

ATAKAN HILMI FIRAT

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RESEARCH INTERESTS

Theoretical high energy physics, string theory, and string field theory. I am currently interested in getting physical predictions out of closed string field theory using hyperbolic geometry.

ACADEMIC POSITIONS

QMAP, University of California Davis,
Postdoctoral Scholar

Sep 2024

EDUCATION

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

- [1] **Atakan Hilmi Firat**. “ A_∞ perspective to Sen’s formalism”. In: (May 2024). arXiv: 2405.05310 [hep-th].
- [2] Theodore Erler and **Atakan Hilmi Firat**. “Wilsonian effective potentials and closed string field theory”. In: *JHEP* 02 (2024), p. 018. DOI: 10.1007/JHEP02(2024)018. arXiv: 2311.17322 [hep-th].
- [3] **Atakan Hilmi Firat**. “String vertices for the large N limit”. In: *Nucl. Phys. B* 1000 (2024), p. 116485. DOI: 10.1016/j.nuclphysb.2024.116485. arXiv: 2311.00747 [hep-th].
- [4] Harold Erbin and **Atakan Hilmi Firat**. “Open string stub as an auxiliary string field”. In: (Aug. 2023). arXiv: 2308.08587 [hep-th].
- [5] **Atakan Hilmi Firat**. “Hyperbolic string tadpole”. In: *SciPost Phys.* 15.6 (2023), p. 237. DOI: 10.21468/SciPostPhys.15.6.237. arXiv: 2306.08599 [hep-th].
- [6] **Atakan Hilmi Firat**. “Bootstrapping closed string field theory”. In: *JHEP* 05 (2023), p. 186. DOI: 10.1007/JHEP05(2023)186. arXiv: 2302.12843 [hep-th].
- [7] Harold Erbin and **Atakan Hilmi Firat**. “Characterizing 4-string contact interaction using machine learning”. In: *JHEP* 04 (2024), p. 016. DOI: 10.1007/JHEP04(2024)016. arXiv: 2211.09129 [hep-th].

- [8] Sergei Alexandrov, **Atakan Hilmi Firat**, Manki Kim, Ashoke Sen, and Bogdan Stefański. “D-instanton induced superpotential”. In: *JHEP* 07 (2022), p. 090. DOI: 10.1007/JHEP07(2022)090. arXiv: 2204.02981 [hep-th].
- [9] Harold Erbin, **Atakan Hilmi Firat**, and Barton Zwiebach. “Initial value problem in string-inspired nonlocal field theory”. In: *JHEP* 01 (2022), p. 167. DOI: 10.1007/JHEP01(2022)167. arXiv: 2111.03672 [hep-th].
- [10] **Atakan Hilmi Firat**. “Hyperbolic three-string vertex”. In: *JHEP* 08 (2021), p. 035. DOI: 10.1007/JHEP08(2021)035. arXiv: 2102.03936 [hep-th].

SCHOLARSHIPS, HONORS, AND CERTIFICATES

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

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

TEACHING AND MENTORING

<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>
<i>Analysis I, Grader, University of Colorado Boulder.</i>	<i>Spring 17</i>
<i>Precalculus Mathematics, Grader, University of Colorado Boulder.</i>	<i>Fall 16</i>

SERVICE AND OUTREACH

<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>