Ayngaran Thavanesan

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DAMTP, Wilberforce Road, Cambridge, Cambridgeshire, CB3 0WA, UK *(Work)*
Jesus College, Cambridge, Cambridgeshire, CB5 8BL, UK *(Home)*

EDUCATION

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)'
Thesis advisors: Prof. Aron Wall & Prof. David Stefanyszyn

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' (*Dr. Tim Clifton*)
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

Kavli Institute for Theoretical Physics Graduate Fellowship Jan. - Jun. 2025
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 Oct. 2020 - Sep. 2021
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., Stefanyszyn 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 $T\overline{T}+\Lambda_d$", *in preparation.*

ACADEMIC VISITS

Kavli Institute for Theoretical Physics
University of California, Santa Barbara — Jan. - Jun. 2025
KITP Graduate fellow; mentored by Prof. Clifford Johnson and Dr. Mykhaylo Usatyuk. — *USA*

School of Natural Sciences
Institute for Advanced Study, Princeton — Nov. - Dec. 2024
Visiting scholar with Prof. Nima Arkani-Hamed — *USA*

Brown Theoretical Physics Center
Department of Physics, Brown University — Nov. 2024
Visiting scholar with Prof. Stephon Alexander — *USA*

Department of Department of Theoretical Physics, CERN
Department of Department of Theoretical Physics, CERN — Oct. 2024
Visiting researcher with Prof. Shota Komatsu — *Switzerland*

Center for Computational Astrophysics
Flatiron Institute - Simons Foundation — June-July 2024
Visiting scholar with Dr. Cyril Creque-Sarbinowski — *USA*

Stanford Institute for Theoretical Physics
Varian Physics Lab Stanford — Feb. - Mar. 2024
Visiting scholar with Prof. Eva Silverstein & Prof. Leonard Susskind — *USA*

Delta Institute for Theoretical Physics
Amsterdam & Leiden — Postponed COVID
Visiting scholar with Prof. Daniel Baumann & Prof. Jan Pieter van der Schaar — *Netherlands*

University of Cambridge
Kavli Institute for Cosmology, Cambridge — Oct. 2020 - Sep.2021
Visiting scholar's grant to work within the University of Cambridge's cosmology departments — *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	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)
†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)
†May. 2022	Strings, Cosmology and Gravity Student Conference 2022 *On Graviton non-Gaussianities in the Effective Field Theory of Inflation* (25+5 mins)
Mar. 2022	Jesus College, University of Cambridge (MCR Graduate Conference) *On Graviton non-Gaussianities in the Effective Field Theory of Inflation* (10 mins)

TALKS - ACADEMIC & PUBLIC (cont.)

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

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.

Queen Mary University of London — Sep. 2018 - Jan. 2019
Outreach Worker with Prof. Richard Nelson — *London, UK*

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

MENTORING & TEACHING (cont.)

The Profs, Leading Education, VIPTutors, Test Teach, Surrey Tutors Jul. 2010 - Present
Tutor *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

Organiser	*Co-organised Quantum de Sitter Universe 1-week workshop held in April 2023.* *Co-organised DAMTP High Energy Physics & General Relativity Journal Club.*
Referee	*Wrote references for multiple students for PhD applications all of whom were successful in securing PhD positions within DAMTP, Cambridge and externally.*
Equality & Diversity	**King's Birthday Honours 2024 OBE nomination for Prof. Anne-Christine Davis** *Wrote successful King's Birthday 2024 honours nomination. for Prof. Anne-Christine Davis.* **Snapshots of Research 2024 speaker** *Event* aimed at undergraduate and Masters students to promote diversity in mathematics. **Promoting equality in the Physics & Astronomy community** *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.* **Promoting equality at the University of Cambridge** *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.* **Co-organiser of Cambridge DAMTP Racism Discussion Group** *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.*
Outreach	**Organiser and speaker at 2021 Cambridge Science Festival** *Organised a series of five talks on the recent progress of the black hole information paradox.*
Sports	**University 1st team (Blues) badminton captain, College football captain**

MISCELLANEOUS

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

REFEREES

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