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in K. Sravan Kumar

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Personal Information

Birth date and place: 📅 30-05-1989, Vaddadi, India.
Nationality: 📅 Indian.
Address: 📍 6H Dairy Croft, Hepburn Road, Bristol, United Kingdom, BS2 8UW.
Languages: 📅 English (Excellent), Telugu (native), Hindi (Average), and Portuguese (B1-Level).
Marital status: 📅 Married (Spouse name: Dr. S.J. Yogaspoorthi, Research Associate in the School of Cellular and Molecular Medicine at the University of Bristol).

Employment History

June 2025- 📅 **Research Fellow in Mathematical Physics**, School of Mathematics and Physics, University of Portsmouth. Associated with the Multiscale Modeling team of the Faraday Institution Multiscale Modeling team of the Faraday Institution.

March 2023-May 2025 📅 **Royal Society Newton International Fellow**, Institute of Cosmology and Gravitation, University of Portsmouth.

December 2022 – February 2023 📅 **Postdoctoral Fellow**, Department of Physics, Institute of Science Tokyo, Tokyo, Japan.

November 2020 – November 2022 📅 **Japan Society for Promotion of Science (JSPS) Postdoctoral Fellow**, Department of Physics, Institute of Science Tokyo, Tokyo, Japan.

November 2018 – October 2020 📅 **Postdoctoral Research Associate**, Van Swinderen Institute (VSI) for Particle Physics and Gravity, University of Groningen, Groningen, The Netherlands.

February 2018 – October 2018 📅 **Postdoctoral Research Associate**, Department of Physics, Shenzhen University of Science and Technology (SUSTech), Shenzhen, China.

Education and Research Experience

2013 – 2017 📅 **Ph.D. Theoretical Physics (Cosmology), Universidade da Beira Interior, Portugal**
Thesis title: *Inflaton Candidates: from string theory to particle physics*
Supervisor: Prof. Paulo Vargas Moniz
Funding: PhD grant from Foundation for Science and Technology (FCT), Portugal.

2011 – 2013 📅 **Research Project Assistant, University of Hyderabad, India.**
Research Project: *Higher spin gauge theories.*
Supervisor: Prof. M. Sivakumar
Funding: Junior Research Fellowship (JRF) grant from Council of Scientific and Industrial Research (CSIR), India.

Education and Research Experience (continued)

- May 2010–July 2010  **Summer internship, Khalsa College, Delhi University, India.**
Research Project: "Applications of Lie Algebra in Quantum Mechanics and Particle Physics".
Supervisors: Prof. Debjyoti Choudhury, Dr. Sukanta Dutta, Dr. Mamta Dahia.
Funding: Department of Science and Technology (DST) funded Project "On Physics beyond the Standard Model."
- 2009 – 2011  **M.Sc. Physics, University of Hyderabad, India.**
Thesis title: *Spacetime symmetries, algebras and representation theories*.
Supervisor: Prof. M. Sivakumar
- 2006 – 2009  **B.Sc. Mathematics, Physics and Chemistry, M.V. N. J. S & R. V. R degree college, Andhra University, India**

Research interests

-  Quantum field theory in curved spacetime, Quantum gravity, Black holes, Early Universe, Foundations of quantum mechanics, Quantum information.
-  Diffusion processes in Li-ion and Na-ion batteries.
-  Condensed matter physics, topological field theory. Analog gravity systems.

Skills

- Programming:  Mathematica: Analytical and Numerical Coding
- Learning:  Python
- Misc.  Academic research, teaching, training, consultation, $\LaTeX$ typesetting and publishing.

Awards, Fellowships, funding, and scientific roles

Awards and Research Fellowships

- 2022  **The Royal Society Newton International Fellowship**, for a research project "A new era of early Universe cosmology: probing non-localities in cosmological collider physics" at ICG, U. Portsmouth. Funding: £ 144,321.
- 2020  **JSPS Postdoctoral Fellowship**, KAKENHI-PROJECT-20F20320 from Japan Society for Promotion of Science (JSPS) to perform research on "Non-local theories and their cosmological implications". Funding: 13,293,178 JPY.
- 2012  **Ph.D. grant (2013–2017)** from the **International Doctorate Network in Particle Physics, Astrophysics and Cosmology (IDPASC)** and **Foundation for Science and Technology (FCT)** of Portugal to carry out research in string cosmology. Funding: 58,049 Euros.
- 2010  **Junior Research Fellowship** from **Council of Scientific and Industrial Research (CSIR)** with 45th rank all over India (2010).
- 2009  University of Hyderabad's **achievement award** for the year 2009 which I received from former **President of India Dr. A. P. J. Abdul Kalam**.

Other funding and scientific roles

- 2016–  Member of **COST Action CA-15117 (CANTATA)** funded by European Union (EU) for advanced research on gravitation and cosmology.

Awards, Fellowships, funding, and scientific roles (continued)

- 2013-2019  Part of the research grant (as an investigator) UID/MAT/00212/2013 of **Centre for Mathematics and Applications (CMA)**, University of Beira Interior, funded by **Foundation for Science and Technology (FCT), Portugal**
- 2010-2015  Part of the project (as an investigator) on Late-time acceleration of the Universe: modified theories of gravity and dark energy related singularities PTDC/FIS/111032/2009 funded by **Foundation for Science and Technology (FCT), Portugal**

Undergraduate/Graduate level Teaching, Supervising Experience

- April-June 2025  **3 week (12h) Lectures** of "**Statistics theory and methods**" course to second year undergraduates at the School of Mathematics And Physics (SMAP) U. Portsmouth. (Teaching and Marking).
- February-June 2025  "**Stochastic processes**" to Mathematics undergraduates in the School of Mathematics And Physics (SMAP) at U. Portsmouth. (**Full course Lectures and Marking**).
- February-April 2025  **15h Lectures** of "**Mathematical Methods for Physics**" course to 3rd year SMAP undergraduate students at U. Portsmouth. (Including coursework marking).
- July-August 2024  **6h Lectures** at the PhD School, NORDITA Program "Quantum gravity: from gravitational effective field theories to ultraviolet complete approaches".
- February-May 2024  **Co-supervised** MPhys thesis project on "Inflation and the early universe beyond Einstein's general relativity" at ICG, U. Portsmouth. Student: Mr. Julian Alexander Wohlers.
- January-February 2024  **10h Lectures** of "**Mathematical Methods for Physics**" course the 3rd year Bachelors at the SMAP, U. Portsmouth. (Including coursework marking).
- March-June 2019  **Supervised** a student on a bachelor research project on "Hamiltonian Description of Higher Order Lagrangians" at the Van Swinderen Institute, University of Groningen, Groningen, Netherlands.
- March-June 2017  **Teaching Assistant** for "**Optics laboratory**" course for undergraduates at the Department of Physics, University of Beira Interior, Covilha, Portugal.
- January-April 2012  **Teaching Assistant** for "**Advanced Particle Physics**" course for M.Sc students at the School of Physics, University of Hyderabad, Hyderabad, India.
- August-November 2011  **Teaching Assistant** for "**Statistical Physics**" course for master students at the School of Physics, University of Hyderabad, Hyderabad, India.

Ph.D. supervision and mentoring

- 2021-  **Co-supervised a PhD student** (Mr. Daniel del Corral, R. No. D3081, expected to defend in 2025) on "**Post-inflationary effects in primordial black hole formation and scalar-induced gravitational waves**" at the Department of Physics, Center for Mathematics and Applications, University of Beira Interior, Covilhã, Portugal. (Thesis submitted on 20th June 2025).
- 2024-  **Co-supervising a PhD student** (Mr. Sam Franklin) at ICG, U. Portsmouth on the subject of **Probing gravitational horizons with astronomical observations**.
- 2018-2021  **Mentored two** PhD students (Dr. Shubham Maheshwari and Dr. Jun Peng) at University of Groningen, The Netherlands on "Studies of non-local theories and bouncing cosmology".

Organized conferences

- May 2024 ■ The conference "Frontiers in Cosmology and Gravitational Physics" from 20th-23rd May 2024 at ICG, University of Portsmouth with the grant from the "Royal Society Newton International Fellowship".
- July–August 2024 ■ "Quantum gravity: from gravitational effective field theories to ultraviolet complete approaches" workshop and PhD school as part of Nordita program which was held at NORDITA (Nordic Institute for Theoretical Physics), Stockholm, Sweden between 29th July - 23rd August 2024. **Won 47,000 Euros funding from NORDITA to organize this event** NORDITA PROGRAM.
- July 2024 ■ Quantum gravity and cosmology at Department of Physics, ShanghaiTech U. from 1st-5th July 2024.
- April 2023 ■ Online conference on "Quantum gravity and cosmology" from 17th to 21st April 2023.
- September 2023 ■ "Dark Energy: from fundamental theories to observations (and back)" conference held in Frascati, Rome from Sept 11-15, 2023.
- March 2022 ■ International conference on Quantum gravity, Cosmology and Blackholes that was held in Hybrid format from 14th-18th March 2022 at Center for Mathematics and Applications, University of Beira Interior, Covilhã, Portugal.
- March 2021 ■ International workshop on "Quantum gravity, Higher derivatives and Non-locality" (<https://www.qgrav2021.com>, <https://www.qgrav2021.inpcs.net/>) that was held from 8th-12th March 2021 at the Tokyo Institute of Technology, Tokyo, Japan. The plenary speakers include Nobel Laureates Prof. Gerard 't Hooft, two ICTP's Dirac medal winners, Prof. Roger Penrose, and Prof. Ashoke Sen. All the talks and intense discussion sessions in the YouTube channel of the Workshop.
- February 2017 ■ Second cosmology and gravity meeting of Serra Estrela Centre for Mathematics and Applications (CMA-UBI), University of Beira Interior, Portugal (10-11 February 2017).
- February 2015 ■ First cosmology and gravity meeting of Serra Estrala at the Centre for Mathematics and Applications (CMA-UBI), University of Beira Interior, Portugal (20-21 February 2015).

Organized seminars and journal clubs

- 2023-2025 ■ Initiated occasional **ICG Forum** discussion sessions in 2024 and acted as postdoc representative (from 2023-)
- April 2021- ■ Scientific secretary of an International Monthly Seminar Series in collaboration with Prof. Irina Aref'eva at Steklov International Mathematical Center (SIMC), Moscow, Russia.
- 2021-2022 ■ Weekly seminars at Department of Physics, Tokyo Institute of Technology, Tokyo, Japan.
- 2019-2020 ■ Weekly seminars at Van Swinderen Institute, University of Groningen, Groningen, Netherlands.
- Weekly Journal club at Van Swinderen Institute, University of Groningen, Groningen, Netherlands.
- Weekly special topics and uncharted areas of physics discussions at Van Swinderen Institute, University of Groningen, Groningen, Netherlands.

Research Visits

- September 2015 & 2018  Scientific visit to Dr. Suratna Das, Department of Physics, Indian Institute of Technology, Kanpur, India to carryout research on “Models of inflation in supergravity” funded by a project of **Department of Science and Technology (DST)**, India.
- April-May 2017  Scientific visit to Prof. Mariam Bouhmadi López, Department of Theoretical Physics, University of Bilbao, Bilbao, Spain to perform research on “Pre-inflationary physics in supergravity models of inflation” which was funded by my **IDPASC-FCT PhD grant**.

Research Publications

40 papers (35 published articles, which include 2 conference papers, 1 book chapter, and 5 under peer review process). **Citations: 666, h-index: 16.** **Note that author names in my field are written in alphabetical order.** See my presentation, which constitutes a technical summary of my recent **most original new research established in recent years**

“Unitary QFT in curved spacetime, Einstein-Rosen Bridges and CMB anomalies, DOI: 10.13140/RG.2.2.26232.15366

All of my current works can be seen at **Inspirehep/K.Sravan.Kumar.1**, ORCID:0000-0002-3126-8195, Google Scholar: Korumilli Sravan Kumar.

Research Gate: Korumilli Sravan Kumar, Research Interest Score: 418.

The most important publications are [7], [9], [13], [14], [27]

Journal Articles

- 1 D. del-Corral, P. Gondolo, K. S. Kumar, and J. Marto, “Primordial black holes through preheating instabilities in α -attractor models,” May 2025. arXiv: 2505.17790 [astro-ph.CO].
- 2 D. del-Corral, P. Gondolo, K. S. Kumar, and J. Marto, “Revisiting primordial black holes formation from preheating instabilities: the case of Starobinsky inflation,” *JCAP*, vol. 02, p. 009, 2025.  DOI: 10.1088/1475-7516/2025/02/009. arXiv: 2311.02754 [astro-ph.CO].
- 3 D. del-Corral, P. Gondolo, K. S. Kumar, and J. Marto, “Scalar-Induced Gravitational Waves from self-resonant preheating in α -attractor models,” Apr. 2025. arXiv: 2504.17602 [astro-ph.CO].
- 4 D. del-Corral, K. S. Kumar, and J. Marto, “Gravitational waves from primordial black hole dominance: The effect of inflaton decay rate,” *Phys. Dark Univ.*, vol. 49, p. 101991, 2025.  DOI: 10.1016/j.dark.2025.101991. arXiv: 2504.05875 [astro-ph.CO].
- 5 E. Gaztañaga and K. S. Kumar, “CMB parity asymmetry from unitary quantum gravitational physics,” *Symmetry*, vol. 17, no. 1, p. 1056, 2025.  DOI: 10.3390/sym17071056. arXiv: 2403.05587 [physics.gen-ph].
- 6 E. Gaztañaga, K. S. Kumar, S. Pradhan, and M. Gabler, “Gravitational bounce from the quantum exclusion principle,” *Phys. Rev. D*, vol. 111, no. 10, p. 103537, 2025.  DOI: 10.1103/PhysRevD.111.103537.
- 7 K. S. Kumar and J. Marto, “Towards a Unitary Formulation of Quantum Field Theory in Curved Spacetime: The Case of de Sitter Spacetime,” *Symmetry*, vol. 17, no. 1, p. 29, 2025.  DOI: 10.3390/sym17010029. arXiv: 2305.06046 [hep-th].
- 8 L. Buoninfante *et al.*, “Visions in Quantum Gravity,” Dec. 2024. arXiv: 2412.08696 [hep-th].
- 9 E. Gaztañaga and K. S. Kumar, “Finding origins of CMB anomalies in the inflationary quantum fluctuations,” *JCAP*, vol. 06, p. 001, 2024.  DOI: 10.1088/1475-7516/2024/06/001. arXiv: 2401.08288 [astro-ph.CO].

- 10 E. Gaztañaga, K. S. Kumar, and J. Marto, “A New Understanding of Einstein-Rosen Bridges,” *Preprint*, 2024.  DOI: 10.20944/preprints202410.0190.v1. preprint: <https://www.preprints.org/manuscript/202410.0190/v1> (Theoretical physics).
- 11 K. S. Kumar and J. Marto, “Hawking radiation with pure states,” *Gen. Rel. Grav.*, vol. 56, no. 12, p. 143, 2024.  DOI: 10.1007/s10714-024-03329-2. arXiv: 2407.18652 [gr-qc].
- 12 K. S. Kumar and J. Marto, “Revisiting Quantum Field Theory in Rindler Spacetime with Superselection Rules,” *Universe*, vol. 10, no. 8, p. 320, 2024.  DOI: 10.3390/universe10080320. arXiv: 2405.20995 [gr-qc].
- 13 K. S. Kumar and J. Marto, “Towards a Unitary Formulation of Quantum Field Theory in Curved Space-Time: The Case of the Schwarzschild Black Hole,” *PTEP*, vol. 2024, no. 12, 123E01, 2024.  DOI: 10.1093/ptep/ptae176. arXiv: 2307.10345 [hep-th].
- 14 A. S. Koshelev, K. S. Kumar, and A. A. Starobinsky, “Generalized non-local R^2 -like inflation,” *JHEP*, vol. 07, p. 146, 2023.  DOI: 10.1007/JHEP07(2023)146. arXiv: 2209.02515 [hep-th].
- 15 A. S. Koshelev, K. S. Kumar, and A. A. Starobinsky, “Non-Gaussianities in generalized non-local R^2 -like inflation,” *JHEP*, vol. 07, p. 094, 2023.  DOI: 10.1007/JHEP07(2023)094. arXiv: 2210.16459 [hep-th].
- 16 K. S. Kumar and J. Marto, “A robust explanation of CMB anomalies with a new formulation of inflationary quantum fluctuations,” *PoS*, vol. CORFU2022, p. 199, 2023.  DOI: 10.22323/1.436.0199. arXiv: 2305.06057 [hep-th].
- 17 L. Buoninfante and K. S. Kumar, “Quantum gravity, higher derivatives and nonlocality,” *Nuovo Cim. C*, vol. 45, no. 2, p. 25, 2022.  DOI: 10.1393/ncc/i2022-22025-8.
- 18 K. S. Kumar and J. Marto, “Parity asymmetry of primordial scalar and tensor power spectra,” Sep. 2022. arXiv: 2209.03928 [gr-qc].
- 19 K. S. Kumar, S. Maheshwari, A. Mazumdar, and J. Peng, “An anisotropic bouncing universe in non-local gravity,” *JCAP*, vol. 07, p. 025, 2021.  DOI: 10.1088/1475-7516/2021/07/025. arXiv: 2103.13980 [gr-qc].
- 20 S. Biondini and K. Sravan Kumar, “Dark matter and Standard Model reheating from conformal GUT inflation,” *JHEP*, vol. 07, p. 039, 2020.  DOI: 10.1007/JHEP07(2020)039. arXiv: 2004.02921 [hep-ph].
- 21 A. S. Koshelev, K. S. Kumar, and A. A. Starobinsky, “Analytic infinite derivative gravity, R^2 -like inflation, quantum gravity and CMB,” *Int. J. Mod. Phys. D*, vol. 29, no. 14, p. 2043018, 2020.  DOI: 10.1142/S021827182043018X. arXiv: 2005.09550 [hep-th].
- 22 A. S. Koshelev, K. Sravan Kumar, A. Mazumdar, and A. A. Starobinsky, “Non-Gaussianities and tensor-to-scalar ratio in non-local R^2 -like inflation,” *JHEP*, vol. 06, p. 152, 2020.  DOI: 10.1007/JHEP06(2020)152. arXiv: 2003.00629 [hep-th].
- 23 K. S. Kumar, S. Maheshwari, A. Mazumdar, and J. Peng, “Stable, nonsingular bouncing universe with only a scalar mode,” *Phys. Rev. D*, vol. 102, no. 2, p. 024080, 2020.  DOI: 10.1103/PhysRevD.102.024080. arXiv: 2005.01762 [gr-qc].
- 24 K. Sravan Kumar, S. Maheshwari, and A. Mazumdar, “Perturbations in higher derivative gravity beyond maximally symmetric spacetimes,” *Phys. Rev. D*, vol. 100, no. 6, p. 064022, 2019.  DOI: 10.1103/PhysRevD.100.064022. arXiv: 1905.03227 [gr-qc].
- 25 K. Sravan Kumar and P. Vargas Moniz, “Conformal GUT inflation, proton lifetime and non-thermal leptogenesis,” *Eur. Phys. J. C*, vol. 79, no. 11, p. 945, 2019.  DOI: 10.1140/epjc/s10052-019-7449-1. arXiv: 1806.09032 [hep-ph].
- 26 A. S. Koshelev, K. Sravan Kumar, L. Modesto, and L. Rachwał, “Finite quantum gravity in dS and AdS spacetimes,” *Phys. Rev. D*, vol. 98, no. 4, p. 046007, 2018.  DOI: 10.1103/PhysRevD.98.046007. arXiv: 1710.07759 [hep-th].

- 27 A. S. Koshelev, K. Sravan Kumar, and A. A. Starobinsky, “ R^2 inflation to probe non-perturbative quantum gravity,” *JHEP*, vol. 03, p. 071, 2018.  DOI: 10.1007/JHEP03(2018)071. arXiv: 1711.08864 [hep-th].
- 28 K. Sravan Kumar and L. Modesto, “Non-local Starobinsky inflation in the light of future CMB,” Oct. 2018. arXiv: 1810.02345 [hep-th].
- 29 S. Banerjee, S. Das, K. Sravan Kumar, and T. P. Singh, “Signatures of spontaneous collapse-dynamics-modified single-field inflation,” *Phys. Rev. D*, vol. 95, no. 10, p. 103518, 2017.  DOI: 10.1103/PhysRevD.95.103518. arXiv: 1612.09131 [astro-ph.CO].
- 30 A. S. Koshelev, K. Sravan Kumar, and P. Vargas Moniz, “Effective models of inflation from a nonlocal framework,” *Phys. Rev. D*, vol. 96, no. 10, p. 103503, 2017.  DOI: 10.1103/PhysRevD.96.103503. arXiv: 1604.01440 [hep-th].
- 31 J. Morais, M. Bouhmadi-López, K. Sravan Kumar, J. Marto, and Y. Tavakoli, “Interacting 3-form dark energy models: distinguishing interactions and avoiding the Little Sibling of the Big Rip,” *Phys. Dark Univ.*, vol. 15, pp. 7–30, 2017.  DOI: 10.1016/j.dark.2016.11.002. arXiv: 1608.01679 [gr-qc].
- 32 M. Bouhmadi-López, K. S. Kumar, J. Marto, J. Morais, and A. Zhuk, “ K -essence model from the mechanical approach point of view: coupled scalar field and the late cosmic acceleration,” *JCAP*, vol. 07, p. 050, 2016.  DOI: 10.1088/1475-7516/2016/07/050. arXiv: 1605.03212 [gr-qc].
- 33 A. Burgazli, A. Zhuk, J. Morais, M. Bouhmadi-López, and K. Sravan Kumar, “Coupled scalar fields in the late Universe: The mechanical approach and the late cosmic acceleration,” *JCAP*, vol. 09, p. 045, 2016.  DOI: 10.1088/1475-7516/2016/09/045. arXiv: 1512.03819 [gr-qc].
- 34 K. S. Kumar, J. C. Bueno Sánchez, C. Escamilla-Rivera, J. Marto, and P. Vargas Moniz, “DBI Galileon inflation in the light of Planck 2015,” *JCAP*, vol. 02, p. 063, 2016.  DOI: 10.1088/1475-7516/2016/02/063. arXiv: 1504.01348 [astro-ph.CO].
- 35 K. S. Kumar, J. Marto, P. Vargas Moniz, and S. Das, “Non-slow-roll dynamics in α -attractors,” *JCAP*, vol. 04, p. 005, 2016.  DOI: 10.1088/1475-7516/2016/04/005. arXiv: 1506.05366 [gr-qc].
- 36 K. Sravan Kumar, D. J. Mulryne, N. J. Nunes, J. Marto, and P. Vargas Moniz, “Non-Gaussianity in multiple three-form field inflation,” *Phys. Rev. D*, vol. 94, no. 10, p. 103504, 2016.  DOI: 10.1103/PhysRevD.94.103504. arXiv: 1606.07114 [astro-ph.CO].
- 37 K. S. Kumar, J. Marto, N. J. Nunes, and P. V. Moniz, “Inflation in a two 3-form fields scenario,” *JCAP*, vol. 06, p. 064, 2014.  DOI: 10.1088/1475-7516/2014/06/064. arXiv: 1404.0211 [gr-qc].

Conference Proceedings

- 1 K. S. Kumar, “Non-local R^2 -like inflation, gravitational waves and Non-Gaussianities,” in *16th Marcel Grossmann Meeting on Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories*, Nov. 2021.  DOI: 10.1142/9789811269776_0090. arXiv: 2111.04291 [hep-th].
- 2 K. Sravan Kumar, J. Marto, P. Vargas Moniz, and S. Das, “Gravitational waves in α -attractors,” in *14th Marcel Grossmann Meeting on Recent Developments in Theoretical and Experimental General Relativity, Astrophysics, and Relativistic Field Theories*, vol. 4, 2017, pp. 4262–4267.  DOI: 10.1142/9789813226609_0571. arXiv: 1512.08490 [gr-qc].

Books and Chapters, Lecture notes

- 1 K. S. Kumar, *Inflationary cosmology: from effective field theory to quantum gravity*. Jul. 2025, Lecture notes.
- 2 A. S. Koshelev, K. S. Kumar, and A. A. Starobinsky, *Cosmology in nonlocal gravity*. May 2023.  DOI: 10.1007/978-981-19-3079-9_37-1. arXiv: 2305.18716 [hep-th].

References

Available on Request

Conferences (Invited Speaker)

- June 2025 "From the Puzzles to New Insights in Fundamental Physics" held at Campagna, Italy from 23rd-27th June 2025. <https://www.pifp2025.it/> **Title:** Unitary QFT in curved spacetime, Einstein-Rosen bridges, CMB anomalies.
- October 2024 The Starobinsky Memorial conference: Evolving Universe: theory and observations that was held in Yerevan (7th to 12th Oct 2024.) <https://starobinski-conf.aanl.am/> **Title:** "Finding the origins of CMB anomalies in the inflationary quantum fluctuations"
- July 2024 (1) The quantum gravity and cosmology 2024 (1st July-5th July 2024) conference at ShanghaiTech U. **Title:** On the origins of CMB anomalies, direct-sum inflation, and quantum gravity.
(2) **Invited seminar** delivered at ShanghaiTech U. for the Coshare Science video Journal. **Title:** "Quantum gravity and Quantum field theory in curved spacetime".
(3) The workshop on "Quantum aspects of inflationary cosmology" 24th June-19th July 2024 at the Munich Institute for Astro-Particle and Biophysics (MIAPbP), Germany. <https://www.munich-iapbp.de/cosmology-quantum-aspects/schedule>. **Title:** "Origins of CMB anomalies"
- July 2023 Keynote speaker of the *Spanish and Portuguese Relativity meeting (EREP 2023)* held from 17th-21st July 2023 at the University of the Basque Country (UPV/EHU), Bilbao, Spain. <https://www.erep2023.eus/> . **Title of the talk:** "A construction of unitary quantum field theory in curved spacetime and its implications for quantum gravity"
- September 2022 Invited plenary speaker at the conference on *Tensions in cosmology* from 8th to 12th September 2022 at Corfu Summer Institute, Greece. <http://www.physics.ntua.gr/corfu2022/co.html> . **Seminar:** "Hemispherical power asymmetry of primordial power spectra".
- July 2021 (1) *NRF-JSPS workshop* on particle physics, cosmology and gravitation, from 20th to 22nd July 2021. **Title:** " R^2 -gravity, Non-locality and Inflation".
(2) **16th Marcel Grossman Meeting, from 5th to 10th July 2021 at ICRANet, Sapienza University of Rome, Italy.** Invited by Prof. Mikhail S. Volkov, and Tours U. CNRS, France, who was chairman of the parallel session "Ghost-free models of modified gravity?". Published in proceedings https://www.worldscientific.com/doi/10.1142/9789811269776_0090
- June 2021 **Quarks 2020, Quantum gravity and Cosmology, A. D. Sakharov Centennial (online) workshop**, from 5th to 8th June at **Lebedev Institute, Moscow, Russia.** <https://indico.quarks.ru/event/2020/page/48-quantum-gravity> . **Title:** "Non-local R^2 -like inflation, Gravitational Waves and Non-Gaussianities".
- July 2020 *Japan-Netherlands Symposium*, University of Groningen, Groningen, The Netherlands. <http://www.th.phys.titech.ac.jp/cosmo/JN.html> . **Title:** "Analytic Infinite Derivative Gravity, R^2 -like inflation and quantum gravity"
- September 2019 *Quantum gravity and matter* workshop at University of Heidelberg, Germany (9th – 13th September). **Title:** "Non-local R^2 inflation and non-Gaussianities".
- June 2019 Lorentz center, University of Leiden, Leiden, The Netherlands. <https://www.lorentzcenter.nl/singularities-and-horizons-from-blackholes-to-cosmology.html> . **Title:** "Singularities and horizons: from blackholes to cosmology".

Seminars (Invited)

- 02-04-2025 Department of Physics, King's College London (KCL). **Seminar:** "Unitary quantum field in curved spacetime and its implications for cosmology and black holes".
- 16-01-2025 Raman Research Institute, Bangalore, India. **Seminar:** "Unitarity QFT in curved spacetime, Einstein-Rosen bridges, and CMB anomalies".
- 09-01-2025 School of Physics, U. Hyderabad, India. **Seminar:** "Unitarity QFT in curved spacetime, Einstein-Rosen bridges, and CMB anomalies".
- 26-11-2024 Department of Physics, Charles University, Prague, Czech Republic. **Seminar:** "A new understanding of Einstein-Rosen bridges".
- 02-10-2024 Department of Physics, Swansea University, UK **Seminar:** "CMB anomalies, quantum gravity, and Einstein-Rosen bridges".
- 06-03-2024 Astronomy Unit, Queen Mary University of London, **Seminar:** "From quantum gravitational physics to CMB anomalies".
- 23-02-2024 **COSMOS Network** project organized by Prof. Silvia De Bianchi at Department of Philosophy, "Piero Martinetti" University of Milan, <https://cosmosproject.unimi.it/en/il-progetto>. **Seminar:** "On the origins of CMB anomalies and testing a new theory of inflationary quantum fluctuations".
- 29-02-2024 Institute of Basic Science, Center for Gravitation, Cosmology and Astroparticle physics (South Korea). **Seminar:** "From quantum gravitational physics to CMB anomalies".
- 11-10-2023 Department of Mathematics, University of Southampton, UK. **Seminar:** "Non-localities in quantum gravity and their implications for early Universe cosmology and black hole physics".
- 05-05-2023 Department of Physics and Astronomy, University of Sussex, UK **Seminar:** "A unitary formulation of quantum field theory in de Sitter spacetime and its implications for inflationary cosmology".
- 31-08-2022 School of Physics, University of Hyderabad, Hyderabad, India. **Seminar:** "Exploring early Universe with quantum gravity and vice versa".
- 19-08-2022 Department of Physics, IIT Chennai, India. **Seminar:** "Generalized non-local R^2 -like inflation and its Universal predictions".
- 16-08-2022 Institute of Mathematical Sciences (IMSc), Chennai, India. **Seminar:** "Generalized non-local R^2 -like inflation and its Universal predictions".
- 14-07-2022 Van Swinderen Institute, U. Groningen, The Netherlands. **Seminar:** "Generalized non-local R^2 -like inflation and its Universal predictions".
- 05-07-2022 Institute of Theoretical Physics, Mainz University, Germany. **Seminar:** "Probing quantum gravity and non-locality through R^2 -like inflation".
- 11-05-2022 Okinawa Institute of Technology (OIST), Okinawa, Japan. **Seminar:** "Probing quantum gravity and non-locality through R^2 -like inflation".
- 27-04-2022 Kavli Institute of Physics and Mathematics Universe (IPMU), University of Tokyo, Tokyo, Japan. **Seminar:** Generalized R^2 -like inflation and its Universal predictions.
- 24-02-2022 Quantum Gravity Seminar series, **Perimeter Institute, Waterloo, Canada.. Seminar:** "Generalized R^2 -like inflation and its Universal predictions". <https://pirsa.org/22020072> (video link for the talk).
- 20-08-2021 Department of Physics, Indian Institute of Technology (IIT) Kharagpur, India. **Seminar:** "Status of theoretical cosmology and search for new physics".
- 20-07-2021 Department of Physics, Indian Institute of Technology (IIT) Mandi, India. **Seminar:** "Status of theoretical cosmology and search for new physics".
- 08-12-2019 University of Salerno, Salerno Italy. **Seminar:** "Non-local R^2 inflation and non-Gaussianities".

Seminars (Invited) (continued)

11-11-2019	University of Oldenburg, Germany. Seminar: "Non-local R^2 inflation and non-Gaussianities"
28-06-2019	Center for Theoretical Physics Jamia Millila Islamia (JMI), New delhi, India. Seminar: "Conformal GUT inflation".
18-01-2018	Center for Theoretical Physics Jamia Millila Islamia (JMI), New delhi, India. Seminar: "Inflation and quantum gravity".
20-12-2017	School of Physics University of Hyderabad, Hyderabad. Seminar: "Starobinsky Inflation and quantum gravity".
21-04-2016	Institute of Astrophysics, University of Lisbon, Lisbon, Portugal, Seminar: "Non-slow-roll dynamics in α -attractors"
-08-205	School of Physics, University of Hyderabad. Seminar: "Status of Inflationary cosmology".

Presentations at conferences

March 2025	"Southcoast cosmology conference" (Sococo), held at University of Portsmouth. Talk: "Hawking radiation with pure states".
May 2023	<i>UKCosmo</i> meeting held at DAMTP University of Cambridge on 23rd May 2023. https://indico.cern.ch/event/1259202/ . Talk: "Quantum field theory in curved space-time and the CMB hemispherical power asymmetry".
April 2023	<i>BritGrav</i> meeting held at University of Southampton, UK from 13th to 14th April 2023. https://sites.google.com/view/britgrav23 . Talk: "Quantum field theory in curved space-time and the CMB hemispherical power asymmetry".
February 2023	<i>Early Universe Mini-workshop</i> happened from 31 st Jan to 2 nd Feb 2023 at the RiKen, Kobe, Japan. Talk: "Hemispherical power asymmetry of primordial power spectra".
October 2022	The conference <i>JGRG31</i> happened from 24 th to 28 th October 2022 at the U. Tokyo, Japan . https://www.resceu.s.u-tokyo.ac.jp/symposium/jgrg31/ . Talk: "Hemispherical power asymmetry of primordial power spectra".
December 2021	<i>30th JGRG meeting</i> , from 6 th to 10 th December 2021 at Waseda University, Tokyo, Japan . Talk: "Conformal GUT inflation, Dark Matter and Standard Model"
October 2021	Yukawa Institute of Theoretical Physics (YITP) , Kyoto, Japan during a visit from 18 rd to 22 nd . Talk: Non-local early Universe cosmology.
August 2021	<i>Strings and Fields 2021 conference</i> , from 23 rd to 27 th August 2021 at Yukawa Institute of Theoretical Physics, Kyoto, Japan . http://www2.yukawa.kyoto-u.ac.jp/qft.web/2021/program.html . Talk: R^2 -gravity, Non-locality and Inflation.
April 2021	The 15 th Iberian cosmology meeting held online at University of Coimbra, Portugal (29 th March—1 st April 2021). https://ibericos2021.math.tecnico.ulisboa.pt/programme . Talk: "A non-local framework to violate single field consistency relations".
November 2020	<i>JGRG conference</i> , University of Tokyo, Japan (23 rd -27 th November 2020). https://sites.google.com/view/online-jgrg/workshop . Zoom Talk: "Analytic Infinite Derivative Gravity, R^2 -like inflation and quantum gravity" Department of Physics, Tokyo Institute of Technology, Tokyo, Japan. Zoom Talk: "Analytic Infinite Derivative Gravity, R^2 -like inflation and quantum gravity".
April 2019	<i>14th Iberian Cosmology meeting</i> at University of Basque country, Bilbao, Spain (15 th -17 th April 2019). http://tp.lc.ehu.es/ibericos/ . Talk: "Non-singular solutions in non-local gravity".

Presentations at conferences (continued)

March 2018	<i>Quantum gravity</i> conference held at Southern University of Science and Technology (SUSTech), Shenzhen, China (March 2018). Talk: "Non-local R^2 inflation in the light of the future CMB"
April 2017	<i>XII Iberian Cosmology meeting</i> at University of Valencia, Valencia, Spain (10 th -12 th April 2017). Talk: " R^2 inflation and quantum gravity".
July 2016	<i>Utrecht cosmology Symposium</i> , University of Utrecht, Utrecht, The Netherlands, (June 27 th -1 st July 2016). https://web.science.uu.nl/ucos/files/schedule.html . Talk: "Inflation from string field theory".
March 2016	<i>XI Iberian Cosmology meeting</i> at Vila do conde, Porto, Portugal (29 th -31 th March 2016). Talk: "Inflation from string field theory".
July 2015	<i>XIV Marcel Grossmann Meeting</i> in University of Sapienza, Rome, Italy in ST4 parallel session (12 th -18 th July 2015). Talk: "Gravitational waves in α – attractors.
June 2015	<i>Cosmology and Quantum Vacuum 2015</i> " conference in Rhodes, Greece (19 th -25 th June 2015). https://inspirehep.net/conferences/1336248?ui-citation-summary=true . Talk: "Interactions in 3-form dark energy model".
December 2014	<i>Primordial Universe after Planck</i> meeting that took place from at the Institut d'Astrophysique de Paris in Paris, France (15 th -19 th December, 2014). Poster: "Two 3-form inflation and non-Gaussianity".
April 2015	<i>X Iberian Cosmology meeting</i> at Aranjuez, Spain (30 th March-1 st April, 2015). http://teorica.fis.ucm.es/ibericos2015/ . Talk: "DBI Galilion inflation".
August 2014	Quantum Cosmology seminar that took place from at the Physikzentrum in Bad Honnef, Germany (28 th July to 1 st August, 2014). Talk: "Two 3-form fields inflation and non-Gaussianity".
April 2014	<i>IX Iberian Cosmology meeting</i> at Department of Physics, University of Aveiro, Portugal (28 th -30 th April 2014). http://gravitation.web.ua.pt/ibericos2014/index.html . Talk: "Two 3-form fields inflation".
September 2013	<i>Modified Gravity Theories: Beyond Einstein's Legacy</i> , Faculty of Science, University of Lisbon, Lisbon, Portugal in (16 th -18 th September 2013). https://idpasc.lip.pt/events/52 ? . Talk: " $N-3$ form fields inflation".

Outreach activities

June 2025	My recent paper [6] appeared in The Conversation <i>What if the Big Bang wasn't the beginning? Our research suggests it may have taken place inside a black hole</i> . Also several articles appeared in platforms like Telegraph and Phys.org.
January 2023 and 2024	Part of annual stargazing event of the ICG, U. Portsmouth and interacted with public and school children on cosmology and astrophysics topics.
2023	Participated in the outreach program for school students at ICG, U. Portsmouth, and delivered a talk titled "An Unfinished Story of time" .
2019	Participated in communicating about studies of gravity and early Universe cosmology to the experts in chemistry and biology departments at the University of Groningen, the Netherlands.
2017	A talk on "Science beyond the boundaries" to undergraduate students at M.V.N. J. S & R. V. R Degree College, Malikipuram, Andhra Pradesh, India. Public talk "The Universe Before the Hot Big Bang" at the science colloquium held by the University of Beira Interior.