
Ayngaran Thavanesan

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DAMTP, Wilberforce Road, Cambridge, Cambridgeshire, CB3 0WA, UK (*Work*)

Jesus College, Cambridge, Cambridgeshire, CB5 8BL, UK (*Home*)

EDUCATION

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|---|----------------|
| DAMTP - University of Cambridge | 2020 - Present |
| Jesus College, University of Cambridge | 2021 - Present |
| PhD candidate in Applied Mathematics & Theoretical Physics | |
| Institute of Physics (IOP) Bell Burnell Graduate Scholarship | |
| Cavendish Scholarship | |
| Jesus College David & Susan Hibbitt Scholarship (honorary) | |
| Thesis: ‘The wavefunction of the universe at the early and late conformal boundaries (TBC)’ | |
| <i>Thesis advisors:</i> Prof. Aron Wall & Prof. David Stefanyshyn | |
| School of Physics and Astronomy, Queen Mary University of London | 2018 - 2019 |
| MSc in Astrophysics & Theoretical Physics | |
| MSc: Distinction (Rank: 1/25, 82%) | |
| Master’s Thesis: ‘Modelling Cosmological Perturbations in Metric Theories of Gravity’ (<i>Dr. Tim Clifton</i>) | |
| The Drapers’ Company Prize | |
| Emmanuel College, University of Cambridge | 2015 - 2018 |
| BA (Hons) in Natural Sciences | |
| Rowley Mainhood Prize | |
| Senior Exhibitioner Election | |
| Whitgift School, Croydon | 2007 - 2014 |
| Whitgift Academic Scholarship & Bursary | |

SELECTED AWARDS AND PRIZES

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| Kavli Institute for Theoretical Physics Graduate Fellowship | Oct. 2024 |
| 6-month fellowship at KITP; mentored by Prof. Clifford Johnson & Dr. Mykhaylo Usatyuk. | USA |
| Smith-Knight & Rayleigh-Knight Prize | Mar. 2023 |
| Awarded for my outstanding and striking research results by Cambridge Mathematics Department. | Cambridge |
| Student-Led Teaching Awards (SLTAs) | Mar. 2022 |
| Shortlisted from amongst over 400 nominations for my teaching across Cambridge University. | Cambridge |
| Jesus College David & Susan Hibbitt Scholarship (3 years) [declined] | Jun. 2021 |
| Awarded £42000 for PhD position at University of Cambridge by Jesus College, Cambridge. | Cambridge |
| Institute of Physics (IOP) Bell Burnell Graduate Scholarship (3.5 years) | Apr. 2021 |
| Awarded ~£40000 for PhD position at University of Cambridge by the UK’s Institute of Physics. | Cambridge |
| Cavendish Scholarship (3.5 years) | Mar. 2021 |
| Awarded ~£90000 for PhD position at University of Cambridge by the Cavendish Trust. | Cambridge |
| de Sitter Fellowship (4 years) [declined] | Feb. 2021 |
| Joint PhD position at Instituut-Lorentz for Theoretical Physics and Leiden Observatory. | Netherlands |
| Delta Institute for Theoretical Physics PhD Visitor Programme | Awarded 2021 (postponed COVID) |
| 6-month PhD visitor programme with Prof. Subodh Patil & Prof. Jan Pieter van der Schaar. | Netherlands |
| Visiting Scholar at Institute of Astronomy, Cambridge | Sep. 2020 |
| Visiting scholar’s grant to work within the University of Cambridge’s cosmology departments. | Cambridge, UK |

PUBLICATIONS

* = Author list alphabetised

An up-to-date list of my publications and additional information can be found on [arXiv](#) and on my [website](#).

1. **Thavanesan, A.**, Werth, D., Handley, W. "Analytical approximations for curved primordial power spectra", *published in Physical Review D* ([PhysRevD.103.023519](#)).
2. *Cabass, G., Stefanyshyn D., Supel, J., **Thavanesan, A.** "On Graviton non-Gaussianities in the Effective Field Theory of Inflation", *published in JHEP* ([JHEP10\(2022\)154](#)).
3. *Goodhew, H., **Thavanesan, A.**, Wall, A.C. "The Cosmological CPT Theorem", ([arXiv:2408.17406](#)), *submitted to Physical Review X*.
4. *Goodhew, H., **Thavanesan, A.**, Wall, A.C. "The CPT Theorem for Cosmology", *awaiting submission to Physical Review Letters*.
5. **Thavanesan, A.** "No-go Theorem for Cosmological Parity Violation", *awaiting submission*.
6. **Thavanesan, A.**, Creque-Sarbinowski, C., Alexander, S. "Parity Violation in Cosmology: A systematic study of yes-go examples", *in preparation*.
7. **Thavanesan, A.** "Going through phases of UV and IR divergences in Cosmology", *in preparation*.
8. *Araujo-Regado, G., **Thavanesan, A.**, Wall, A.C. "Holographic Cosmology at Finite Time", *in preparation*.
9. *Shyam, V., Silverstein, E., Soni, R., **Thavanesan, A.**, Torroba, G. "dS/CFT from $T\bar{T} + \Lambda_d$ ", *in preparation*.

ACADEMIC VISITS

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| Kavli Institute for Theoretical Physics University of California, Santa Barbara <i>KITP Graduate fellow; mentored by Prof. Clifford Johnson and Dr. Mykhaylo Usatyuk.</i> | Jan. - Jun. 2025 USA |
| School of Natural Sciences Institute for Advanced Study, Princeton <i>Visiting scholar with Prof. Nima Arkani-Hamed</i> | Nov. - Dec. 2024 USA |
| Brown Theoretical Physics Center Department of Physics, Brown University <i>Visiting scholar with Prof. Stephon Alexander</i> | Nov. 2024 USA |
| Department of Department of Theoretical Physics, CERN Department of Department of Theoretical Physics, CERN <i>Visiting researcher with Prof. Shota Komatsu</i> | Oct. 2024 Switzerland |
| Center for Computational Astrophysics Flatiron Institute - Simons Foundation <i>Visiting scholar with Dr. Cyril Creque-Sarbinowski</i> | June-July 2024 USA |
| Stanford Institute for Theoretical Physics Varian Physics Lab Stanford <i>Visiting scholar with Prof. Eva Silverstein & Prof. Leonard Susskind</i> | Feb. - Mar. 2024 USA |
| Delta Institute for Theoretical Physics Amsterdam & Leiden <i>Visiting scholar with Prof. Daniel Baumann & Prof. Jan Pieter van der Schaar</i> | Postponed COVID Netherlands |
| University of Cambridge Kavli Institute for Cosmology, Cambridge <i>Visiting scholar's grant to work within the University of Cambridge's cosmology departments</i> | Oct. 2020 - Sep.2021 Cambridge, UK |

TALKS - ACADEMIC & PUBLIC

[†] = *Invited talk*

- [†]Nov. 2024 Parity Violation from Home
No-go Theorem for Cosmological Parity Violation
- [†]Nov. 2024 Department of Applied Mathematics & Theoretical Physics, Cambridge (GR Seminar)
Insights into Cosmology and Holography from the Wavefunction of the Universe
- [†]Oct. 2024 Holography @DITP Meeting
To dS/CFT and back through Cauchy Slice Holography
- [†]Oct. 2024 Nottingham Particle Cosmology Seminar (Centre for Astronomy and Particle Theory)
To dS/CFT and back through Cauchy Slice Holography
- [†]Oct. 2024 Swansea Theory Seminar (Particle Theory and Cosmology Group)
The Cosmological CPT Theorem
- [†]Oct. 2024 KCL Cosmology Meeting
Insights into Cosmology and Holography from the Wavefunction of the Universe
- [†]Sep. 2024 University of Jaffna
The Quantum World and the Early Universe
- [†]Sep. 2024 McGill High Energy Theory Group Meeting
The Cosmological CPT Theorem
- [†]Jul. 2024 Center for Computational Astrophysics - Simons Foundation - Cosmology Meeting
The Cosmological CPT Theorem
- Jun. 2024 Cosmology from Home 2024
The Cosmological CPT Theorem
- Jun. 2024 Amplitudes 2024
 dS/CFT from $T\overline{T} + \Lambda_d$ (5 mins)
- [†]May. 2024 Snapshots for Research 2024
The Quantum World and the Early Universe
- [†]Apr. 2024 Nottingham Theory Seminar (Centre for Astronomy and Particle Theory)
The Cosmological CPT Theorem
- [†]Mar. 2024 IAS Quantum Aspects of Black Holes Meeting
The Cosmological CPT Theorem
- [†]Jan. 2024 Berkeley String Seminar
The Cosmological CPT Theorem
- [†]Jan. 2024 MURI Meeting
The Cosmological CPT Theorem
- [†]Nov. 2023 KITP High Energy and Gravity Seminar
Holographic Cosmology at finite cutoff
- April. 2023 Quantum de Sitter Universe
The Cosmological CPT Theorem (5 mins)
- Jan. 2023 UK-QFT XI
On Graviton non-Gaussianities in the Effective Field Theory of Inflation (25 mins)
- Dec. 2022 YTF 22
On Graviton non-Gaussianities in the Effective Field Theory of Inflation (30 mins)
- [†]Nov. 2022 Manchester Cosmology Seminar
On Graviton non-Gaussianities in the Effective Field Theory of Inflation
- Jul. 2022 Cosmology from Home 2022
On Graviton non-Gaussianities in the Effective Field Theory of Inflation (18+10 mins)
- Jun. 2022 STAG School on Black Holes, Cosmology and Holography
On Graviton non-Gaussianities in the Effective Field Theory of Inflation (4+1 mins)
- [†]May. 2022 UK Cosmo 2022
On Graviton non-Gaussianities in the Effective Field Theory of Inflation (25+5 mins)

TALKS - ACADEMIC & PUBLIC (cont.)

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| †May. 2022 | Strings, Cosmology and Gravity Student Conference 2022 <i>On Graviton non-Gaussianities in the Effective Field Theory of Inflation</i> (25+5 mins) |
| Mar. 2022 | Jesus College, University of Cambridge (MCR Graduate Conference) <i>On Graviton non-Gaussianities in the Effective Field Theory of Inflation</i> (10 mins) |
| †Mar. 2022 | iTelescope.net <i>The Quantum World and the Early Universe</i> |
| †Nov. 2021 | Connecting the Young World Fair <i>CYWFAIR 2021: Ayngaran Thavanesan</i> |
| †Nov. 2021 | Whitgift School <i>The boundaries of the universe: A journey from Whitgift to the beginning of the universe</i> |
| †Jul. 2021 | Cosmology from Home (Cosmology from Home 2021) <i>Various talks</i> |
| Mar.-Apr. 2021 | Cambridge Science Festival (Black Hole Wars) <i>Black Hole Wars: Episodes I and IV</i> |
| †Mar. 2021 | Cambridge University Astronomy (Public Open Evening) <i>The topsy-turvy quantum world</i> |
| †Mar. 2021 | Department of Applied Mathematics & Theoretical Physics, Cambridge (Cosmo. Journal Club) <i>Analytically approximating the primordial power spectrum in the kinetic dominance paradigm</i> |
| Jan. 2021 | Queen Mary University of London (50th BUSSTEPP) <i>Initial conditions for the early universe</i> (4 mins) |
| Jan. 2021 | Cambridge University & Ludwig-Maximilians-University Munich (Cosmology Workshop 2021) <i>Initial conditions for the early universe</i> (10 mins) |
| †Dec. 2020 | Cambridge University Astronomy (Astronomy on Tap) <i>To Inflation and Beyond!</i> |
| Dec. 2020 | Centre for Particle Theory, Durham (YTF 20 Conference) <i>Analytical Approximations for Curved Primordial Power Spectra</i> |
| †Jul. 2020 | Department of Applied Mathematics & Theoretical Physics, Cambridge (Cosmo. Journal Club) <i>Analytical Approximations for Curved Primordial Power Spectra</i> |

MENTORING & TEACHING

Advisor/Mentor Aug. 2024 - Present
Mentoring Flatiron Intern USA & Online

- Supervising undergraduate ([Ezra Msolla](#)) from underrepresented background with interests in cosmology.
- Ezra's research project studies mechanisms to circumvent the no-go theorem for parity violation in cosmology.

Lumiere Education Mar. 2023 - Present
Research Project Supervisor (unpaid volunteering and paid work) Online

- Supervised 9 students' individual research projects on various topics, including cosmology and Hawking radiation.

UniArk Mar. 2021 - Present
Co-founder and Mentor UK & Online

- Co-founded the charity UniArk with the aim to reduce the educational attainment gap of disadvantaged students.
- Mentored students for Oxbridge and other university admissions for undergraduate, masters and PhD.

University of Cambridge (Natural Sciences & Mathematics) Oct. 2020 - Present
Examples Class Lecturer/Demonstrator & Supervisor (small group tutor) Cambridge, UK

- Lectured examples class for Part III Field Theory in Cosmology and Part III Gauge/Gravity Duality.
- Supervised (small group tutoring) for Part II General Relativity, Part II Principles of Quantum Mechanics, Part II Galactic Dynamics, Part IB Oscillations, Waves & Optics and Part IB Experimental Methods.

MENTORING & TEACHING (cont.)

Queen Mary University of London
Outreach Worker with Prof. Richard Nelson

Sep. 2018 - Jan. 2019
London, UK

- Guided high school students through the physics and programming exercises of **Planet Hunting with Python**.

The Profs, Leading Education, VIPTutors, Test Teach, Surrey Tutors
Tutor

Jul. 2010 - Present
UK & Online

- Provided tutoring for students from primary school up to university Masters level.
- Provided interview preparation for admissions at Oxbridge and other high-ranking universities.

PROFESSIONAL ACTIVITIES

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|---------------------------------|---|
| Organiser | <i>Co-organised Quantum de Sitter Universe 1-week workshop held in April 2023.</i> <i>Co-organised DAMTP High Energy Physics & General Relativity Journal Club.</i> |
| Referee | <i>Wrote references for multiple students for PhD applications all of whom were successful in securing PhD positions within DAMTP, Cambridge and externally.</i> |
| Equality & Diversity | King's Birthday Honours 2024 OBE nomination for Prof. Anne-Christine Davis <i>Wrote successful King's Birthday 2024 honours nomination. for Prof. Anne-Christine Davis.</i> Snapshots of Research 2024 speaker <i>Event aimed at undergraduate and Masters students to promote diversity in mathematics.</i> Promoting equality in the Physics & Astronomy community <i>Co-wrote an open letter to our physics and astronomy colleagues in support of the Asian+ community in light of horrific acts against the community in recent times.</i> Promoting equality at the University of Cambridge <i>Co-wrote successful application to fund BAME postgraduate research at Cambridge, by using my background to determine methods to tackle inequality and improve minorities' experiences.</i> Co-organiser of Cambridge DAMTP Racism Discussion Group <i>Discussion group which meets every few weeks to discuss how to tackle different forms of racism, including but not limited to cultural, economical and institutional racism.</i> |
| Outreach | Organiser and speaker at 2021 Cambridge Science Festival <i>Organised a series of five talks on the recent progress of the black hole information paradox.</i> |
| Sports | University 1st team (Blues) badminton captain, College football captain |

MISCELLANEOUS

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| Computing Languages OS | Python, C, Mathematica, Java, HTML Linux, Windows, Mac OS |
| Programmes & Tools | L ^A T _E X, MATLAB, CLASS, CAMB, UltraNest , healpy, Gnuplot, anesthetic |
| Languages | English (Native), Tamil (Mother tongue), German (Professional), French (Basic) |

REFEREES

Prof. A C Wall
(PhD Supervisor)

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