

# ATAKAN HILMI FIRAT

Center for Quantum Mathematics and Physics (QMAP), UC Davis, CA 95616, USA

+1 (857) 777-9546  $\diamond$  ahfirat@ucdavis.edu  $\diamond$  atakanhilmifirat.com

Inspire HEP  $\diamond$  arXiv  $\diamond$  Google Scholar  $\diamond$  ORCID

## RESEARCH INTERESTS

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*Theoretical high energy physics, string theory, and string field theory. I am currently interested in covariant phase space methods with a view towards applications to cosmological models in string theory.*

## ACADEMIC POSITIONS

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**QMAP, University of California Davis,**  
Postdoctoral Scholar

Sep 2024 - current

## EDUCATION

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**Massachusetts Institute of Technology,**  
Ph.D. in Physics,  
Thesis: “Hyperbolic String Field Theory”,  
Advisor: Barton Zwiebach,  
GPA: 5.00/5.00.

Aug 2019 - May 2024

**University of Colorado Boulder,**  
B.A. in Physics and Mathematics,  
Summa Cum Laude with distinction,  
Thesis: “Local Holographic Superconductors and Hovering Black Holes”,  
Advisor: Oliver DeWolfe,  
GPA: 4.00/4.00, graduated as valedictorian.

Aug 2015 - May 2019

## PUBLICATIONS

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- [1] Vinícius Bernardes, Theodore Erler, and **Atakan Hilmi Firat**. “Symplectic structure in open string field theory I: Rolling tachyons” (2025). arXiv: 2511.03777 [hep-th].
- [2] Vinícius Bernardes, Theodore Erler, and **Atakan Hilmi Firat**. “Covariant phase space and  $L_\infty$  algebras”. *JHEP* 09 (2025), p. 057. DOI: 10.1007/JHEP09(2025)057. arXiv: 2506.20706 [hep-th].
- [3] **Atakan Hilmi Firat** and Raji Ashenafi Mamade. “Boundary terms in string field theory”. *JHEP* 02 (2025), p. 058. DOI: 10.1007/JHEP02(2025)058. arXiv: 2411.16673 [hep-th].
- [4] **Atakan Hilmi Firat** and Nico Valdes-Meller. “Topological recursion for hyperbolic string field theory”. *JHEP* 11 (2024), p. 005. DOI: 10.1007/JHEP11(2024)005. arXiv: 2409.02982 [hep-th].
- [5] **Atakan Hilmi Firat**. “ $A_\infty$  perspective to Sen’s formalism”. *Nucl. Phys. B* 1008 (2024), p. 116691. DOI: 10.1016/j.nuclphysb.2024.116691. arXiv: 2405.05310 [hep-th].
- [6] Theodore Erler and **Atakan Hilmi Firat**. “Wilsonian effective potentials and closed string field theory”. *JHEP* 02 (2024), p. 018. DOI: 10.1007/JHEP02(2024)018. arXiv: 2311.17322 [hep-th].
- [7] **Atakan Hilmi Firat**. “String vertices for the large  $N$  limit”. *Nucl. Phys. B* 1000 (2024), p. 116485. DOI: 10.1016/j.nuclphysb.2024.116485. arXiv: 2311.00747 [hep-th].
- [8] Harold Erbin and **Atakan Hilmi Firat**. “Open string stub as an auxiliary string field”. *SciPost Phys.* 17 (2024), p. 044. DOI: 10.21468/SciPostPhys.17.2.044. arXiv: 2308.08587 [hep-th].

- [9] **Atakan Hilmi Fırat**. “Hyperbolic string tadpole”. *SciPost Phys.* 15.6 (2023), p. 237. DOI: 10.21468/SciPostPhys.15.6.237. arXiv: 2306.08599 [hep-th].
- [10] **Atakan Hilmi Fırat**. “Bootstrapping closed string field theory”. *JHEP* 05 (2023), p. 186. DOI: 10.1007/JHEP05(2023)186. arXiv: 2302.12843 [hep-th].
- [11] Harold Erbin and **Atakan Hilmi Fırat**. “Characterizing 4-string contact interaction using machine learning”. *JHEP* 04 (2024), p. 016. DOI: 10.1007/JHEP04(2024)016. arXiv: 2211.09129 [hep-th].
- [12] Sergei Alexandrov, **Atakan Hilmi Fırat**, Manki Kim, Ashoke Sen, and Bogdan Stefański. “D-instanton induced superpotential”. *JHEP* 07 (2022), p. 090. DOI: 10.1007/JHEP07(2022)090. arXiv: 2204.02981 [hep-th].
- [13] Harold Erbin, **Atakan Hilmi Fırat**, and Barton Zwiebach. “Initial value problem in string-inspired nonlocal field theory”. *JHEP* 01 (2022), p. 167. DOI: 10.1007/JHEP01(2022)167. arXiv: 2111.03672 [hep-th].
- [14] **Atakan Hilmi Fırat**. “Hyperbolic three-string vertex”. *JHEP* 08 (2021), p. 035. DOI: 10.1007/JHEP08(2021)035. arXiv: 2102.03936 [hep-th].

## SCHOLARSHIPS, HONORS, AND CERTIFICATES

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Presidential Graduate Fellowship Award, MIT.	Oct 2019
Stephen Hilley White Undergraduate Research Award, University of Colorado Boulder.	May 2019
Chancellor’s Recognition Award, University of Colorado Boulder.	May 2019
GRE Physics 990/990.	Sep 2018
George and Clara Moreno Scholarship, University of Colorado Boulder.	Aug 2017

## INVITED TALKS AND POSTERS

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What is string theory?, ODTÜ Physics Seminar, Ankara, Turkey.	Nov 2025
What is string theory?, Özyeğin University Colloquium, İstanbul, Turkey.	Nov 2025
Covariant Phase Space and $L_\infty$ Algebras, ICTS String Seminars, Bengaluru, India.	Sep 2025
What is string theory?, İYTE Physics Seminar, İzmir, Turkey.	Sep 2025
Covariant Phase Space and $L_\infty$ Algebras, MIT CTP Special Summer Seminar, Cambridge MA, USA.	Jul 2025
Covariant Phase Space and Homotopy Algebras, UC Davis Fields, Strings, Gravity Seminar, Davis CA, USA.	Mar 2025
Topological Recursion for Hyperbolic String Field Theory, The University of Tokyo String Seminar, Komaba, Japan.	Dec 2024
Topological Recursion for Hyperbolic String Field Theory, ICTS String Seminars, Bengaluru, India.	Oct 2024
String Field Theory: An Introduction, UC Davis Mathematical Physics Seminar, Davis CA, USA.	Sep 2024

<i>Recent Developments in (Hyperbolic) String Vertices, At the Interface of Physics, Mathematics, and AI, Pollica, Italy.</i>	<i>June 2023</i>
<i>Recent Developments in (Hyperbolic) String Vertices, CEA-LIST, Paris, France.</i>	<i>May 2023</i>
<i>Hyperbolic String Vertices, Matrix Models and String Field Theory, Benasque, Spain.</i>	<i>May 2023</i>
<i>Bootstrapping Closed String Field Theory, ICTS String Seminars, Bengaluru, India.</i>	<i>Apr 2023</i>
<i>Characterizing 4-string Contact Interaction Using Machine Learning, SITP Colloquia, Stanford University, Palo Alto CA, USA.</i>	<i>Nov 2022</i>
<i>Characterizing 4-string Contact Interaction Using Machine Learning, SFT 2022, FZU, Prague, Czechia.</i>	<i>Sep 2022</i>
<i>Introduction to String Vertices, FZU, Prague, Czechia.</i>	<i>Sep 2022</i>
<i>D-instanton Induced Superpotential, Poster, Strings 2022, University of Vienna, Vienna, Austria.</i>	<i>July 2022</i>
<i>D-instanton Induced Superpotential, SFT Journal Club.</i>	<i>May 2022</i>
<i>D-instanton Superpotential in Type II String Theory on Calabi-Yau Orientifolds, Seminar Series on String Phenomenology.</i>	<i>Mar 2022</i>
<i>D-instanton Superpotential in Type II String Theory on Calabi-Yau Orientifolds, Particle Theory Seminar, Cornell University, Ithaca NY USA.</i>	<i>Mar 2022</i>
<i>Initial Value Problem and Causality in String-Inspired Non-local Field Theory, SFT@Cloud 2021.</i>	<i>Sep 2021</i>
<i>Hyperbolic Three-String Vertex, Poster, Strings 2021, ICTP-SAIFR, Sao Paulo, Brazil.</i>	<i>June 2021</i>

## TEACHING AND MENTORING

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<i>Quantum Field Theory II, Teaching Assistant, MIT.</i>	<i>Fall 21, 22, 23</i>
<i>Quantum Field Theory III, Teaching Assistant, MIT.</i>	<i>Spring 21, 23</i>
<i>Directed Reading Program in Physics, Mentor, MIT.</i>	<i>Winter 21, 22</i>
<i>Graduate Quantum Mechanics I, Teaching Assistant, MIT.</i>	<i>Fall 20</i>
<i>Classical Mech. and Math. Methods II, Learning Assistant, University of Colorado Boulder.</i>	<i>Spring 19</i>
<i>Foundations of Modern Physics, Learning Assistant, University of Colorado Boulder.</i>	<i>Fall 17</i>

## SERVICE AND OUTREACH

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<i>Referee: JHEP, Modern Mathematical Physics, Nuclear Physics B, Symmetry.</i>	<i>Current</i>
<i>Member of MSRP Physics Application Review Committee, MIT.</i>	<i>Winter 23</i>
<i>MIT Physics Graduate Students Friday Social, Chair, MIT.</i>	<i>Fall 22</i>
<i>CTP Graduate Student Faculty Search Committee, Committee Head, MIT.</i>	<i>Fall 21</i>