetric Operators,*. arXiv:2505.07094, 2025, 18 pages

[5] Minghao Wang and Junrong Yan. *Feynman Graph Integrals on Kähler Manifolds*. arXiv:2507.09170, 2025, 49 pages

[6] Maxim Braverman, Xianzhe Dai and Junrong Yan. *The Classical Weyl Law for Schrödinger Operators on Complete Riemannian Manifolds*. arxiv:2605.07200, 2026, 35 pages

[7] Minghao Wang and Junrong Yan. *Renormalizations in Holomorphic Field Theories on Kähler Manifolds*. arXiv:2608.00546, 2026, 82 pages

[8] Junrong Yan. *The Weyl Law Meets Large-Scale Regularity on Ricci Shrinkers*. arXiv:2609.0820, 29 pages

[9] Xinxing Tang and Junrong Yan. *The Genus-One B-Model Calabi-Yau/Landau-Ginzburg Correspondence*. arXiv:2610.33984, 45 pages

Academic Services

Referee

SIGMA (Symmetry, Integrability and Geometry: Methods and Applications);

Journal für die reine und angewandte Mathematik;

Pacific Journal of Mathematics;

Communications in Mathematical Physics;

Journal of Geometric Analysis.

Reviewer

zbMATH Open; MathSciNet.

Teaching Experience

Instructor

Northeastern University

MATH 7371: Morse Theory, Fall 2025.

MATH 2331: Linear Algebra, Fall 2025.

MATH 1342: Calculus 2 for Science and Engineering, Fall 2024; Spring 2025.

Peking University

Calculus 2, Winter 2024.

UC Santa Barbara — *MATH 3B: Calculus with Applications*, Summer 2021.

Teaching Assistant

MATH 8: Transitions to Higher Mathematics, Spring 2018; Fall 2018; Fall 2020.

MATH 6B: Vector Calculus, Winter 2019.

MATH 34B: Calculus for Social and Life Sciences, Spring 2019.

MATH 6A: Vector Calculus, Fall 2019; Winter 2020; Summer 2020; Winter 2021; Spring 2021.

Reader

MATH 117: Methods of Analysis, Fall 2017; Fall 2019.

MATH 108B: Introduction to Linear Algebra, Winter 2018.

Undergraduate Mentoring (2021 UCSB Directed Reading Program)

Jiasheng Lin — Morse theory and Floer homology

Kai Yan & Xinzhe Li — Gauge theory, TQFT and knot theory

Selected Talks

Aug. 2026 **Graph integral on Kähler manifolds**, *Workshop on Global Analysis on Manifolds*, Tianjin

June 2026 **Graph integral on Kähler manifolds**, *University of Bonn*, Bonn

June 2026 **Graph integral on Kähler manifolds**, *Universite Paris-Saclay*, Orsay

Apr. 2026 **Graph integral on Kähler manifolds**, *Texas A&M University*, College Station

Mar. 2026 **Graph integral on Kähler manifolds**, *George Mason University*, Washington DC

Feb. 2026 **Weyl's law on complete manifolds**, *University of California, Santa Barbara*, Santa Barbara

Feb. 2026 **Graph integral on Kähler manifolds**, *University of Californi, Irvine*, Irvine

Jan. 2026 **Graph integral on Kähler manifolds**, *Boston University*, Boston

Dec. 2025 **Graph integral on Kähler manifolds**, *Wuhan University*, Wuhan

June. 2025 **Heat kernel expansion, Tauberian theory and Weyl law for Schrodinger operator on noncompact manifolds**, *AMS Special Session on Noncommutative Geometry and Applications*, St. Louis

June. 2025 **Heat kernel expansion, Tauberian theory and Weyl law for Schrodinger operator on noncompact manifolds**, *Xiamen University*, Xiamen

May. 2025 **Heat kernel expansion and Weyl's law for Schrödinger-type operators on noncompact manifolds**, *Tsinghua University*, Beijing

April. 2025 **Heat kernel expansion and Weyl's law for Schrödinger-type operators on noncompact manifolds**, *University of Tokyo*, Tokyo

Mar. 2025 **Witten deformation for non-Morse functions and gluing formulas**, *Go Fishing 2025–Possion Geometry Meeting*, St. Louis

Dec. 2024 **Towards the comparison of higher torsion invariants**, *Around Local Index Theorem*, Paris

Sept. 2024 **Higher torsions and Witten-type deformation**, *Northeastern University*, Boston

Sept. 2024 **Witten deformation for non-Morse functions and gluing formulas**, *Harvard University*, Boston

Aug. 2024 **Higher torsions and Witten-type deformation**, *Workshop on Global Analysis on Manifolds 2024*, Wuhan

Feb. 2024 **Witten deformation for non-Morse functions and higher Cheeger-Müller theorem**, *Conference on Dirac operators: analysis and geometry*, Beijing

Nov. 2023 **Witten deformation for non-Morse functions and gluing formulas**, *University of Freiburg*, Freiburg

Oct. 2023 **Witten deformation for non-Morse functions and gluing formulas**, *Université Paris-Saclay*, Orsay

Mar. 2023 **Witten deformation for non-Morse functions and gluing formulas**, *Chern Institute of Mathematics, Nankai University*, Tianjin

Sept. 2022 **Calabi-Yau/Landau-Ginzburg correspondence for tt^* Structures**, *Peking University*, Beijing

Jun. 2022 **Calabi-Yau/Landau-Ginzburg correspondence for tt^* Structures**, *The Chinese University of Hong Kong*, Hongkong

Jan. 2022 **Analytic torsion on noncompact manifolds**, *AMS Special Session on Intersections of geometric analysis and mathematical physics*, Seattle

Jan. 2021 **Heat kernel expansion and local index theorem on noncompact manifolds**, *Peking University*, Beijing

Dec. 2020 **Heat kernel expansion and local index theorem on noncompact manifolds**, *Chern Institute of Mathematics, Nankai University*, Tianjin

Nov. 2020 **Heat kernel expansion and local index theorem on noncompact manifolds**, *East China Normal University*, Shanghai

Apr. 2020 **Witten deformation on noncompact manifolds and mirror symmetry for Landau-Ginzburg model**, *UCSB Differential Geometry Seminar*, Santa Barbara

Jan. 2020 **Witten deformation on noncomapct manifolds**, *AMS Special Session on Differential Geometry and Global Analysis, I Honoring the Memory of Tadashi Nagano*, Denver

Nov. 2019 **Witten deformation on noncomapct manifolds**, *AMS Special Session on Topics in Global Geometric Analysis*, Los Angeles