

Aaron Hillman

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EDUCATION

Princeton University

PhD, Theoretical Physics, advised by Prof. Nima Arkani-Hamed (Institute for Advanced Study)

- Studied scattering amplitudes in particle physics and string theory as well as cosmological correlators
- Published individually and in large collaborations

2018-2023

Princeton, NJ

Yale University

B.S. Physics Intensive—*magna cum laude*

- **Undergrad Coursework:** Mechanics, Scientific Programming, Partial Differential Equations, Abstract Algebra
- **Graduate Coursework:** General Relativity, Quantum Field Theory, Quantum Information, Statistical Physics

2014-2018

New Haven, CT

RESEARCH POSITIONS

Caltech – Postdoctoral Research

DuBridge Scholar, Walter Burke Institute for Theoretical Physics

- Continued work on scattering amplitudes and uniqueness of string theory, publishing in Physical Review Letters (PRL)
- Exploring topics in machine learning research

2023-

Pasadena, CA

Yale Summer Researcher – Theoretical Research

Undergraduate Researcher

- Research on conformal field theory advised by Prof. David Poland culminating in a publication

Summer 2017

New Haven, CT

Yale Summer Researcher – Experimental Group

Freshman Summer Research Fellow

- Worked in the Harris Lab modeling whispering gallery modes in a superfluid helium drop

Summer 2015

New Haven, CT

SELECTED PUBLICATIONS

For all my papers, see my [Google Scholar](#).

Spectral Constraints on Theories of Colored Particles and Gravity

Nov 2024

A. Hillman, Y. Huang, L. Rodina, J. Rumbutis. [arXiv](#).

- Derived a constraint requiring the existence of certain particles in weakly coupled UV completions of gravity with symmetry

A Bootstrap Principle for the Spectrum and Scattering of Strings

May 2024

C. Cheung, A. Hillman, G. Remmen. [arXiv](#).

- Motivated a non-trivial bootstrap problem whose unique solution we demonstrated to be the string amplitude

Differential Equations for Cosmological Correlators

Dec 2023

N. Arkani-Hamed, D. Baumann, A. Joyce, A. Hillman, H. Lee, G. Pimentel. [arXiv](#).

- Derived a system of graphical rules to efficiently and elegantly produce differential obeyed by cosmological correlators

A Subtraction Scheme for Feynman Integrals

Nov 2023

A. Hillman. [arXiv](#).

- Used mathematics motivated by string theory to solve an unsolved problem in the calculation of loop amplitudes in quantum field theory, furnishing the first systematic expansion of divergent loop integrals in terms of finite integrals in dimensional regularization

SELECTED INVITED TALKS

LeCosPa Seminar – National University of Taiwan

2024

“Stringy Completions of the Standard Model from the Bottom Up”

Taipei, TW

HET Seminar – Stanford Linear Accelerator (SLAC)

2024

“A Subtraction Scheme for Feynman Integrals”

Menlo Park, CA

Workshop on Tropical Geometry and IR Divergences – ETH Zurich

2024

“Feynman Polytopes and the Tropical Geometry of UV and IR Divergences”

Zurich, CH

HONORS AND AWARDS

- **Ford Foundation Fellowship (honorable mention)** – Fellowship to support graduate study in the sciences

2019

- **Wohlenberg Prize in Science** – For an outstanding senior in the sciences, Berkeley College, Yale

2018

- **Howard L. Schultz Prize in Physics** – For outstanding seniors in physics at Yale

2018

SKILLS

Programming: Python, Mathematica, LaTeX

Tools: PyTorch, NumPy. Experience with data science & HPC.

Teaching: Graduate: Topics in Quantum Mechanics and Gravity (Instructor: Edward Witten), High Energy Physics (Instructor: Isobel Ojalvo)

Undergraduate: Modern Classical Dynamics (Instructor: Alexander Polyakov), Physics for Future Leaders (Instructor: Paul Steinhardt), Tutor at Yale’s Center for Teaching and Learning

Languages: English (native), Spanish (native)