

# ADRIAN E. BAYER

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## EDUCATION

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**University of California, Berkeley, USA**

Ph.D. Physics

2018 - 2023

Thesis adviser: Uroš Seljak

**University of Cambridge, UK**

Master of Advanced Study, Mathematics

2017 - 2018

**Imperial College London, UK**

MSci Physics with Theoretical Physics

Graduated top of the cohort (approx. 250 students).

2013 - 2017

Thesis adviser: Fay Dowker

## VISITING RESEARCH POSITIONS

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**The University of Tokyo (Kavli IPMU), Japan**

Visiting Researcher

2022

Adviser: Jia Liu

**Massachusetts Institute of Technology, USA**

Undergraduate Researcher

2016

Adviser: Lindley Winslow

## HONORS AND AWARDS

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Outstanding Graduate Student Instructor Award, University of California, Berkeley, 2022

Berkeley Distinguished Graduate Fellows Video Prize (\$1,000 grant), University of California, Berkeley, 2019

The Berkeley Fellowship, University of California, Berkeley, 2018

Abdus Salam Undergraduate Prize, Imperial College London, 2017

Governors' MSci Prize in Physics, Imperial College London, 2017

Ken Allen Prize, Imperial College London, 2016

Winton Capital Prize for Outstanding Performance in Second Year Physics, Imperial College London, 2015

EPSRC Summer Vacation Bursary (£2,200 grant), Engineering and Physical Sciences Research Council, 2015

## SELECTED TALKS

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Berkeley Center for Cosmological Physics Summer Workshop, **Vipolže**, Slovenia

“Massive Neutrino Information in Large-Scale Structure and Field-Level Inference”

July 2022

GPU Workshop, **The University of Tokyo**, Japan

“Cosmological simulations on GPU with tensorflow”

May 2022

APEC Seminar, **The University of Tokyo (Kavli IPMU)**, Japan

“Towards detecting neutrino mass using non-linear cosmic structure”

April 2022

Cosmology with Weak Lensing: Beyond the 2-pt Statistics, **Kyoto University (YITP)**, Japan

“Detecting neutrino mass using nonlinear cosmic structure”

April 2022

Journal Club – Univers, **Institut d'Astrophysique de Paris (IAP)**, Paris, France

“Detecting neutrino mass using nonlinear cosmic structure”,

February 2022

Learn the Universe, **Center for Computational Astrophysics (CCA)**, Flatiron Institute, USA

“The Look-Elsewhere Effect”

August 2021

## BIBLIOGRAPHY

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1. **Bayer, A. E.**, C. Modi, and S. Ferraro. *Joint velocity and density reconstruction of the Universe with nonlinear differentiable forward modeling*. 2022. arXiv: [2210.15649](#) [[astro-ph.CO](#)]
2. **Bayer, A. E.**, J. Liu, R. Terasawa, A. Barreira, Y. Zhong, and Y. Feng. *Super-sample covariance of the power spectrum, bispectrum, halos, voids, and their cross-covariances*. 2022. arXiv: [2210.15647](#) [[astro-ph.CO](#)]
3. Ding, Z., C.-H. Chuang, Y. Yu, L. H. Garrison, **A. E. Bayer**, Y. Feng, C. Modi, D. J. Eisenstein, M. White, A. Variu, C. Zhao, H. Zhang, J. Meneses Rizo, D. Brooks, K. Dawson, P. Doel, E. Gaztanaga, R. Kehoe, A. Krolewski, M. Landriau, N. Palanque-Delabrouille, and C. Poppett. “The DESI N-body Simulation Project - II. Suppressing sample variance with fast simulations”. In: MNRAS 514.3 (Aug. 2022), pp. 3308–3328. DOI: [10.1093/mnras/stac1501](#). arXiv: [2202.06074](#) [[astro-ph.CO](#)]
4. **Bayer, A. E.**, A. Banerjee, and U. Seljak. “Beware of fake  $\nu$ ’s: The effect of massive neutrinos on the nonlinear evolution of cosmic structure”. In: Phys. Rev. D 105.12, 123510 (June 2022), p. 123510. DOI: [10.1103/PhysRevD.105.123510](#). arXiv: [2108.04215](#) [[astro-ph.CO](#)]
5. Kreisch, C. D., A. Pisani, F. Villaescusa-Navarro, D. N. Spergel, B. D. Wandelt, N. Hamaus, and **A. E. Bayer**. “The GIGANTES Data Set: Precision Cosmology from Voids in the Machine-learning Era”. In: ApJ 935.2, 100 (Aug. 2022), p. 100. DOI: [10.3847/1538-4357/ac7d4b](#). arXiv: [2107.02304](#) [[astro-ph.CO](#)]
6. **Bayer, A. E.**, U. Seljak, and J. Robnik. “Self-calibrating the look-elsewhere effect: fast evaluation of the statistical significance using peak heights”. In: MNRAS 508.1 (Nov. 2021), pp. 1346–1357. DOI: [10.1093/mnras/stab2331](#). arXiv: [2108.06333](#) [[astro-ph.IM](#)]
7. **Bayer, A. E.**, F. Villaescusa-Navarro, E. Massara, J. Liu, D. N. Spergel, L. Verde, B. D. Wandelt, M. Viel, and S. Ho. “Detecting Neutrino Mass by Combining Matter Clustering, Halos, and Voids”. In: ApJ 919.1, 24 (Sept. 2021), p. 24. DOI: [10.3847/1538-4357/ac0e91](#). arXiv: [2102.05049](#) [[astro-ph.CO](#)]
8. **Bayer, A. E.**, A. Banerjee, and Y. Feng. “A fast particle-mesh simulation of non-linear cosmological structure formation with massive neutrinos”. In: J. Cosmology Astropart. Phys. 2021.1, 016 (Jan. 2021), p. 016. DOI: [10.1088/1475-7516/2021/01/016](#). arXiv: [2007.13394](#) [[astro-ph.CO](#)]
9. **Bayer, A. E.** and U. Seljak. “The look-elsewhere effect from a unified Bayesian and frequentist perspective”. In: J. Cosmology Astropart. Phys. 2020.10, 009 (Oct. 2020), p. 009. DOI: [10.1088/1475-7516/2020/10/009](#). arXiv: [2007.13821](#) [[physics.data-an](#)]
10. Tomás, A., H. M. Araújo, A. J. Bailey, **A. Bayer**, E. Chen, B. López Paredes, and T. J. Sumner. “Study and mitigation of spurious electron emission from cathodic wires in noble liquid time projection chambers”. In: *Astroparticle Physics* 103 (Dec. 2018), pp. 49–61. DOI: [10.1016/j.astropartphys.2018.07.001](#). arXiv: [1801.07231](#) [[physics.ins-det](#)]

## REFEREEING

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Monthly Notices of the Royal Astronomical Society (MNRAS), 2022

Machine Learning for Astrophysics Workshop, International Conference on Machine Learning (ICML), 2022

## TEACHING

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Graduate Student Instructor for *Bayesian Data Analysis and Machine Learning for Physical Sciences*, 2021

Teaching Assistant for *Python for Physics*, Imperial College London, 2016

## MENTORING

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Malika Golshan (undergraduate at UC Berkeley, co-advised with Vanessa Böhm)

Project: Can AI reliably learn neutrino physics from N-body simulations?

Berkeley Compass Mentor, 2022

Adopt-a-Physicist Mentor, 2020