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# Ayngaran Thavanesan, Ph.D.

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## ACADEMIC POSITIONS

<b>Laboratory for Theoretical Fundamental Physics - EPFL, Switzerland</b> Postdoctoral Research Scientist	Aug. 2025 - Present
<i>Mentor:</i> Prof. Victor Gorbenko	
<b>Department for Theoretical Physics - CERN, Switzerland</b> Scientific Collaborator	Aug. 2025 - Present
<i>Mentors:</i> Prof. Shota Komatsu and Prof. Timothy Cohen	
<b>DAMTP - University of Cambridge, UK</b> Postdoctoral Research Scientist	Jul. 2025 - Aug. 2025
<i>Mentor:</i> Prof. Aron C. Wall	

## EDUCATION

<b>DAMTP - University of Cambridge, UK</b>	2020 - 2025
<b>Jesus College, University of Cambridge</b>	2021 - 2025
PhD candidate in Applied Mathematics & Theoretical Physics	
<b>Institute of Physics (IOP) Bell Burnell Graduate Scholarship</b>	
Cavendish Scholarship	
Jesus College David & Susan Hibbitt Scholarship (honorary)	
<b>Thesis:</b> ‘The Phase of the Cosmological Wavefunction’	
<i>Thesis advisor:</i> Prof. Aron C. Wall	
<b>School of Physics and Astronomy, Queen Mary University of London, UK</b>	2018 - 2019
MSc in Astrophysics & Theoretical Physics	
<b>MSc:</b> Distinction (Rank: 1/25, 82%)	
<b>Master’s Thesis:</b> ‘Modelling Cosmological Perturbations in Metric Theories of Gravity’ ( <i>Dr. Timothy Clifton</i> )	
The Drapers’ Company Prize	
<b>Emmanuel College, University of Cambridge, UK</b>	2015 - 2018
BA (Hons) in Natural Sciences	
Rowley Mainhood Prize	
Senior Exhibitioner Election	
<b>Whitgift School, Croydon, UK</b>	2007 - 2014
Whitgift Academic Scholarship & Bursary	

## SELECTED AWARDS AND PRIZES

<b>Kavli Institute for Theoretical Physics Graduate Fellowship</b>	Oct. 2024
6-month fellowship at KITP; mentored by Prof. Clifford Johnson & Dr. Mykhaylo Usatyuk.	USA
<b>Smith-Knight &amp; Rayleigh-Knight Prize</b>	Mar. 2023
Awarded for my outstanding and striking research results by Cambridge Mathematics Department.	Cambridge
<b>Student-Led Teaching Awards (SLTAs)</b>	Mar. 2022
Shortlisted from amongst over 400 nominations for my teaching across Cambridge University.	Cambridge
<b>Jesus College David &amp; Susan Hibbitt Scholarship (3 years) [declined]</b>	Jun. 2021
Awarded £42000 for PhD position at University of Cambridge by Jesus College, Cambridge.	Cambridge

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## SELECTED AWARDS AND PRIZES (cont.)

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<b>Institute of Physics (IOP) Bell Burnell Graduate Scholarship (3.5 years)</b>	Apr. 2021
<i>Awarded ~£40000 for PhD position at University of Cambridge by the UK's Institute of Physics.</i>	<i>Cambridge</i>
<b>Cavendish Scholarship (3.5 years)</b>	Mar. 2021
<i>Awarded ~£90000 for PhD position at University of Cambridge by the Cavendish Trust.</i>	<i>Cambridge</i>
<b>de Sitter Fellowship (4 years) [declined]</b>	Feb. 2021
<i>Joint PhD position at Instituut-Lorentz for Theoretical Physics and Leiden Observatory.</i>	<i>Netherlands</i>
<b>Delta Institute for Theoretical Physics PhD Visitor Programme</b>	Awarded 2021 (postponed COVID)
<i>6-month PhD visitor programme with Prof. Subodh Patil &amp; Prof. Jan Pieter van der Schaar.</i>	<i>Netherlands</i>
<b>Visiting Scholar at Institute of Astronomy, Cambridge</b>	Sep. 2020
<i>Visiting scholar's grant to work within the University of Cambridge's cosmology departments.</i>	<i>Cambridge, UK</i>

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## PUBLICATIONS

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\* = 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](#)), accepted for publication in *SciPost*.
4. **Thavanesan, A.** "No-go Theorem for Cosmological Parity Violation", ([arXiv:2501.06383](#)), accepted for publication in *Journal of Cosmology and Astroparticle Physics*.
5. \***Thavanesan, A.** and Wall, A.C. "Kosmic Field Theories: Towards Holographic Duals for Unitary String Cosmologies", ([arXiv:2510.21701](#)), accepted for publication in *JHEP*.
6. \*Araujo-Regado, G., **Thavanesan, A.**, Wall, A.C. "Holographic Cosmology at Finite Time", ([arXiv:2511.04511](#)), accepted for publication in *JHEP*.
7. \*Msolla, E. and **Thavanesan, A.**, "Analytical approximations for curved primordial tensor spectra", ([arXiv:2511.10644](#)), accepted for publication in *Physical Review D*.
8. \*Shyam, V., Silverstein, E., Soni, R. M, **Thavanesan, A.**, Torroba, G. "dS/CFT from  $T\bar{T} + \Lambda_d$ ", *in preparation*.
9. **Thavanesan, A.** "A Gentle Introduction to Cauchy Slice Holography", *in preparation*.
10. **Thavanesan, A.** "Going through Phases in Cosmology", *in preparation*.

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## ACADEMIC VISITS

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<b>School of Natural Sciences</b>	
<b>Institute for Advanced Study, Princeton</b>	TBC
<i>Visiting scholar with Prof. Nima Arkani-Hamed</i>	<i>USA</i>
<b>Brown Theoretical Physics Center</b>	
<b>Department of Physics, Brown University</b>	TBC
<i>Visiting scholar with Prof. Stephon Alexander</i>	<i>USA</i>
<b>Department of Theoretical Physics, CERN</b>	
<b>Department of Theoretical Physics, CERN</b>	Aug. 2025 - Present
<i>Scientific Collaborator with Prof. Shota Komatsu and Prof. Timothy Cohen</i>	<i>Switzerland</i>

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## ACADEMIC VISITS (cont.)

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<b>Perimeter Institute for Theoretical Physics</b>		
<b>Perimeter Institute for Theoretical Physics</b>		Aug. 2025
<i>Visiting researcher with Prof. Robert C. Myers and Dr. Joshua Kirklin</i>		Canada
<b>Kavli Institute for Theoretical Physics</b>		
<b>University of California, Santa Barbara</b>		Jan. - Jun. 2025
<i>KITP Graduate fellow; mentored by Prof. Clifford Johnson and Dr. Mykhaylo Usat�uk</i>		USA
<b>Center for Computational Astrophysics</b>		
<b>Flatiron Institute - Simons Foundation</b>		Jun. - Jul. 2024
<i>Visiting scholar with Dr. Cyril Creque-Sarbinowski</i>		USA
<b>Stanford Institute for Theoretical Physics</b>		
<b>Varian Physics Lab Stanford</b>		Feb. - Mar. 2024
<i>Visiting scholar with Prof. Eva Silverstein &amp; Prof. Leonard Susskind</i>		USA
<b>Delta Institute for Theoretical Physics</b>		
<b>Amsterdam &amp; Leiden</b>		Postponed COVID
<i>Visiting scholar with Prof. Daniel Baumann &amp; Prof. Jan Pieter van der Schaar</i>		Netherlands
<b>University of Cambridge</b>		
<b>Kavli Institute for Cosmology, Cambridge</b>		Oct. 2020 - Sep. 2021
<i>Visiting scholar's grant to work within the University of Cambridge's cosmology departments</i>		Cambridge, UK

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## TALKS - ACADEMIC & PUBLIC

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† = Invited talk	
†May 2026	Holographic Universe 2026 <i>Towards Holographic Duals for Cosmology</i>
†Mar. 2026	CERN (TH String Theory Seminar) <i>Towards Holographic Duals for Cosmology</i>
†Feb. 2026	Early Universe from Home 2026) <i>Towards Holographic Duals for Cosmology</i>
†Dec. 2025	Quantum Cosmology Seminar Series (online) <i>Kosmic Field Theories: Towards Holographic Duals for Cosmology</i>
†Nov. 2025	Durham Amplitudes and Correlators Journal Club <i>Holographic Cosmology through the Cosmological CPT Theorem</i>
†Nov. 2025	STAG Research Centre, Southampton (String Theory Seminar) <i>Kosmic Field Theories: Holographic Duals to Strings on Cosmological Backgrounds</i>
†Nov. 2025	Department of Applied Mathematics & Theoretical Physics, Cambridge (QF&S Seminar) <i>Kosmic Field Theories: Holographic Duals to Strings on Cosmological Backgrounds</i>
†Sep. 2025	Majorana-Raychaudhuri Seminar Series <i>Holographic Cosmology through the Cosmological CPT Theorem</i>
†Aug. 2025	Perimeter Quantum Fields and Strings Seminar <i>Holographic Cosmology through the Cosmological CPT Theorem</i>
†Jun. 2025	QIQQ 2025 <i>A Complex Proposal for Holographic Cosmology (1 min + Poster)</i>
†Jun. 2025	UCSB/KITP High Energy and Gravity Seminar <i>Holographic Cosmology through the Cosmological CPT Theorem</i>
†May. 2025	Moore Library Research Café - Light and Dark <i>Chiral Echoes from the Dawn of Time: Light, Dark, and the Arrow of Time</i>
†Apr. 2025	EPFL High Energy Theory Seminar <i>The Cosmological CPT Theorem</i>
†Mar. 2025	Caltech High Energy Theory Seminar <i>The Cosmological CPT Theorem</i>

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## TALKS - ACADEMIC & PUBLIC (cont.)

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Jan. 2025	Strings 2025 <i>To dS/CFT and back through Cauchy Slice Holography</i>
†Nov. 2024	Parity Violation from Home 2024 <i>No-go Theorem for Cosmological Parity Violation</i>
Nov. 2024	UKQFT XIII <i>The Cosmological CPT Theorem</i>
†Nov. 2024	Department of Applied Mathematics & Theoretical Physics, Cambridge (GR Seminar) <i>To dS/CFT and back through Cauchy Slice Holography</i>
†Oct. 2024	Looping in the Primordial Universe) <i>The Cosmological CPT Theorem</i>
†Oct. 2024	Holography @DITP Meeting <i>To dS/CFT and back through Cauchy Slice Holography</i>
†Oct. 2024	Nottingham Particle Cosmology Seminar (Centre for Astronomy and Particle Theory) <i>To dS/CFT and back through Cauchy Slice Holography</i>
†Oct. 2024	Swansea Theory Seminar (Particle Theory and Cosmology Group) <i>The Cosmological CPT Theorem</i>
†Oct. 2024	KCL Cosmology Meeting <i>Insights into Cosmology and Holography from the Wavefunction of the Universe</i>
†Sep. 2024	University of Jaffna <i>The Quantum World and the Early Universe</i>
†Sep. 2024	McGill High Energy Theory Group Meeting <i>The Cosmological CPT Theorem</i>
†Jul. 2024	Center for Computational Astrophysics - Simons Foundation - Cosmology Meeting <i>The Cosmological CPT Theorem</i>
Jun. 2024	Cosmology from Home 2024 <i>The Cosmological CPT Theorem</i>
Jun. 2024	Amplitudes 2024 <i>dS/CFT from <math>T\bar{T}</math> + <math>\Lambda_d</math> (5 mins)</i>
†May. 2024	Snapshots for Research 2024 <i>The Quantum World and the Early Universe</i>
†Apr. 2024	Nottingham Theory Seminar (Centre for Astronomy and Particle Theory) <i>The Cosmological CPT Theorem</i>
†Mar. 2024	IAS Quantum Aspects of Black Holes Meeting <i>The Cosmological CPT Theorem</i>
†Jan. 2024	Berkeley String Seminar <i>The Cosmological CPT Theorem</i>
†Jan. 2024	MURI Meeting <i>The Cosmological CPT Theorem</i>
†Nov. 2023	KITP High Energy and Gravity Seminar <i>Holographic Cosmology at finite cutoff</i>
April. 2023	Quantum de Sitter Universe <i>The Cosmological CPT Theorem (5 mins)</i>
Jan. 2023	UK-QFT XI <i>On Graviton non-Gaussianities in the Effective Field Theory of Inflation (25 mins)</i>
Dec. 2022	YTF 22 <i>On Graviton non-Gaussianities in the Effective Field Theory of Inflation (30 mins)</i>
†Nov. 2022	Manchester Cosmology Seminar <i>On Graviton non-Gaussianities in the Effective Field Theory of Inflation</i>

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## TALKS - ACADEMIC & PUBLIC (cont.)

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<sup>†</sup> = <i>Invited talk</i>	
Jul. 2022	Cosmology from Home 2022 <i>On Graviton non-Gaussianities in the Effective Field Theory of Inflation</i> (18+10 mins)
Jun. 2022	STAG School on Black Holes, Cosmology and Holography <i>On Graviton non-Gaussianities in the Effective Field Theory of Inflation</i> (4+1 mins)
<sup>†</sup> May. 2022	UK Cosmo 2022 <i>On Graviton non-Gaussianities in the Effective Field Theory of Inflation</i> (25+5 mins)
<sup>†</sup> 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)
<sup>†</sup> Mar. 2022	iTelescope.net <i>The Quantum World and the Early Universe</i>
<sup>†</sup> Nov. 2021	Connecting the Young World Fair <i>CYWFAIR 2021: Ayngaran Thavanesan</i>
<sup>†</sup> Nov. 2021	Whitgift School <i>The boundaries of the universe: A journey from Whitgift to the beginning of the universe</i>
<sup>†</sup> 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>
<sup>†</sup> Mar. 2021	Cambridge University Astronomy (Public Open Evening) <i>The topsy-turvy quantum world</i>
<sup>†</sup> 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)
<sup>†</sup> 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>
<sup>†</sup> Jul. 2020	Department of Applied Mathematics & Theoretical Physics, Cambridge (Cosmo. Journal Club) <i>Analytical Approximations for Curved Primordial Power Spectra</i>

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## MENTORING & TEACHING

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<b>Advisor/Mentor</b> <i>Mentoring Flatiron Intern</i>	Aug. 2024 - Present <i>USA &amp; Online</i>
· Supervising undergraduate ( <a href="#">Ezra Msolla</a> ) from underrepresented background with interests in cosmology.	
· In the paper with Ezra we derive analytical expressions for tensor power spectra in curved inflating universes.	
<b>Lumiere Education</b> <i>Research Project Supervisor (unpaid volunteering and paid work)</i>	Mar. 2023 - Present <i>Online</i>
· Supervised 9 students' individual research projects on various topics, including cosmology and Hawking radiation, many of whom have gone on to be admitted at prestigious universities such as Harvard and Stanford.	

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## MENTORING & TEACHING (cont.)

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<b>UniArk</b> <i>Co-founder and Mentor</i>	Mar. 2021 - Present 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.	
<b>University of Cambridge (Natural Sciences &amp; Mathematics)</b> <i>Examples Class Lecturer/Demonstrator &amp; Supervisor (small group tutor)</i>	Oct. 2020 - Present 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.	
<b>Queen Mary University of London</b> <i>Outreach Worker with Prof. Richard Nelson</i>	Sep. 2018 - Jan. 2019 London, UK
· Guided high school students through the physics and programming exercises of <a href="#">Planet Hunting with Python</a> .	
<b>The Profs, Leading Education, VIPTutors, Test Teach, Surrey Tutors</b> <i>Tutor</i>	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.	

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## PROFESSIONAL ACTIVITIES

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<b>Organiser</b>	<i>Co-organised <a href="#">Quantum de Sitter Universe</a> 1-week workshop held in April 2023.</i> <i>Co-organised DAMTP High Energy Physics &amp; General Relativity Journal Club.</i>
<b>Referee</b>	<i>Wrote references for multiple students for PhD applications all of whom were successful in securing PhD positions within DAMTP, Cambridge and externally.</i>
<b>Equality &amp; Diversity</b>	<b>Taking Charge for Change: Postgraduate Widening Participation Forum 2025</b> <i>Panelist on discussion session regarding student experiences of postgraduate admissions for <a href="#">Taking Charge for Change: Postgraduate Widening Participation Forum 2025</a>. as part of the University of Cambridge Access and participation plan.</i> <b>King's Birthday Honours 2024 OBE nomination for Prof. Anne-Christine Davis</b> <i>Wrote successful <a href="#">King's Birthday 2024 honours nomination</a>. for Prof. Anne-Christine Davis.</i> <b>Snapshots of Research 2024 speaker</b> <i>Event aimed at undergraduate and Masters students to promote diversity in mathematics.</i> <b>Promoting equality in the Physics &amp; Astronomy community</b> <i>Co-wrote an <a href="#">open letter</a> to our physics and astronomy colleagues in support of the Asian+ community in light of horrific acts against the community in recent times.</i> <b>Promoting equality at the University of Cambridge</b> <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> <b>Co-organiser of Cambridge DAMTP Racism Discussion Group</b> <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>
<b>Outreach</b>	<b>Organiser and speaker at 2021 Cambridge Science Festival</b> <i>Organised a series of <a href="#">five talks</a> on the recent progress of the black hole information paradox.</i>
<b>Sports</b>	<b>University 1<sup>st</sup> team (Blues) badminton captain, College football captain</b>

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## MISCELLANEOUS

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<b>Computing Languages</b>	Python, C, Mathematica, Java, HTML
<b>OS</b>	Linux, Windows, Mac OS
<b>Programmes &amp; Tools</b>	L <small>A</small> T <small>E</small> X, MATLAB, CLASS, CAMB, <a href="#">UltraNest</a> , healpy, Gnuplot, <a href="#">anesthetic</a>
<b>Languages</b>	English (Native), Tamil (Mother tongue), German (Professional), French (Basic)

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## REFEREES

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**Prof. A C Wall**  
*(PhD Supervisor)*  
DAMTP, Cambridge  
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**Prof. E Silverstein**  
*(Collaborator)*  
SITP, Stanford University  
evas@stanford.edu

**Prof. S Komatsu**  
*(Collaborator)*  
CERN  
shota.komatsu@cern.ch

**Prof. H Gleeson**  
*(Head of BBGSF)*  
SPA, University of Leeds  
h.f.gleeson@leeds.ac.uk