Dr. Selim Can Hotinli

Personal details

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Professional

P. J. E. Peebles Senior Postdoctoral Fellow October 2023 –
Perimeter Institute for Theoretical Physics

Horizon Fellow in Cosmology and Gravitation February 2021 – 2023
Johns Hopkins University

Postdoctoral Fellow* October 2020 – 2021
Imperial College London

*A post-doctorate position until my delayed start at Johns Hopkins due to COVID19 travel restrictions.

Education

Imperial College London 2016-2020
PhD in Physics, Thesis Advisor: Andrew Jaffe
Thesis Subject: Modern Cosmology in the post-Planck era.

Imperial College London 2014-2016
MSc in Physics (Distinction), Thesis Advisor: Andrew Jaffe and Carlo Contaldi
Thesis Subject: Effects of quenched disorder in the early Universe.

Bosphorus University 2009-2014
BSc in Physics (First Class), Advisor: Erkcan Ozcan (CERN)

Positions Held

Co-lead-editor: 'Review of the new discoveries in the era of low noise high resolution CMB experiments' June 2022 –
Co-leading an ambitious review project–to be published at the Elsevier, Physics Reports–with over 25 contributing authors.

Visitor, Aspen Centre of Physics August 2023-September 2023
Aspen, CO 81611, United States

Organizer: Johns Hopkins University theory group seminars

Co-organizer: Space Telescope Institute Colloqium May 2022 – October 2023
Johns Hopkins University, Baltimore, MD 21218, USA

Representative: EDI Committee February 2021 – October 2023
Johns Hopkins University, Baltimore, MD 21218, USA

Visitor, Aspen Centre of Physics August 2021-September 2021
Aspen, CO 81611, United States

Graduate Fellow, Perimeter October 2019-February 2020
Waterloo, ON N2L 2Y5, Canada

Visiting JRF, Johns Hopkins University (JHU) February 2019
Baltimore, MD 21218, USA

Visitor, Center for Computational Astrophysics (CCA) Summer 2018
Flatiron Institute, 162-5th Ave, New York, NY 10010

Visitor, Canadian Institute of Theoretical Astrophysics (CITA) 2017 and 2018

Research assistant in cosmology, Imperial College London Summer 2015
Blackett Building, Imperial College London, London, UK, SW7 2BX

Summer research assistant, DESY Summer 2013
Notkestraße 85, 22607 Hamburg, Germany
Group member and research assistant, Cavendish Laboratory Summer 2012
Atomic, Mesoscopic and Optical Physics Group (AMOP), Rutherford Building, JJ Thomson Ave, Cambridge CB3 0HE, United Kingdom

Notable Awards and Grants

P. J. E. Peebles Senior Postdoctoral Fellowship 2023 –
Johns Hopkins Horizon Fellowship 2020 – 2023
Aspen Center of Physics 2021 (and 2023)
stipend for travel and *coverage*
Balzan Foundations Fellowship 2019
stipend from New-College-Oxford/Johns-Hopkins Centre for Cosmological Studies
Imperial College President's Scholarship 2016-2020
Prize Scholarship.

Memberships

CMB-S4 member 2021 –
Active independent member.
Simons Observatory member 2018 –
Active member.

Co-advising

Nanoom Lee (PhD candidate NYU) `nanoom.lee@nyu.edu` 2022 –
Neha Anil Kumar (PhD candidate, JHU) `nanilku1@jhu.edu` 2022 –
Mesut Caliskan (PhD candidate, JHU) `caliskan@jhu.edu` 2022 –
Avery Tishue (PhD, Dartmouth) `avery.tishue.gr@dartmouth.edu` 2022 –
Jaxon North (Undergraduate student, JHU) 2022

Talks and Seminars

4 Conferences 2022-2023
Kyoto, Flatiron Institute, UCSD, Montreal.
***Invited* Talk and Interview, Boston University** February 2023
Shortlisted candidate talk for tenure-track assistant professorship in cosmology.
12 *Invited* Talks 2019-2023
Kavli Institute for Particle Astrophysics and Cosmology (KIPAC) at Stanford, Max Planck Institute, Munich, Germany, Cornell University, University of Maryland College Park. Perimeter. University of Southern California. Columbia University, UC Berkeley. University of Sussex.
13 seminars given in Europe, USA and Canada February-September 2019
Talk, NanoGrav meeting April 2019
Talk, CMB in high definition workshop, CCA, Flatiron Institute, NYC. December 2018
Co-organizer, Imperial College London weekly cosmology seminars. 2016-2019
8 seminars given in Canada and United Kingdom 2017-2019

C/C++, Python, Fortran, Mathematica, Julia Advanced

Public codes: ReCCO, class_delens, FisherLens

Refereed Journals: PRL, PRD, JCAP, APJ, OJA

References*

Prof. Gilbert P. Holder gholder@illinois.edu
Prof. Andrew H. Jaffe a.jaffe@imperial.ac.uk
Prof. Matthew Johnson mjohnson@perimeterinstitute.ca
Prof. Marc Kamionkowski kamion@jhu.edu
Prof. Joel Meyers joelmeyers@utexas.edu
Prof. Kendrick Smith kmsmith@perimeterinstitute.ca

*In alphabetical order.

Publications

*: Supervised graduate student (below). **: Supervised undergraduate student (below).
Leading or major contribution:

[1] C. Trendafilova, **S. C. Hotinli** and J. Meyers, "Improving Constraints on Inflation with CMB Delensing," [arXiv:2312.02954 [astro-ph.CO] (submitted to JCAP)].

[2] M. Çalışkan*, N. Anil Kumar*, **S. C. Hotinli** and M. Kamionkowski, "Reconstructing patchy helium reionization using the cosmic microwave background and large-scale structure," [arXiv:2312.00118 [astro-ph.CO] (submitted to JCAP)].

[3] E. Vanzan*, M. Kamionkowski and **S. C. Hotinli**, "Phenomenology of a vector-field-induced (and possibly parity breaking) compensated isocurvature perturbation," [arXiv:2311.18121 [astro-ph.CO] (submitted to PRL)].

[4] N. Lee* and **S. C. Hotinli**, "Probing light relics through cosmic dawn," [arXiv:2309.15119 [astro-ph.CO] (submitted to PRL)].

[5] **S. C. Hotinli**, N. Sabti, J. North** and M. Kamionkowski, "Unveiling neutrino halos with CMB lensing," Phys. Rev. D **108**, no.10, 103504 (2023) doi:10.1103/PhysRevD.108.103504 [arXiv:2306.15715 [astro-ph.CO]].

[6] **S. C. Hotinli**, E. Pierpaoli, S. Ferraro and K. Smith, "Transverse velocities and matter gradient correlations: A new signal and a new challenge to moving-lens analyses," Phys. Rev. D **108**, no.8, 083508 (2023) doi:10.1103/PhysRevD.108.083508 [arXiv:2305.15462 [astro-ph.CO]].

[7] **S. C. Hotinli** and K. Ahn, "Probing the global 21-cm background by velocity-induced dipole and quadrupole anisotropies," [arXiv:2305.01672 [astro-ph.CO] (submitted to MRAS)].

[8] **S. C. Hotinli**, "Cosmological probes of helium reionization," Phys. Rev. D **108**, no.4, 043528 (2023) doi:10.1103/PhysRevD.108.043528 [arXiv:2212.08004 [astro-ph.CO]].

[9] S. Foreman, **S. C. Hotinli**, M. S. Madhavacheril, A. van Engelen and C. D. Kreisch, "Subtracting the kinetic Sunyaev-Zeldovich effect from the cosmic microwave background with surveys of large-scale structure," Phys. Rev. D **107**, no.8, 083502 (2023) doi:10.1103/PhysRevD.107.083502 [arXiv:2209.03973 [astro-ph.CO]].

[10] N. A. Kumar*, **S. C. Hotinli** and M. Kamionkowski, "Uncorrelated compensated isocurvature perturbations from kinetic Sunyaev-Zeldovich tomography," Phys. Rev. D **107**, no.4, 043504 (2023) doi:10.1103/PhysRevD.107.043504 [arXiv:2208.02829 [astro-ph.CO]].

[11] **S. C. Hotinli**, S. Ferraro, G. P. Holder, M. C. Johnson, M. Kamionkowski and P. La Plante, "Probing helium reionization with kinetic Sunyaev-Zel'dovich tomography," Phys. Rev. D **107**, no.10, 103517 (2023) doi:10.1103/PhysRevD.107.103517 [arXiv:2207.07660 [astro-ph.CO]].

[12] N. Lee*, **S. C. Hotinli** and M. Kamionkowski, "Probing cosmic birefringence with polarized Sunyaev-Zel'dovich tomography," Phys. Rev. D **106**, no.8, 083518 (2022) doi:10.1103/PhysRevD.106.083518 [arXiv:2207.05687 [astro-ph.CO]].

[13] N. Anil Kumar*, G. Sato-Polito, M. Kamionkowski and **S. C. Hotinli**, "Primordial trispectrum from kinetic Sunyaev-Zel'dovich tomography," Phys. Rev. D **106**, no.6, 063533 (2022) doi:10.1103/PhysRevD.106.063533 [arXiv:2205.03423 [astro-ph.CO]].

[14] **S. C. Hotinli**, G. P. Holder, M. C. Johnson and M. Kamionkowski, "Cosmology from the kinetic polarized Sunyaev Zel'dovich effect," JCAP **10**, 026 (2022) doi:10.1088/1475-7516/2022/10/026 [arXiv:2204.12503 [astro-ph.CO]].

[15] **S. C. Hotinli**, D. J. E. Marsh and M. Kamionkowski, Phys. Rev. D **106**, no.4, 043529 (2022) doi:10.1103/PhysRevD.106.043529 [arXiv:2112.06943 [astro-ph.CO]].

[16] **S. C. Hotinli**, J. Meyers, C. Trendafilova, D. Green and A. van Engelen, "*The benefits of CMB delensing,*" JCAP **04** (2022) no.04, 020 doi:10.1088/1475-7516/2022/04/020 [arXiv:2111.15036 [astro-ph.CO]].

[17] J. Cayuso*, R. Bloch*, **S. C. Hotinli**, M. C. Johnson and F. McCarthy, "*Velocity reconstruction with the cosmic microwave background and galaxy surveys,*" [arXiv:2111.11526 [astro-ph.CO]].

[18] L. Ji*, **S. C. Hotinli** and M. Kamionkowski, "*Cross-correlation of the Polarizations of the 21-cm and Cosmic Microwave Backgrounds,*" [arXiv:2110.01619 [astro-ph.CO]]. (to be published at PRD)

[19] **S. C. Hotinli**, K. M. Smith, M. S. Madhavacheril and M. Kamionkowski, "*Cosmology with the moving lens effect,*" Phys. Rev. D **104**, no.8, 083529 (2021) doi:10.1103/PhysRevD.104.083529 [arXiv:2108.02207 [astro-ph.CO]].

[20] **S. C. Hotinli**, T. Binnie, J. B. Muñoz, B. R. Dinda and M. Kamionkowski, "*Probing compensated isocurvature with the 21-cm signal during cosmic dawn,*" Phys. Rev. D **104**, no.6, 063536 (2021) doi:10.1103/PhysRevD.104.063536 [arXiv:2106.11979 [astro-ph.CO]].

[21] **S. C. Hotinli** and M. C. Johnson, Phys. Rev. D **105**, no.6, 063522 (2022) doi:10.1103/PhysRevD.105.063522 [arXiv:2012.09851 [astro-ph.CO]].

[22] **S. C. Hotinli**, "*New directions in cosmology and astrophysics,*" doi:10.25560/85382

[23] **S. C. Hotinli**, M. C. Johnson and J. Meyers, "*Optimal filters for the moving lens effect,*" Phys. Rev. D **103**, no.4, 043536 (2021) doi:10.1103/PhysRevD.103.043536 [arXiv:2006.03060 [astro-ph.CO]].

[24] **S. C. Hotinli**, James B. Mertens, Matthew C. Johnson and Marc Kamionkowski, "*Probing correlated compensated isocurvature perturbations using scale-dependent galaxy bias*," doi:10.1103/PhysRevD.100.103528, `arXiv:1908.08953 [astro-ph.CO]`.

[25] **S. C. Hotinli**, M. Kamionkowski and A. H. Jaffe, "*The search for anisotropy in the gravitational-wave background with pulsar-timing arrays*," doi:10.21105/astro.1904.05348, `arXiv:1904.05348 [astro-ph.CO]`.

[26] **S. C. Hotinli** and Meyers, Joel and Dalal, Neal and Jaffe, Andrew H. and Johnson, Matthew C. and Mertens, James B. and Münchmeyer, Moritz and Smith, Kendrick M. and van Engelen, Alexander, "*Transverse Velocities with the Moving Lens Effect*," Phys. Rev. Lett. **123**, no. 6, 061301 (2019) doi:10.1103/PhysRevLett.123.061301, `arXiv:1812.03167 [astro-ph.CO]`.

[27] **S. C. Hotinli**, J. Frazer, A. H. Jaffe, J. Meyers, L. C. Price and E. R. M. Tarrant, "*Effect of reheating on predictions following multiple-field inflation*," Phys. Rev. D **97**, no. 2, 023511 (2018) doi:10.1103/PhysRevD.97.023511, `arXiv:1710.08913 [astro-ph.CO]`.

Significant contribution:

[28] S. Aiola *et al.* [CMB-HD], "*Snowmass2021 CMB-HD White Paper,*" [arXiv:2203.05728 [astro-ph.CO]].

[29] J. J. Renk *et al.* [GAMBIT Cosmology Workgroup], "*CosmoBit: A GAMBIT module for computing cosmological observables and likelihoods,*" JCAP **02**, 022 (2021) doi:10.1088/1475-7516/2021/02/022 [arXiv:2009.03286 [astro-ph.CO]].

Minor contribution:

[30] C. L. Chang, K. M. Huffenberger, B. A. Benson, F. Bianchini, J. Chluba, J. Delabrouille, R. Flauger, S. Hanany, W. C. Jones and A. J. Kogut, *et al.* "*Snowmass2021 Cosmic Frontier: Cosmic Microwave Background Measurements White Paper,*" [arXiv:2203.07638 [astro-ph.CO]].

[31] K. Abazajian *et al.* [CMB-S4], "*Snowmass 2021 CMB-S4 White Paper,*" [arXiv:2203.08024 [astro-ph.CO]].

[32] S. S. AbdusSalam, F. J. Agocs, B. C. Allanach, P. Athron, C. Balázs, E. Bagnaschi, P. Bechtle, O. Buchmueller, A. Beniwal and J. Bhom, *et al.* "*Simple and statistically sound strategies for analysing physical theories,*" [arXiv:2012.09874 [hep-ph]].

[33] P. Stöcker *et al.* [GAMBIT Cosmology Workgroup], "*Strengthening the bound on the mass of the lightest neutrino with terrestrial and cosmological experiments,*" Phys. Rev. D **103**, no.12, 123508 (2021) doi:10.1103/PhysRevD.103.123508 [arXiv:2009.03287 [astro-ph.CO]].

[34] W. R. Coulton, P. D. Meerburg, D. G. Baker, **S. C. Hotinli**, A. J. Duivenvoorden and A. van Engelen, "Minimizing gravitational lensing contributions to the primordial bispectrum covariance," arXiv:1912.07619 [astro-ph.CO].

[35] K. Basu *et al.*, "A Space Mission to Map the Entire Observable Universe using the CMB as a Backlight," arXiv:1909.01592 [astro-ph.CO]. Science White Paper submitted in response to the ESA Voyage 2050 call, 20 pages + title page + references.
Contribution: Edited part of Section 2.1.3 titled '*Cosmic velocity fields with the kSZ and moving lens effects*'. Provided the analysis that produced Figure 4, and produced Figure 4.

Please see arXiv and inpsire for a more complete list.