Zihan Yan

PhD Student in Theoretical Physics at University of Cambridge

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Education

2021 – Present	**DAMTP & Trinity College, University of Cambridge** *PhD in Applied Maths and Theoretical Physics* - Doctoral Supervisor: Aron Wall Research Aspects: Black Hole Thermodynamics, Holography, String Theory
2024	**Trinity College, University of Cambridge** *Master of Arts* - Honorary Master's Degree
2020 – 2021	**Trinity College, University of Cambridge** *MMath in Mathematics* - Honour Pass with Distinction (86%)
2017 – 2020	**Trinity College, University of Cambridge** *BA in Natural Sciences (Physics)* - First Class

Academic Awards and Qualifications

2021 – Present	**Trinity College Internal Graduate Studentship** Full scholarship (£40,000 per year for 3.5 years) for PhD studies.
2019 – 2021	**Trinity College Senior Scholar** Elected based on outstanding performance in Tripos exams.
2019 & 2021	**Trinity College Examination Prizes** Awarded in recognition of excellent exam performance
2019	**Trinity College Summer Studentship** Funding support for a summer research project in fluid dynamics on the topic of basal sliding of ice sheets, leading to publication [4].

Publications and Preprints

[1] **Z. Yan**, "Gravitational focusing and horizon entropy for higher-spin fields," Dec. 2024. arXiv: 2412.07107 [gr-qc].

[2] A. Ahmadain, V. Shyam, and **Z. Yan**, "A Comment on Deriving the Gibbons-Hawking-York Term From the String Worldsheet," Jul. 2024. arXiv: 2407.18866 [hep-th].

[3] M. R. Visser and **Z. Yan**, "Properties of dynamical black hole entropy," *JHEP*, vol. 10, p. 029, 2024. arXiv: 2403.07140 [hep-th].

[4] **Z. Yan** and K. N. Kowal, "A controllable sliding law for thin-film flows over slippery fluid-saturated substrates: Theory and experiments," *Journal of Fluid Mechanics*, vol. 982, A14, 2024.

[5] H. Wu, **Z. Yan**, and S. Ying, "Revisiting Schwarzschild black hole singularity through string theory," Feb. 2024. arXiv: 2402.05870 [hep-th].

[6] A. C. Wall and **Z. Yan**, "Linearized second law for higher curvature gravity and nonminimally coupled vector fields," *Phys. Rev. D*, vol. 110, no. 8, p. 084 005, 2024. arXiv: 2402.05411 [gr-qc].

Note: Except for [4] that belongs to a different subject, the author names are listed in alphabetical order rather than contribution order, by conventions of high energy physics. I am the leading contributor of the collaborated articles [3, 4, 6].

Forthcoming Publications

1. M.R. Visser and **Z. Yan**, "*Dynamical Entropy of Charged Black Holes*", in preparation
2. S. Hollands, M.R. Visser, R.M. Wald, **Z. Yan** and V.G. Zhang, "*Generalized Apparent Horizon*", in preparation.
3. Z. Liu, A.C. Wall and **Z. Yan**, "*Entropy Increase Generates Horizon Null Translation*", in preparation.
4. A.C. Wall and **Z. Yan**, "*Supercovariant Phase Space, Second Law, and Positive Energy Theorem*", in preparation.

Teaching

2021 – Present | **Trinity College, University of Cambridge**
College Undergraduate Supervisor
Part II Statistical Physics (Lent 2023)
Part II General Relativity (Lent 2022)
Part IA Dynamics and Relativity (Lent 2022)
Part II Principles of Quantum Mechanics (Michaelmas 2021, Michaelmas 2022)

2021 – Present | **University of Cambridge**
Example Class Instructor
Part III Gauge/Gravity Duality (Easter 2022)

2021 – Present | **Five Sigma Education**
A-Level Tutor
A-Level tutoring in Mathematics and Physics and mock interviews for Oxbridge applicants.

Invited Talks

13 May 2024 | **Sichuan University, China**
Linearised Second Law for Higher Curvature Gravity and Non-Minimally Coupled Vector Fields

3 May 2024 | **GR Seminar, DAMTP, University of Cambridge**
Black Hole Entropy for Higher Curvature Gravity with Higher Spin Fields

18 April 2024 | **Swansea Theory Seminars, Swansea University**
Linearised Second Law for Higher Curvature Gravity and Non-Minimally Coupled Vector Fields

17 Apr 2024 | **BritGrav24, Queen Mary University London**
Linearised Second Law for Higher Curvature Gravity and Non-Minimally Coupled Vector Fields

2 Apr 2024 | **General Relativity Seminar, CMSA, Harvard University**
Linearised Second Law for Higher Curvature Gravity and Non-Minimally Coupled Vector Fields

10 Feb 2023 | **GR Seminar, DAMTP, University of Cambridge**
Linearised Second Law for Higher Curvature Gravity and Non-Minimally Coupled Vector Fields

Conferences and Visits

18–20 Mar 2024	**PCTS, Princeton University**
	PCTS Random Physics Workshop
Jan–Mar 2024	**Kavli Institute for Theoretical Physics, UCSB**
	Affiliate Visitor - What is String Theory? Weaving Perspectives Together
12–13 Feb 2024	**Kavli Institute for Theoretical Physics, UCSB**
	Conference - Jim Hartle's Legacy
17–21 Apr 2023	**University of Cambridge**
	Conference - Quantum de Sitter Universe
26–29 Sep 2022	**University of Cambridge**
	Cam/LMU workshop on Black Hole Thermodynamics and Semiclassical Gravity