

Yanli Song

Curriculum Vitae

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Research Interests

Equivariant index theory; noncommutative geometry; operator K -theory; representation theory; symplectic geometry and geometric quantization.

Academic Appointments

2023–present	Associate Professor of Mathematics , Washington University in St. Louis.
2017–2023	Assistant Professor of Mathematics , Washington University in St. Louis.
2016–2017	John Wesley Young Research Instructor , Dartmouth College, Hanover, NH.
2013–2016	Postdoctoral Fellow , University of Toronto, Canada.

Education

2008–2013	Ph.D. in Mathematics , Pennsylvania State University, University Park, PA. Advisor: Nigel Higson.
2004–2008	B.S. in Mathematics , Fudan University, Shanghai, China.

Research Support

2025–2030	Simons Foundation Travel Support for Mathematicians . Principal investigator; \$42,000.
2020–2023	NSF DMS-1952557 , FRG: Collaborative Research. Principal investigator; \$154,000.
2019–2021	NSF DMS-1954733 , Conference: GPOTS 2020. Co-principal investigator; \$49,999.
2019–2021	NSF DMS-1856688 , Conference: Noncommutative Geometry Festival 2019. Principal investigator; \$34,000.
2018–2021	NSF DMS-1800667 . Principal investigator; \$160,787.

Research Software and Formalization

BC4lean: Baum–Connes Conjecture

Ongoing

An open-source Lean project developing reusable, machine-checked foundations for the coefficient-free, reduced Baum–Connes conjecture for countable discrete groups, with a mathematical blueprint and proof dependency graphs.

Project website | Source code

Publications

1. P. Piazza, H. Posthuma, **Y. Song**, and X. Tang. Delocalized eta invariants of the signature operator on G -proper manifolds. *J. Funct. Anal.* **291** (2026), no. 12, Article 111671. [arXiv:2307.09252](#).
2. A. Román, **Y. Song**, and X. Tang. Higher orbital integrals on motion groups and Mackey deformation. *J. Geom. Phys.* **228** (2026), Article 105909. [arXiv:2507.21008](#).
3. **Y. Song** and X. Tang. Higher Orbital Integrals, Cyclic Cocycles and Noncommutative Geometry. *Forum Math. Sigma* **13** (2025), Article e37. [arXiv:1910.00175](#).
4. P. Piazza, H. Posthuma, **Y. Song**, and X. Tang. Higher orbital integrals, rho numbers and index theory. *Math. Ann.* **391** (2025), no. 3, 3687–3763. [arXiv:2108.00982](#).
5. P. Clare, N. Higson, and **Y. Song**. On the Connes-Kasparov Isomorphism, II. The Vogan Classification of Essential Components in the Tempered Dual. *Jpn. J. Math.* **19** (2024), no. 1, 111–141. [arXiv:2202.02857](#).
6. P. Clare, N. Higson, **Y. Song**, and X. Tang. On the Connes-Kasparov Isomorphism, I. The Reduced C^* -algebra of a Real Reductive Group and the K-theory of the Tempered Dual. *Jpn. J. Math.* **19** (2024), no. 1, 67–109. [arXiv:2202.02855](#).
7. Y. Lin, Y. Loizides, R. Sjamaar, and **Y. Song**. Riemannian foliations and geometric quantization. *J. Geom. Phys.* **198** (2024), Article 105133. [arXiv:2209.13766](#).
8. **Y. Song** and X. Tang. Cartan motion group and orbital integrals. In *Cyclic Cohomology at 40: Achievements and Future Prospects*, Proc. Sympos. Pure Math. **105**, American Mathematical Society, 2023, 477–489. [arXiv:2204.00243](#).
9. Y. Lin, Y. Loizides, R. Sjamaar, and **Y. Song**. Symplectic reduction and a Darboux-Moser-Weinstein theorem for Lie algebroids. *Pure Appl. Math. Q.* **19** (2023), no. 4, 2067–2131. [arXiv:2211.13288](#).
10. P. Hochs, **Y. Song**, and X. Tang. An index theorem for higher orbital integrals. *Math. Ann.* **382** (2022), nos. 1–2, 169–202. [arXiv:2005.06119](#).
11. Y. Lin, Y. Loizides, R. Sjamaar, and **Y. Song**. Log symplectic manifolds and $[Q, R] = 0$. *Int. Math. Res. Not. IMRN* (2022), no. 18, 14034–14066. [arXiv:2008.12728](#).
12. Y. Loizides, R. Rodsphon, and **Y. Song**. A KK-theoretic perspective on deformed Dirac operators. *Adv. Math.* **380** (2021), Article 107604. [arXiv:1907.06150](#).
13. M. Braverman, Y. Loizides, and **Y. Song**. Geometric quantization of b -symplectic manifolds. *J. Symplectic Geom.* **19** (2021), no. 1, 1–36. [arXiv:1910.10016](#).
14. P. Hochs, **Y. Song**, and S. Yu. A geometric realisation of tempered representations restricted to maximal compact subgroups. *Math. Ann.* **378** (2020), nos. 1–2, 97–152. [arXiv:1705.02088](#).
15. Y. Loizides and **Y. Song**. Norm-square localization and the quantization of Hamiltonian loop group spaces. *J. Funct. Anal.* **278** (2020), no. 9, Article 108445. [arXiv:1810.02347](#).
16. Y. Loizides, E. Meinrenken, and **Y. Song**. Spinor modules for Hamiltonian loop group spaces. *J. Symplectic Geom.* **18** (2020), no. 3, 889–937. [arXiv:1706.07493](#).
17. P. Hochs, **Y. Song**, and S. Yu. A geometric formula for multiplicities of K -types of tempered representations. *Trans. Amer. Math. Soc.* **372** (2019), no. 12, 8553–8586. [arXiv:1805.02297](#).
18. Y. Loizides and **Y. Song**. Quantization of Hamiltonian loop group spaces. *Math. Ann.* **374** (2019), nos. 1–2, 681–722. [arXiv:1804.00110](#).
19. P. Hochs and **Y. Song**. An equivariant index for proper actions II: properties and applications. *J. Noncommut. Geom.* **12** (2018), no. 1, 157–193. [arXiv:1602.02836](#).

20. P. Hochs and **Y. Song**. Equivariant indices of Spin^c -Dirac operators for proper moment maps. *Duke Math. J.* **166** (2017), no. 6, 1125–1178. [arXiv:1503.00801](#).
21. P. Hochs and **Y. Song**. On the Vergne conjecture. *Arch. Math. (Basel)* **108** (2017), no. 1, 99–112. [arXiv:1509.02425](#).
22. **Y. Song**. A K-homological approach to the quantization commutes with reduction problem. *J. Geom. Phys.* **112** (2017), 29–44. [arXiv:1404.4840](#).
23. P. Hochs and **Y. Song**. An equivariant index for proper actions I. *J. Funct. Anal.* **272** (2017), no. 2, 661–704. [arXiv:1512.07575](#).
24. P. Hochs and **Y. Song**. An equivariant index for proper actions III: the invariant and discrete series indices. *Differential Geom. Appl.* **49** (2016), 1–22. [arXiv:1412.5348](#).
25. **Y. Song**. Dirac operators on quasi-Hamiltonian G-spaces. *J. Geom. Phys.* **106** (2016), 70–86. [arXiv:1503.03150](#).
26. N. Higson and **Y. Song**. K-theory and the quantization commutes with reduction problem. *Chin. Ann. Math. Ser. B* **35** (2014), no. 5, 703–732. [doi:10.1007/s11401-014-0856-6](#).

Preprints

1. A. Afgoustidis, P. Hochs, S. Nishikawa, and **Y. Song**. Well-tempered symmetric spaces. Preprint (2026). [arXiv:2609.32916](#).
2. P. Piazza, H. Posthuma, **Y. Song**, and X. Tang. Higher Lefschetz formulas on Γ -proper manifolds. Preprint (2025). [arXiv:2512.14318](#).
3. S. Shen, **Y. Song**, and X. Tang. Heat kernel, large-time behavior, and representation theory. Preprint (2025). [arXiv:2503.00554](#).
4. **Y. Song**. Lefschetz formula for locally symmetric spaces. Preprint (2025). [arXiv:2502.16100](#).

Selected Mathematical Community Activities

Mar. 2025	Gone Fishing 2025 , Washington University in St. Louis. Co-organizer; March 6–9.
Fall 2024	Seminar on Trace Formula , Washington University in St. Louis.
June 2024	Multivariable Operator Theory Conference , Washington University in St. Louis.
July 2023	Noncommutative Geometry, Index Theory and Representation Theory , Kyoto University, Japan.
June 2023	Noncommutative Geometry Festival 2023 , Washington University in St. Louis. Organizer; June 12–16.
Sept. 2022	Conference on Hypoelliptic Operators , Washington University in St. Louis.
May 2022	GPOTS 2022 , Washington University in St. Louis.
June 2021	Virtual GPOTS 2021 , Washington University in St. Louis.
Dec. 2019	Workshop on Symplectic Geometry and Noncommutative Geometry , Washington University in St. Louis.
Nov. 2019	Mini-Workshop on C^*-Algebras , Washington University in St. Louis.
June 2019	Workshop on Noncommutative Geometry and Symplectic Geometry , Sichuan University, China.
Apr. 2019	Workshop on Noncommutative Geometry and Hypoelliptic Operators , Pennsylvania State University.
Apr. 2019	Noncommutative Geometry Festival 2019 , Washington University in St. Louis.
2018	Graduate Seminar , Washington University in St. Louis.
2017–2021	Geometry and Topology Seminar , Washington University in St. Louis.

Selected Invited Talks

- Aug. 2025 **Analysis and Geometry on Manifolds Conference**, National University of Singapore, Singapore.
- Apr. 2025 **Noncommutative Geometry Seminar**, East China Normal University, Shanghai, China.
- Apr. 2025 **Noncommutative Geometry Seminar**, SIMS, Shanghai, China.
- Apr. 2025 **Lefschetz formula for locally symmetric spaces**, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing, China; April 2.
- Mar. 2025 **Representation Theory and Noncommutative Geometry Conference**, Institut Henri Poincaré, Paris, France.
- Jan. 2025 **Geometry and Topology Seminar**, Chinese Academy of Sciences, Beijing, China.
- Sept. 2024 **AMS Sectional Meeting**, University of Texas at San Antonio.
- Apr. 2024 **Global Noncommutative Geometry Seminar (RTNCG)**.
- Dec. 2023 **Workshop on Operator Algebras and Applications: Non-Commutative Geometry**, Fields Institute, Toronto, Canada. Plenary speaker.
- June 2023 **Noncommutative Geometry Festival 2023**, Washington University in St. Louis.
- Mar. 2023 **Workshop on Noncommutative Geometry and Representation Theory**, Athens, Greece.
- Dec. 2022 **Winter School and Conference on Noncommutative Geometry and Geometric Analysis**, Colombia.
- Aug. 2022 **K -Theory of Operator Algebras and Its Applications to Geometry and Topology**, San Juan, Puerto Rico.
- Aug. 2022 **Poisson 2022**, Madrid, Spain.
- July 2022 **Conference on K -Theory and Representation Theory**, Bath, United Kingdom.
- June 2022 **Dirac Operators in Topology, Geometry and Representation Theory**, Cortona, Italy.