

Zheyuan Wan (birthdate: 1993-11-24)

Research field: Mathematical Physics (applying algebraic topology to study theoretical physics)

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Google Scholar Citations: 940+

CONTACT INFORMATION

Current position: Assistant Research Fellow

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EDUCATION

- University of Science and Technology of China.
PhD in mathematics, 2019.
Thesis: Cobordism groups, cocycle formulas and their applications in classification of categories and mathematical physics
Thesis advisor: Yu Ye and Juven Wang.
- University of Science and Technology of China.
Bachelor in mathematics, 2014.

PAPERS

- Higher Anomalies, Higher Symmetries, and Cobordisms II: Applications to Quantum Gauge Theories, **Zheyuan Wan**, Juven Wang, Yunqin Zheng. *Annals of Mathematical Sciences and Applications*, Vol. 5, No. 2, 171-257 (2020). Preprint available at arXiv: 1912.13504.
- Higher Anomalies, Higher Symmetries, and Cobordisms III: QCD Matter Phases Anew, **Zheyuan Wan**, Juven Wang. *Nuclear Physics B*, 115016 (2020). Preprint available at arXiv: 1912.13514.
- Beyond Standard Models and Grand Unifications: Anomalies, Topological Terms, and Dynamical Constraints via Cobordisms, **Zheyuan Wan**, Juven Wang. *JHEP* 07 (2020) 062. Preprint available at arXiv: 1910.14668.
- Quantum 4d Yang-Mills Theory and Time-Reversal Symmetric 5d Higher-Gauge Topological Field Theory, **Zheyuan Wan**, Juven Wang, Yunqin Zheng. *Phys.Rev.D* 100 (2019) 8, 085012. Preprint available at arXiv: 1904.00994.
- New Higher Anomalies, SU(N) Yang-Mills Gauge Theory and $\mathbb{CP}^{N-1}$ Sigma Model, **Zheyuan Wan**, Juven Wang, Yunqin Zheng. *Annals Phys.* 414 (2020) 168074. Preprint available at arXiv: 1812.11968.
- Higher anomalies, higher symmetries, and cobordisms I: classification of higher-symmetry-protected topological states and their boundary fermionic/bosonic anomalies via a generalized cobordism theory, **Zheyuan Wan**, Juven Wang. *Ann.Math.Sci.Appl.* 4 (2019) 2, 107-311. Preprint available at arXiv: 1812.11967.
- Fermionic Finite-Group Gauge Theories and Interacting Symmetric/Crystalline Orders via Cobordisms, Meng Guo, Kantaro Ohmori, Pavel Putrov, **Zheyuan Wan**, Juven Wang. *Commun.Math.Phys.* (2020) 1-82. Preprint available at arXiv: 1812.11959.
- Adjoint QCD₄, Symmetry-Enriched TQFT and Higher Symmetry-Extension, **Zheyuan Wan**, Juven Wang. *Phys.Rev.D* 99 (2019) 6, 065013. Preprint available at arXiv: 1812.11955.

- Explicit cocycle formulas on finite abelian groups with applications to braided linear Gr-categories and Dijkgraaf-Witten invariants, Hua-Lin Huang, **Zheyang Wan**, Yu Ye. *Proceedings of the Royal Society of Edinburgh Section A: Mathematics* (2019). Preprint available at arXiv: 1703.03266.
- Tunneling Topological Vacua via Extended Operators: (Spin-)TQFT Spectra and Boundary Deconfinement in Various Dimensions, Juven Wang, Kantaro Ohmori, Pavel Putrov, Yunqin Zheng, **Zheyang Wan**, Meng Guo, Hai Lin, Peng Gao, Shing-Tung Yau. *Prog. Theor. Exp. Phys.* 053A01 (2018). Preprint available at arXiv: 1801.05416.
- Studying complex manifolds by using groups G_n^k and Γ_n^k , Vassily Olegovich Manturov, **Zheyang Wan**. *Journal of Knot Theory and its Ramifications Vol. 29, No. 13, 2043002* (2020). Preprint available at arXiv: 2007.02791.
- Classification of spherical fusion categories of Frobenius-Schur exponent 2, **Zheyang Wan**, Yilong Wang. *Algebra Colloquium 28 : 1* (2021) 39-50. Preprint available at arXiv: 1811.02004.
- On Prof. Yau's problem. **Zheyang Wan**. *ICCM Not.* 9 (2021), no. 1, 74–79.
- 3+1d Boundaries with Gravitational Anomaly of 4+1d Invertible Topological Order for Branch-Independent Bosonic Systems, **Zheyang Wan**, Juven Wang, Xiao-Gang Wen. *Phys. Rev. B* 106 (2022), 045127. Preprint available at arXiv: 2112.12148.
- Cobordism and Deformation Class of the Standard Model, Juven Wang, **Zheyang Wan**, Yi-Zhuang You. *Phys. Rev. D* 106 (2022), L041701. Preprint available at arXiv: 2112.14765.
- Proton Stability: From the Standard Model to Ultra Unification, Juven Wang, **Zheyang Wan**, Yi-Zhuang You. *Phys. Rev. D* 106 (2022), 025016. Preprint available at arXiv: 2204.08393.
- The photography method: solving pentagon equation, Vassily Olegovich Manturov, **Zheyang Wan**. *Journal of Knot Theory and Its Ramifications Vol. 32, No. 11, 2350074* (2023). Preprint available at arXiv: 2305.11945.
- Topological complexity of finding flex points on cubic plane curves, Weiyan Chen, **Zheyang Wan**. *Proceedings of the American Mathematical Society, 2025, 153(5): 2255-2267*. Preprint available at arXiv: 2306.17303.
- A matrix solution to any polygon equation, **Zheyang Wan**. *Advances in Theoretical and Mathematical Physics, Vol. 29, Issue 7* (2025), pp. 1827-1855. Preprint available at arXiv: 2407.07131.
- C-R-T Fractionalization in the First Quantized Hamiltonian Theory, Yang-Yang Li, **Zheyang Wan**, Juven Wang, Shing-Tung Yau, Yi-Zhuang You. *Phys. Rev. B* 113 (2026), 195102. Preprint available at arXiv: 2412.11958.

PREPRINTS

- Anomalous (3+1)d Fermionic Topological Quantum Field Theories via Symmetry Extension, **Zheyang Wan**, Juven Wang. Preprint available at arXiv: 2512.25038.
- Anomaly of 4d Weyl fermion with discrete symmetries, **Zheyang Wan**. Preprint available at arXiv: 2506.19710.
- Topological Responses of the Standard Model Gauge Group, **Zheyang Wan**, Juven Wang, Yi-Zhuang You. Preprint available at arXiv: 2412.21196.
- C-R-T Fractionalization, Fermions, and Mod 8 Periodicity, **Zheyang Wan**, Juven Wang, Shing-Tung Yau, Yi-Zhuang You. *Accepted by Advances in Theoretical and Mathematical Physics*. Preprint available at arXiv: 2312.17126.

- Extension of elementary p -groups and its application in classification of groups of prime exponent, **Zheyang Wan**, Yu Ye, Chi Zhang. Preprint available at arXiv: 2003.12802.

TEACHING

- Lecturer at BIMS. Cobordism and Anomalies in spring 2026.
- Lecturer at BIMS. Spin Geometry in fall 2025.
- Lecturer at BIMS. Generalized Symmetry and Topology in spring 2025.
- Lecturer at BIMS. Topological Modular Forms in fall 2024.
- Lecturer at BIMS. Selective Topics in Topology and Physics in spring 2024.
- Lecturer at BIMS. Cobordism, index theorem, and generalized symmetry in fall 2023.
- Lecturer at BIMS. Fibre bundles, characteristic classes, and index theorems in spring 2023.
- Lecturer at BIMS. Introduction to bordism in fall 2022.
- Teaching assistant at Tsinghua University. Algebraic Topology 2 in fall 2021.
- Teaching assistant at Tsinghua University. Geometry and Symmetry in fall 2020.
- Teaching assistant at Tsinghua University. Microscopic mathematics in spring 2020.
- Teaching assistant at University of Science and Technology of China. Topology in spring 2017. Awarded “excellent teaching assistant”.
- Teaching assistant at University of Science and Technology of China. Linear algebra (B2) in fall 2016. Awarded “excellent teaching assistant”.
- Teaching assistant at University of Science and Technology of China. Modern algebra in spring 2016.
- Teaching assistant at University of Science and Technology of China. Linear algebra (A2) in fall 2015.