Jonathan J. Heckman

Department of Physics and Astronomy
University of Pennsylvania
209 South 33rd Street
Philadelphia, PA 19104-6396
phone: (215)-573-9070
e-mail: jheckman [at] sas.upenn.edu
Homepage: `http://www.jjheckman.com`

Positions Held

University of Pennsylvania, Department of Physics and Astronomy, Philadelphia PA
Professor, July 2025 - Present

University of Pennsylvania, Department of Mathematics, Philadelphia PA
Secondary Appointment, July 2019 - Present

University of Pennsylvania, Department of Physics and Astronomy, Philadelphia PA
Undergraduate Chair, July 2026 - June 2029

University of Pennsylvania, Department of Physics and Astronomy, Philadelphia PA
Associate Professor, July 2020 - June 2025

University of Pennsylvania, Department of Physics and Astronomy, Philadelphia PA
Assistant Professor, July 2017 - June 2020

University of North Carolina, Department of Physics and Astronomy, Chapel Hill NC
Assistant Professor, July 2014 - June 2017

Columbia University, Department of Physics, New York NY, and
CUNY Graduate Center, Initiative for the Theoretical Sciences, New York NY
On Leave from UNC Chapel Hill, September 2015 - May 2016

Harvard University, Department of Physics, Cambridge MA
Postdoctoral Researcher, September 2012 - August 2014

Institute for Advanced Study, School of Natural Sciences, Princeton NJ
Postdoctoral Member, September 2009 - August 2012

Education

Ph.D. Physics, Harvard University, June 2009

Dissertation: F-theory Approach to Particle Physics

Advisor: Cumrun Vafa

A.M. Physics, Harvard University, June 2005

A.B. Physics, Princeton University, June 2004, *Summa Cum Laude, Phi Beta Kappa, Sigma Xi*

Senior Thesis: Large R-charged Sectors of the AdS/CFT Correspondence

Advisors: Curtis G. Callan, Jr. and Steven S. Gubser

Research Interests

String Theory, Quantum Field Theory, and its application to:
Particle Theory, Cosmology, Quantum Gravity, Mathematics, Information Theory, Machine Learning

Selected Honors and Awards

Gravity Research Foundation, Honorable Mention (with C. Cummings), 2026

University Research Foundation Award, University of Pennsylvania, 2025

Eisenbud Lectures in Mathematics and Physics at Brandeis University, 2024

University Research Foundation Award (Co-PI), University of Pennsylvania, 2023

University Research Foundation Conference Award, University of Pennsylvania, 2023

NSF CAREER Grant, 2015 - 2020

University Research Foundation Award, University of Pennsylvania, 2020

Junior Faculty Development Award, UNC Chapel Hill, 2016

STFC Ernest Rutherford Fellowship, 2014 - 2019 (declined)

PCTS Fellowship, Princeton University, 2009 - 2012 (declined)

NSF Graduate Research Fellowship, 2005 - 2008

Purcell Fellowship, Harvard University, 2004 - 2005

APS Apker Award for Undergraduate Research, 2004

Grants

Co-PI for DOE Grant: "University of Pennsylvania Theoretical Program," 2021 - 2028

PI for UPenn University Research Foundation Award: "Probing Quantum Spacetimes with Symmetries," 2025 - 2026

PI for BSF Grant: "Generalized Symmetries from String Theory" 2023 - 2027

PI for DOE Grant: "Geometry and Strings Conference 2023," 2023

Co-PI for UPenn University Research Foundation Award: "Generalized Symmetries of Quantum Fields and Gravity," 2023 - 2024

PI for UPenn University Research Foundation Conference Award: "Geometry and Strings 2023," 2023

PI for UPenn School of Arts and Sciences SAS Conference Grant: "Geometry and Strings 2023," 2023

PI for DOE Grant: "Particles and Fields via String Compactification," 2020 - 2021

PI for UPenn University Research Foundation Award: "Geometry and Physics of Extra Dimensions," 2020 - 2021

PI for NSF CAREER Grant: "Effective Field Theories from String Compactification," 2015 - 2020

Co-PI for NSF Grant: "A Regional Conference Series in Mathematical String Theory," 2016 - 2019

UNC Chapel Hill Junior Faculty Development Award, 2016 - 2017

Teaching and Advising Experience

Courses Taught

Physics 6632 (formerly 632) (University of Pennsylvania); Relativistic Quantum Field Theory, Spring 2022, Spring 2023, Spring 2024

Physics 6601 (formerly 601) (University of Pennsylvania); Introduction to Field Theory, Fall 2018, Fall 2019, Fall 2020, Fall 2021, Fall 2022, Fall 2023, Fall 2024, Fall 2025

Physics 0140 / 0150 (formerly 140 / 150) (University of Pennsylvania); Principles I (Calculus Based Mechanics), Spring 2018, Spring 2019, Spring 2020, Spring 2021, Spring 2025, Spring 2026

Physics 5501 (formerly 501) (University of Pennsylvania); Topics in Research (One Guest Lecture per Semester), Fall 2017, Fall 2018, Fall 2019, Fall 2020, Fall 2021, Fall 2022, Fall 2023, Fall 2024, Fall 2025

Physics 119 (UNC Chapel Hill); Calculus Based Electromagnetism and Quanta, Spring 2017

Physics 883 (UNC Chapel Hill); Current Advances in Physics; Topics in String Theory, Fall 2016

Physics 119, Studio 502 (UNC Chapel Hill); Calculus Based Electromagnetism and Quanta, Spring 2015

Physics 117, Studio 502 (UNC Chapel Hill); Calculus Based Electromagnetism and Optics, Fall 2014

Physics 15b, Section Instructor (Harvard); Introductory Electricity and Magnetism, Spring 2009

Graduate Students

Atakan Çavuşoğlu (University of Pennsylvania); Expected Ph.D. Date: Spring 2029

Vivek Chakrabhavi (University of Pennsylvania); Expected Ph.D. Date: Spring 2028

Rebecca Hicks (University of Pennsylvania, Co-Advisor along with E. Thomson); Expected Ph.D. Date: Spring 2027

Noah Braeger (University of Pennsylvania); Ph.D. Spring 2025

Dissertation: Topological Approach to Quantum Gravity and String Theory

Hao Y. Zhang (University of Pennsylvania, Co-Advisor along with M. Cvetič); Ph.D. Summer 2023

Dissertation: Generalized Symmetries in Supergravities and Superconformal Field Theories via String Theory

Ethan Torres (University of Pennsylvania); Ph.D. Spring 2023

Dissertation: Modern Perspectives on Symmetries in Quantum Fields and Strings

Thomas Rochais (University of Pennsylvania); Ph.D. Spring 2021

Dissertation: Geometric Approaches to Quantum Fields and Strings at Strong Couplings

Ramon Fowler (UNC Chapel Hill); Ph.D. Spring 2020

Dissertation: Information Theoretic Interpretations of Renormalization Group Flow

Arada Malekian (UNC Chapel Hill); Ph.D. Summer 2016

Dissertation: Theory and Phenomenology of Kinetic Mixing at Strong Coupling

Visiting Graduate Students

Xingyang Yu (NYU); Visitor to University of Pennsylvania from Spring 2021 - Spring 2023

Luigi Tizzano (Uppsala University); Visitor to UNC Chapel Hill in Spring 2017 and University of Pennsylvania in Fall 2017

Undergraduate Students

Vivek Krishnan (University of Pennsylvania); Spring 2026 - Present

Sanjit Kobla (University of Pennsylvania); Spring 2026 - Present

Kason Kunkelmann (University of Pennsylvania); Spring 2025 - Present

Becka Terzakis (University of Pennsylvania); Spring 2023 - Spring 2024

Marc Klinger (University of Pennsylvania); Fall 2018 - Summer 2020

Ali Ghorashi (University of Pennsylvania); Summer 2018

Supervised Postdocs

Jeffrey Kuntz (University of Pennsylvania); September 2025 - August 2027

Brian McPeak (Visiting scholar, postdoc at Syracuse University); September 2024 - August 2025

Chitraang Murdia (University of Pennsylvania); September 2023 - August 2026

Monica Kang (University of Pennsylvania); September 2023 - August 2025

Max Hübner (University of Pennsylvania); September 2021 - August 2024

Andrew P. Turner (University of Pennsylvania); September 2020 - August 2024

Florent Baume (Visiting on SNF Grant); November 2020 - August 2022

Markus Dierigl (Visiting on DFG Grant); October 2019 - December 2020

Craig Lawrie (University of Pennsylvania); September 2018 - August 2021

Gianluca Zoccarato (University of Pennsylvania); October 2018 - September 2021

Fabio Apruzzi (UNC Chapel Hill and University of Pennsylvania); September 2015 - August 2018

Falk Hassler (UNC Chapel Hill and University of Pennsylvania); September 2015 - August 2018

Scientific Publications

Publications ordered according to when they appeared on the pre-print arXiv for high energy physics theory (hep-th) and phenomenology (hep-ph). Year (20yy) and month (mm) of publication is indicated by the first four numbers in an arXiv listing: yymm. In high energy theory publications all authors are ordered alphabetically.

INSPIRE-HEP Profile

Google Scholar Profile

123. J.J. Heckman, R.J. Hicks, and C. Murdia, "Generalized Complexity Distances and Non-Invertible Symmetries," hep-th/2604.14275.

122. O. Bergman, J.J. Heckman, M. Hübner, D. Migliorati, X. Yu, and H.Y. Zhang, "On the SymTFTs of Finite Non-Abelian Symmetries," hep-th/2603.12323.

121. A. Çavuşoğlu, M. Cveti'vc, J.J. Heckman, J. Kuntz, and C. Murdia, "Gravitational Background of Alice-Vortices and R7-Branes," hep-th/2602.13196.

120. C. Cummings and J.J. Heckman, "The Topological Equivalence Principle: On Decoupling TFTs from Gravity," hep-th/2601.09781.

119. M. Cvetič, R. Donagi, J.J. Heckman, and M. Hübner, "Extra-Dimensional η-Invariants and Anomaly Theories," hep-th/2512.17906.

118. V. Chakrabhavi, A. Debray, M. Dierigl, and J.J. Heckman, "Exploring Pintopia: Reflection Branes, Bordisms, and U-Dualities," hep-th/2509.03573. Submitted to Phys. Rev. D.

117. J.J. Heckman, J. McNamara, J. Parra-Martinez, and E. Torres, "GSO Defects: IIA/IIB Walls and the Surprisingly Stable R7-Brane," hep-th/2507.21210. Submitted to Phys. Rev. D.

116. J.J. Heckman, M. Hübner, and C. Murdia, "Symmetry Theories, Wigner's Function, Compactification, and Holography," Phys. Rev. **D113, No. 2**, 026003 (2026) hep-th/2505.23887.

115. N. Braeger, A. Debray, M. Dierigl, J.J. Heckman, and M. Montero, "Cobordism Utopia: U-Dualities, Bordisms, and the Swampland," hep-th/2505.15885. Accepted in ATMP.

114. N. Braeger, V. Chakrabhavi, J.J. Heckman, and M. Hübner, "Generalized Symmetries of Non-SUSY and Discrete Torsion Backgrounds," SciPost Phys. **19, No. 6** 160 (2025) hep-th/2504.10484.

113. J.J. Heckman, M. Hübner, and C. Murdia, "On the Holographic Dual of a Symmetry Operator at Finite Temperature," Phys. Rev. **D112, No. 12** 126010 (2025) hep-th/2503.16427.

112. M. Cvetič, J.J. Heckman, M. Hübner, and C. Murdia, "Metric Isometries, Holography, and Continuous Symmetry Operators," Phys. Rev. **D112, No. 10** 106020 (2025) hep-th/2501.17911.

111. M. Baumgart, P. Christeas, J.J. Heckman, and R.J. Hicks, "How to Falsify String Theory at a Collider," Phys. Rev. Res. **7, No. 2**, 023184 (2025) hep-ph/2412.13192.

110. J.J. Heckman, A. Sharon, and M. Watanabe, "6d Large Charge and 2d Virasoro Blocks," Phys. Rev. **D111, No. 4** 045002 (2025) hep-th/2409.05944.

109. J.J. Heckman, C. Vafa, T. Weigand, and F. Xu, "The Dark Dimension and the Grand Unification of Forces," Phys. Rev. **D111, No. 4** 046014 (2025) hep-th/2409.01405.

108. M. Cvetič, R. Donagi, J.J. Heckman, M. Hübner, and E. Torres, "Cornering Relative Symmetry Theories," Phys. Rev. **D111** 085026 (2025) hep-th/2408.12600.

107. J.J. Heckman and M. Hübner, "Celestial Topology, Symmetry Theories, and Evidence for a Non-SUSY D3-Brane CFT," Fortsch. Phys. 2400270 (2025) hep-th/2406.08485.

106. J.J. Heckman, O.F. Ramadan, and J. Sakstein, "First Constraints on a Pixelated Universe in Light of DESI," Phys. Rev. **D111, No. 2** 023510 (2025) astro-ph.CO/2406.04408.

105. N. Braeger, V. Chakrabhavi, J.J. Heckman, and M. Hübner, "Generalized Symmetries of Non-Supersymmetric Orbifolds," Phys. Rev. **D111** 066015 (2025) hep-th/2404.17639.

104. J.J. Heckman, J. McNamara, M. Montero, A. Sharon, C. Vafa, and I. Valenzuela, "On the Fate of Stringy Non-Invertible Symmetries," Phys. Rev. **D110** 106001 (2024) hep-th/2402.00118.

103. J.J. Heckman, M. Hübner, and C. Murdia, "On the Holographic Dual of a Topological Symmetry Operator," Phys. Rev. **D110, No. 4** 046007 (2024) hep-th/2401.09538.

102. F. Baume, J.J. Heckman, M. Hübner, E. Torres, A.P. Turner, and X. Yu, "SymTrees and Multi-Sector QFTs," Phys. Rev. **D109, No. 10** 106013 (2024) hep-th/2310.12980.

101. M. Cvetič, J.J. Heckman, M. Hübner, and E. Torres, "Generalized Symmetries, Gravity and the Swampland," Phys. Rev. **D109, No. 2** 026012 (2024) hep-th/2307.13027.

100. M. Cvetič, J.J. Heckman, M. Hübner, and E. Torres, "Fluxbranes, Generalized Symmetries, and Verlinde's Metastable Monopole," Phys. Rev. **D109, No. 4** 046007 (2024) hep-th/2305.09665.

99. M. Dierigl, J.J. Heckman, M. Montero, and E. Torres, "R7-Branes as Charge Conjugation Operators," Phys. Rev. **D109, No. 4** 046004 (2024) hep-th/2305.05689.

98. B.S. Acharya, M. Del Zotto, J.J. Heckman, M. Hübner, and E. Torres, "Junctions, Edge Modes, and G_2-Holonomy Orbifolds," Beijing J. Pure and Appl. Math. **Vol. 1, No. 1** 153 (2024) hep-th/2304.03300.

97. A. Debray, M. Dierigl, J.J. Heckman, and M. Montero, "The Chronicles of IIBordia: Dualities, Bordisms, and the Swampland," ATMP **Vol. 28, No. 3** 805 (2024) hep-th/2302.00007.

96. J.J. Heckman, M. Hübner, E. Torres, X. Yu, and H.Y. Zhang, "Top Down Approach to Topological Duality Defects," Phys. Rev. **D108, No. 4** 046015 (2023) hep-th/2212.09743.

95. M. Dierigl, J.J. Heckman, M. Montero, and E. Torres, "IIB Explored: Reflection 7-Branes," Phys. Rev. **D107, No. 8** 086015 (2023) hep-th/2212.05077.

94. J.J. Heckman, M. Hübner, E. Torres, and H.Y. Zhang, "The Branes Behind Generalized Symmetry Operators," Fortsch. Phys. **71, No. 1** 2200180 (2023) hep-th/2209.03343.

93. F. Baume, J.J. Heckman, and C. Lawrie, "Super-Spin Chains for 6D SCFTs," Nucl. Phys. **B992** 116250 (2023) hep-th/2208.02272.

92. J.J. Heckman, A. Joyce, J. Sakstein, and M. Trodden, "Exploring $2+2$ Answers to $3+1$ Questions," Int. J. Mod. Phys. **A37, No. 34** 2250201 (2022) hep-th/2208.02267.

91. J.J. Heckman, C. Lawrie, L. Lin, H.Y Zhang, and G. Zoccarato, "6d SCFTs, Center-Flavor Symmetries, and Stiefel–Whitney Compactifications," Phys. Rev. **D106** 6, 066003 (2022) hep-th/2205.03411.

90. D.S. Berman, J.J. Heckman, and M. Klinger, "On the Dynamics of Inference and Learning," contribution to "Machine Learning in Pure Mathematics and Theoretical Physics," Chief Editor: Yang-Hui He, World-Scientific (2023) cond-mat.dis-nn/2204.12939.

89. J.J. Heckman, "Extra W-Boson Mass from a D3-Brane," Phys. Lett. **B833** 137387 (2022) hep-ph/2204.05302.

88. M. Cvetič, J.J. Heckman, M. Hübner, and E. Torres, "0-Form, 1-Form and 2-Group Symmetries via Cutting and Gluing of Orbifolds," Phys. Rev. **D106** 106003 (2022) hep-th/2203.10102.

87. P.C. Argyres, J.J. Heckman, K. Intriligator, and M. Martone, "Snowmass White Paper on SCFTs," (Invited submission as part of theory effort of Snowmass Process) hep-th/2202.07683.

86. M. Del Zotto, J.J. Heckman, S.N. Meynet, R. Moscrop, and H.Y. Zhang, "Higher Symmetries of 5d Orbifold SCFTs," Phys. Rev. **D106** 046010 (2022) hep-th/2201.08372.

85. J.J. Heckman, A.P. Turner, and X. Yu, "Disorder Averaging and its UV (Dis)Contents," Phys. Rev. **D105** 8, 086021 (2022) hep-th/2111.06404.

84. M. Baumgart, J.J. Heckman, and L. Thomas, "CFTs Blueshift Tensor Fluctuations Universally," JCAP **07** 034 (2022) hep-ph/2109.08166.

83. R. Fowler and J.J. Heckman, "Misanthropic Entropy and Renormalization as a Communication Channel," Int. J. Mod. Phys. **A37, No. 16** 2250109 (2022) hep-th/2108.02772.

82. A. Debray, M. Dierigl, J.J. Heckman, and M. Montero, "The anomaly that was not meant IIB," Fortsch. Phys. **70** 2100168 (2022) hep-th/2107.14227.

81. M. Cvetič, J.J. Heckman, E. Torres, and G. Zoccarato, "Reflections on the Matter of 3d $\mathcal{N}=1$ Vacua and Local $Spin(7)$ Compactifications," Phys. Rev. **D105** 2, 026008 (2022) hep-th/2107.00025.

80. J.J. Heckman, S. Kundu, and H.Y. Zhang, "EFT of 6D SUSY RG Flows," Phys. Rev. **D104** 8, 085017 (2021) hep-th/2103.13395.

79. V. Balasubramanian, J.J. Heckman, E. Lipeles, and A.P. Turner, "Statistical Coupling Constants from Hidden Sector Entanglement," Phys. Rev. **D103** 6, 066024 (2021) hep-th/2012.09182.

78. M. Dierigl and J.J. Heckman, "On the Swampland Cobordism Conjecture and Non-Abelian Duality Groups," Phys. Rev. **D103** 6, 066006 (2021) hep-th/2012.00013.

77. J.J. Heckman, C. Lawrie, T.B. Rochais, H.Y. Zhang, and G. Zoccarato, "S-folds, String Junctions, and 4D $\mathcal{N}=2$ SCFTs," Phys. Rev. **D103** 6, 086013 (2021) hep-th/2009.10090.

76. J.J. Heckman, "Qubit Construction in 6D SCFTs," Phys. Lett. **B811** 135891 (2020) hep-th/2007.08545.

75. F. Baume, J.J. Heckman, and C. Lawrie, "6D SCFTs, 4D SCFTs, Conformal Matter, and Spin Chains," Nucl. Phys. **B967** 115401 (2021) hep-th/2007.07262.

74. M. Dierigl, J.J. Heckman, T.B. Rochais, and E. Torres, "Geometric Approach to 3D Interfaces at Strong Coupling," Phys. Rev. **D102** 10, 106011 (2020) hep-th/2005.05983.

73. M. Cvetič, J.J. Heckman, T.B. Rochais, E. Torres, and G. Zoccarato, "Geometric Unification of Higgs Bundle Vacua," Phys. Rev. **D102** 10, 106012 (2020) hep-th/2003.13682.

72. F. Apruzzi, M. Fazzi, J.J. Heckman, T. Rudelius, and H.Y. Zhang, "General Prescription for Global $U(1)$'s in 6D SCFTs," Phys. Rev. **D101**, 086023 (2020) hep-th/2001.10549.

71. F. Hassler, J.J. Heckman, T.B. Rochais, T. Rudelius, and H.Y. Zhang, "T-Branes, String Junctions, and 6D SCFTs," Phys. Rev. **D101**, 086018 (2020) hep-th/1907.11230.

70. R. Barbosa, M. Cvetič, J.J. Heckman, C. Lawrie, E. Torres, and G. Zoccarato, "T-Branes and G_2 Backgrounds," Phys. Rev. **D101**, 026015 (2020) hep-th/1906.02212.

69. J.J. Heckman and C. Vafa, "Fine Tuning, Sequestering, and the Swampland," Phys. Lett. **B798** 135004 (2019) hep-th/1905.06342.

68. J.J. Heckman, C. Lawrie, L. Lin, J. Sakstein, and G. Zoccarato, "Pixelated Dark Energy," Fortsch. Phys. **67, No. 11** 1900071 (2019) hep-th/1901.10489.

67. J.J. Heckman, C. Lawrie, L. Lin, and G. Zoccarato, "F-theory and Dark Energy," Fortsch. Phys. **67, No. 10** 1900057 (2019) hep-th/1811.01959.

66. F. Apruzzi, F. Hassler, J.J. Heckman, and T.B. Rochais, "Nilpotent Networks and 4D RG Flows," JHEP **05** 074 (2019) hep-th/1808.10439.

65. J.J. Heckman, T. Rudelius, and A. Tomasiello, "Fission, Fusion, and 6D RG Flows," JHEP **02** 167 (2019) hep-th/1807.10274.

64. M. Cvetič, J.J. Heckman, and L. Lin, "Towards Exotic Matter and Non-Abelian Discrete Symmetries in F-theory," JHEP **11** 001 (2018) hep-th/1806.10594.

63. J.J. Heckman and T. Rudelius, "Top Down Approach to 6D SCFTs," J. Phys. A **52, No. 9** 093001 (2019) hep-th/1805.06467.

62. F. Apruzzi, J.J. Heckman, D.R. Morrison, and L. Tizzano, "4D Gauge Theories with Conformal Matter," JHEP **09** 088 (2018) hep-th/1803.00582.

61. F. Hassler and J.J. Heckman, "Punctures and Dynamical Systems," Lett. Math. Phys. **109, No. 3** 449 (2018) hep-th/1711.03973.

60. J.J. Heckman and L. Tizzano, "6D Fractional Quantum Hall Effect," JHEP **05** 120 (2018) hep-th/1708.02250.

59. F. Apruzzi, J.J. Heckman, and T. Rudelius, "Green-Schwarz Automorphisms and 6D SCFTs," JHEP **02** 157 (2018) hep-th/1707.06242.

58. M. Del Zotto, J.J. Heckman, and D.R. Morrison, "6D SCFTs and Phases of 5D Theories," JHEP **09** 147 (2017) hep-th/1703.02981.

57. L.B. Anderson, J.J. Heckman, S. Katz, and L.P. Schaposnik, "T-Branes at the Limits of Geometry," JHEP **10** 058 (2017) hep-th/1702.06137.

56. F. Apruzzi, F. Hassler, J.J. Heckman, and I.V. Melnikov, "From 6D SCFTs to Dynamic GLSMs," Phys. Rev. **D96** 066015 (2017) hep-th/1610.00718.

55. J.J. Heckman, P. Jefferson, T. Rudelius, and C. Vafa, "Punctures for Theories of Class $\mathcal{S}_\Gamma$," JHEP **03** 171 (2017) hep-th/1609.01281.

54. M. Del Zotto, J.J. Heckman, P. Kumar, A. Malekian, and B. Wecht, "Kinetic Mixing at Strong Coupling," Phys. Rev. **D95** 016007 (2017) hep-ph/1608.06635.

53. J.J. Heckman, J.G. Bernstein, and B. Vigoda, "MCMC with Strings and Branes: The Suburban Algorithm," stat.CO/1605.06122; "MCMC with Strings and Branes: The Suburban Algorithm (Extended Version)," Int. J. Mod. Phys. **A32, No. 22** 1750133 (2017) physics.comp-ph/1605.05334.

52. F. Apruzzi, F. Hassler, J.J. Heckman, and I.V. Melnikov, "UV Completions for Non-Critical Strings," JHEP **07** 045 (2016) hep-th/1602.04221.

51. J.J. Heckman, T. Rudelius, and A. Tomasiello, "6D RG Flows and Nilpotent Hierarchies," JHEP **07** 082 (2016) hep-th/1601.04078.

50. J.J. Heckman, "750 GeV Diphotons from a D3-brane," Nucl. Phys. **B906** 231-240 (2016) hep-th/1512.06773.

49. L. Bhardwaj, M. Del Zotto, J.J. Heckman, D.R. Morrison, T. Rudelius, and C. Vafa, "F-theory and the Classification of Little Strings," Phys. Rev. **D93** 086002 (2016) hep-th/1511.05565.

48. J.J. Heckman and T. Rudelius, "Evidence for C-theorems in 6D SCFTs," JHEP **09** 218 (2015) hep-th/1506.06753.

47. J.J. Heckman, D.R. Morrison, T. Rudelius, and C. Vafa, "Geometry of 6D RG Flows," JHEP **09** 052 (2015) hep-th/1505.00009.

46. M. Del Zotto, J.J. Heckman, D.S. Park, and T. Rudelius, "On the Defect Group of a 6D SCFT," Lett. Math. Phys. **106, No. 6** 765-786 (2016) hep-th/1503.04806.

45. J.J. Heckman, D.R. Morrison, T. Rudelius, and C. Vafa, "Atomic Classification of 6D SCFTs," Fortsch. Phys. **63** 468-530 (2015) hep-th/1502.05405.

44. M. Del Zotto, J.J. Heckman, D.R. Morrison, and D.S. Park, "6D SCFTs and Gravity," JHEP **06** 158 (2015) hep-th/1412.6526.

43. V. Balasubramanian, J.J. Heckman, and A. Maloney, "Relative Entropy and Proximity of Quantum Field Theories," JHEP **05** 104 (2015) hep-th/1410.6809.

42. J.J. Heckman, "More on the Matter of 6D SCFTs," Phys. Lett. **B747** 73-75 (2015) hep-th/1408.0006.

41. M. Del Zotto, J.J. Heckman, A. Tomasiello, and C. Vafa, "6d Conformal Matter," JHEP **02** 054 (2015) hep-th/1407.6359.

40. J. Heckman and H. Verlinde, "Covariant Non-Commutative Space-Time," Nucl. Phys. **B894** 58-74 (2015) hep-th/1401.1810.

39. J.J. Heckman, D.R. Morrison, and C. Vafa, "On the Classification of 6D SCFTs and Generalized ADE Orbifolds," JHEP **05** 028 (2014) hep-th/1312.5746.

38. J.J. Heckman, H. Lin, and S.-T. Yau, "Building Blocks for Generalized Heterotic/F-theory Duality," Adv. Theor. Math. Phys. **18** 1463-1503 (2014) hep-th/1311.6477.

37. L.B. Anderson, J.J. Heckman, and S. Katz, "T-Branes and Geometry," JHEP **05** 080 (2014) hep-th/1310.1931.

36. J.J. Heckman, "Statistical Inference and String Theory," Int. J. Mod. Phys. **A30, No. 26** 1550160 (2015) hep-th/1305.3621.

35. J.J. Heckman, P. Kumar, and B. Wecht, "S and T for SCFTs," Phys. Rev. **D88** 065016 (2013) hep-th/1212.2979.

34. J.J. Heckman, C. Vafa, D. Xie, and M. Yamazaki, "String Theory Origin of Bipartite SCFTs," JHEP **05** 148 (2013) hep-th/1211.4587.

33. L. Bellantoni, J. Erler, J.J. Heckman, and E. Ramirez-Homs, "Masses of a Fourth Generation with Two Higgs Doublets," Phys. Rev. **D86** 034022 (2012) hep-ph/1205.5580.

32. J.J. Heckman, P. Kumar, and B. Wecht, "The Higgs as a Probe of Supersymmetric Extra Sectors," JHEP **07** 118 (2012) hep-ph/1204.3640.

31. J.J. Heckman and H. Verlinde, "Instantons, Twistors, and Emergent Gravity," hep-th/1112.5210.

30. J.J. Heckman and H. Verlinde, "Gravity Amplitudes from a Gaussian Matrix Model," JHEP **09** 150 (2013) hep-th/1112.5209.

29. J.J. Heckman, P. Kumar, C. Vafa, and B. Wecht, "Electroweak Symmetry Breaking in the DSSM," JHEP **01** 156 (2012) hep-ph/1108.3849.

28. J.J. Heckman and H. Verlinde, "Super Yang-Mills Theory as a Twistor Matrix Model," hep-th/1104.2605.

27. J.J. Heckman, C. Vafa, and B. Wecht, "The Conformal Sector of F-theory GUTs," JHEP **07** 075 (2011) hep-th/1103.3287.

26. J.J. Heckman and S.-J. Rey, "Baryon and Dark Matter Genesis from Strongly Coupled Strings," JHEP **06** 120 (2011) hep-th/1102.5346.

25. S. Cecotti, C. Córdova, J.J. Heckman, and C. Vafa, "T-Branes and Monodromy," JHEP **07** 030 (2011) hep-th/1010.5780.

24. J.J. Heckman, Y. Tachikawa, C. Vafa, and B. Wecht, "$\mathcal{N} = 1$ SCFTs from Brane Monodromy," JHEP **11** 132 (2010) hep-th/1009.0017.

23. J.J. Heckman and C. Vafa, "An Exceptional Sector for F-theory GUTs," Phys. Rev. **D83** 026006 (2011) hep-th/1006.5459.

22. J.J. Heckman and H. Verlinde, "Evidence for F(uzz) Theory," JHEP **01** 044 (2011) hep-th/1005.3033.

21. J.J. Heckman, J. Shao, and C. Vafa, "F-theory and the LHC: Stau Search," JHEP **09** 020 (2010) hep-ph/1001.4084.

20. J.J. Heckman, "Particle Physics Implications of F-Theory," Ann. Rev. Nuc. Part. Sci. **60** 237 (2010) hep-th/1001.0577.

19. S. Cecotti, M.C.N. Cheng, J.J. Heckman, and C. Vafa, "Yukawa Couplings in F-theory and Non-Commutative Geometry," Surv. in Diff. Geom. **15** 37-97 (2010) hep-th/0910.0477.

18. J.J. Heckman, A. Tavanfar, and C. Vafa, "The Point of E_8 in F-theory GUTs," JHEP **08** 040 (2010) hep-th/0906.0581.

17. J.J. Heckman and C. Vafa, "CP Violation and F-theory GUTs," Phys. Lett. **B694** 482 (2011) hep-th/0904.3101.

16. V. Bouchard, J.J. Heckman, J. Seo, and C. Vafa, "F-theory and Neutrinos: Kaluza-Klein Dilution of Flavor Hierarchy," JHEP **01** 061 (2010) hep-ph/0904.1419.

15. J.J. Heckman, G.L. Kane, J. Shao, and C. Vafa, "The Footprint of F-theory at the LHC," JHEP **10** 039 (2009) hep-ph/0903.3609.

14. J.J. Heckman, A. Tavanfar, and C. Vafa, "Cosmology of F-theory GUTs," JHEP **04** 054 (2010) hep-th/0812.3155.

13. J.J. Heckman and C. Vafa, "Flavor Hierarchy From F-theory," Nucl. Phys. **B837** 137 (2010) hep-th/0811.2417.

12. J.J. Heckman and C. Vafa, "From F-theory GUTs to the LHC," hep-ph/0809.3452.

11. J.J. Heckman and C. Vafa, "F-theory, GUTs, and the Weak Scale," JHEP **09** 079 (2009) hep-th/0809.1098.

10. J.J. Heckman, J. Marsano, N. Saulina, S. Schäfer-Nameki, and C. Vafa, "Instantons and SUSY Breaking in F-theory," hep-th/0808.1286.

9. C. Beasley, J.J. Heckman, and C. Vafa, "GUTs and Exceptional Branes in F-theory - II: Experimental Predictions," JHEP **01** 059 (2009) hep-th/0806.0102.

8. C. Beasley, J.J. Heckman, and C. Vafa, "GUTs and Exceptional Branes in F-theory - I," JHEP **01** 058 (2009) hep-th/0802.3391.

7. J.J. Heckman, C. Vafa, H. Verlinde, M. Wijnholt, "Cascading to the MSSM," JHEP **06** 016 (2008) hep-ph/0711.0387.

6. J.J. Heckman and C. Vafa, "Geometrically Induced Phase Transitions at Large N," JHEP **04** 052 (2008) hep-th/0707.4011.

5. J.J. Heckman, J. Seo, and C. Vafa, "Phase Structure of a Brane/Anti-Brane System at Large N," JHEP **07** 073 (2007) hep-th/0702077.

4. J.J. Heckman and C. Vafa, "Crystal Melting and Black Holes," JHEP **09** 011 (2007) hep-th/0610005.

3. S.S. Gubser and J.J. Heckman, "Thermodynamics of R-charged Black Holes in AdS_5 From Effective Strings," JHEP **11** 052 (2004) hep-th/0411001.

2. C.G. Callan, Jr., J. Heckman, T. McLoughlin, and I. Swanson, "Lattice super Yang-Mills: A virial approach to operator dimensions," Nucl. Phys. **B701** 180 (2004) hep-th/0407096.

1. J.J. Heckman, M.P. Ledbetter, and M.V. Romalis, "Enhancement of SQUID-Detected NMR Signals with Hyperpolarized Liquid ^{129}Xe in a 1 μT Magnetic Field," Phys. Rev. Lett. **91** 067601 (2003).

Published Conference Proceedings

J.J. Heckman, "Unification and D3-Branes in F-theory," GUT2012 AIP Conf. Proc. **1467**, 122-129 (2012).

Semi-Popular Articles

J.J. Heckman, "Quantum Probability," at sempercurious.com (2019).

J.J. Heckman, "F-theory and Experiment," Contemp. Phys. **51** 331-348 (2010).

Invited Conference and Workshop Talks

"¿What is an R7-Brane?" February 2026 "Southwest Strings Meeting" Arizona State University, Tempe USA

"Cobordism Pintopia" September 2025 "Strings in Seoul 2025" KIAS, Seoul Korea

"Cobordism Utopia" August 2025 "Simons Summer Workshop" Simons Center for Geometry and Physics, State University of New York, Stony Brook USA

"¡The R7-Brane is Stable!" July 2025 "String Phenomenology Conference" Northeastern University, Boston USA

"Cobordism Utopia: U-Dualities, Bordisms, and the Swampland" June 2025 "String Math 2025" BIMSA, Beijing China

"Geometric Approach to Symmetries at Finite Temperature" April 2025 "Strings and Geometry 2025" ICTP, Trieste Italy

"Cobordism Utopia" January 2025 "Symmetries and Gravity" Harvard University Center of Mathematical Sciences and Applications, Cambridge USA

"Top Down Generalizations of SymTFTs" August 2024 "Symmetries 2024" Mathematical Institute, University of Oxford, Oxford UK

"Symmetries of Non-SUSY String Backgrounds" July 2024 "Simons Summer Workshop" Simons Center for Geometry and Physics, State University of New York, Stony Brook USA

"Top Down Approach to Generalized Symmetries in Quantum Field Theory and Quantum Gravity" July 2024 "International Congress of Basic Science" BIMSA, Beijing China

"Celestial Topology, Symmetry Theories, and Non-SUSY D3-Brane CFTs" June 2024 "String Phenomenology Conference" University of Padua, Padua Italy

"Generalized Symmetries of Non-Supersymmetric Orbifolds" May 2024 "Strings and Geometry" Conference, Hamburg University, Hamburg Germany

"Symmetries Approach to Non-Supersymmetric String Backgrounds" April 2024 "Spacetime and String Theory" KITP, Santa Barbara USA

"Symmetries from Branes and Branes from Symmetries" March 2024 "Geometry, Strings and the Swampland Program" Schloss Ringberg, Tegernsee Germany

"What Happens to Topological Symmetries Operators in Quantum Gravity?" March 2024 "Modern Perspectives of Symmetry" Symposium at CUNY Graduate Center, New York USA

Panelist for "String universality and classification of string vacua" December 2023 "Deconstructing the String Landscape (a.k.a. landscapia)" IPhT, CEA-Saclay, France

"SymTrees and Multi-Sector QFTs" November 2023 "NYU Satellite Workshop on Global Categorical Symmetries" NYU, New York USA

"Symmetries via Branes: To Infinity and Beyond" August 2023 "Categorical Aspects of Symmetries" NORDITA, Stockholm Sweden

"Generalized Symmetries, Gravity, and Topological Non-Decoupling" July 2023 "String Phenomenology Conference" Center for Theoretical Physics of the Universe (CTPU) at the Institute for Basic Science (IBS), Daejeon South Korea

"IIB Determined" June 2023 "Simons Summer Workshop" Simons Center for Geometry and Physics, State University of New York, Stony Brook USA

"The Branes Behind Generalized Symmetry Operators" September 2022 "Generalized Global Symmetries, Quantum Field Theory, and Geometry" Simons Center for Geometry and Physics, State University of New York, Stony Brook USA

"Reflections on F-theory and the Swampland Cobordism Conjecture" July 2022 "String Phenomenology Conference" University of Liverpool, Liverpool UK

"Getting High on Gluing Orbifolds (Introduction)" June 2022 "Geometry, Topology and Singular Special Holonomy Spaces" Freiburg University, Freiburg Germany

"Higher Symmetries via Cutting and Gluing" May 2022 "Strings and Geometry" Conference, Utrecht University, Utrecht The Netherlands

"6D SCFTs, 4D SCFTs, Conformal Matter and Spin Chains" March 2022 "Workshop on Elliptic Integrable Systems" Online Workshop hosted by Berkeley University, Berkeley USA

"Disorder Averaging and its UV (Dis)Contents" September 2021 "Geometry of (S)QFT" Online Workshop hosted by Simons Center for Geometry and Physics, State University of New York, Stony Brook USA

"Quantum Reflections in 3D QFTs and their Local Spin(7) Counterparts" September 2021 "Special Holonomy: Progress and Open Problems 2021" Simons Center for Geometry and Physics, State University of New York, Stony Brook USA

"Life Without Holomorphy" July 2021 "String Phenomenology Conference" Online Conference hosted by Northeastern University, Boston USA

Panelist for online discussion on "Open Problems in Special Holonomy from a Physics Point of View" September 2020 "Special Holonomy: Progress and Open Problems 2020" for Simons Collaboration on Special Holonomy in Geometry, Analysis, and Physics

Moderator for online panel discussion on "Physics of Higgs Bundles and $G_2/Spin(7)$ Spaces" September 2020 "Special Holonomy: Progress and Open Problems 2020" for Simons Collaboration on Special Holonomy in Geometry, Analysis, and Physics

"F-theory and Interfaces" June 2020 "String Phenomenology Conference" Northeastern University, Boston USA (cancelled due to COVID-19)

"QFT at finite temperature, UV consistency in $d > 2$, and RG flows" (Discussion Leader) May 2020 "Physics Sessions Initiative" Crete Greece (cancelled due to COVID-19)

"F-theory and Interfaces" April 2020 "Strings and Geometry" Conference, Utrecht University, Utrecht The Netherlands (cancelled due to COVID-19)

"String Motivated Strongly Coupled Extra Sectors" February 2020 "Inflationary Reheating Meets Particle Physics Frontier" KITP, Santa Barbara USA

"Fine Tuning, Sequestering, and the Swampland" September 2019 "Navigating the Swampland" Instituto de Física Teórica, Madrid Spain

"T-Branes, String Junctions, and 6D SCFTs" September 2019 "Geometry and Strings Conference" Mathematical Institute, University of Oxford, Oxford UK

"Pixelated Dark Energy" July 2019 "Simons Summer Workshop" Simons Center for Geometry and Physics, State University of New York, Stony Brook USA

"F-theory and Dark Energy" June 2019 "String Phenomenology Conference" CERN

"F-theory and $Spin(7)$ Manifolds" April 2019 "Simons Collaboration Special Holonomy Meeting" KITP, Santa Barbara USA

"F-theory and Dark Energy" February 2019 "Southwest Strings Meeting" Arizona State University, Tempe USA

"T-Branes and RG Flows" September 2018 "Physics and Mathematics of F-theory" Harvard University Center of Mathematical Sciences and Applications, Cambridge USA

"4D Gauge Theories with Conformal Matter" April 2018 "23rd European String Workshop (EuroStrings): Strings, Geometry and Black Holes" King's College London United Kingdom

"4D Gauge Theories with Conformal Matter" March 2018 "Physics and Geometry of F-theory" Instituto de Física Teórica, Madrid Spain

"Canonical Singularities, Superconformal Field Theories, and More Exotic Geometric Structures in Elliptic Fibrations and F-theory" January 2018 "Workshop on Geometry and Physics of F-theory" Banff International Research Station, Banff Canada

"Punctures and Dynamical Systems" January 2018 "SCFTs in 6 and lower dimensions" Tsinghua Sanya International Mathematics Forum, Sanya China

"6D Fractional Quantum Hall Effect" October 2017 "Fields and Duality 2017" Ludwig Maximilians Universität, Munich Germany

"6D SCFTs and Phases of 5D Theories" March 2017 "Aspen Winter Conference on Superconformal Field Theories in $d \geq 4$" Aspen, USA

"T-Branes Gone Wild" February 2017 "Physics and Geometry of F-theory" ICTP, Trieste Italy

"F-theory on Ten-Manifolds" October 2016 "Physics and Mathematics of F-theory" Virginia Tech, USA

"Defects of 6D CFTs" July 2016 "Simons Summer Workshop" Simons Center for Geometry and Physics, State University of New York, Stony Brook USA

"On the Classification of 6D RG Flows" February 2016 "F-theory at 20" Caltech, USA

"Higher Derivative Holography, E-Strings, and a 6D Conformal Anomaly" August 2015 "FRG Workshop in Cambridge" Harvard University, USA

"Periodic Table of 6D SCFTs" July 2015 "Simons Summer Workshop" Simons Center for Geometry and Physics, State University of New York, Stony Brook USA

"Geometry of 6D SCFTs" June 2015 "Strings 2015" Bangalore India

"All 6D SCFTs From F-theory" February 2015 "Physics and Geometry of F-theory" Max-Planck-Institut für Physics, Munich Germany

"Strongly Coupled Extra Sectors" November 2014 "Hidden Dark Matter Conference" University of Michigan at Ann Arbor, USA

"Relative Entropy and Proximity of Quantum Field Theories" July 2014 "Frontiers in String Phenomenology" Schloss Ringberg, Tegernsee Germany

"On the Classification of 6D SCFTs" June 2014 "String Math 2014" University of Alberta, Edmonton Canada

"Building Blocks for Generalized Heterotic / F-theory Duality" April 2014 "Heterotic Strings and $(0,2)$ QFT" Mitchell Institute for Fundamental Physics and Astronomy, Texas A & M University, USA

"On the Classification of 6D SCFTs" April 2014 "Supersymmetric Quantum Field Theories in Five and Six Dimensions" Perimeter Institute, Waterloo Canada

"The Higgs Sector and Supersymmetric Extra Sectors" October 2012 "Frontiers Beyond the Standard Model III" The William I. Fine Theoretical Physics Institute, University of Minnesota, USA

"Higgs and Extra Sectors" October 2012 "4th Bethe Center Workshop on Unification and String Theory" Physikzentrum, Bad Honnef Germany

"Higgs and Extra Sectors" September 2012 "New Challenges for String Phenomenology" Instituto de Física Teórica, Madrid Spain

"Covariant Non-Commutative Geometry From String Theory" August 2012 "FRG Workshop in Cambridge: Generalized Geometry, String Theory and Deformations" Harvard University, USA

"Exceptional CFTs From D3-Brane Probes of 7-Branes" August 2012 "Simons Summer Workshop" (Beach Talk), Simons Center for Geometry and Physics, State University of New York, Stony Brook USA

"Covariant Non-Commutative Geometry From String Theory" July 2012 "Strings 2012" Munich Germany

"Flavor and Funparticles From F-theory" June 2012 "PASCOS Meeting" Mérida Mexico

"F-theory Phenomenology: Summary Talk" March 2012 "F-theory Workshop" Simons Center for Geometry and Physics, Stony Brook USA

"Unification and D3-Branes" March 2012 "International Workshop on Grand Unified Theories" Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto Japan

"Delta-deformed Supersymmetric Standard Model" September 2011 "StringVac Conference" Busan Korea

"Electroweak Symmetry Breaking in the DSSM" August 2011 "String Phenomenology Conference" University of Wisconsin, Madison USA

"Fuzzy Twistors and Emergent Gravity" (parallel session) August 2011 "Division of Particles and Fields of the American Physical Society" Brown University, Providence USA

"The Conformal Sector of F-theory GUTs" May 2011 "String Vacuum Project Meeting" University of Pennsylvania, Philadelphia USA

"Quantum Field Theory and Fuzzy Twistors" May 2011 "Solvay Workshop on Gauge Theories, Strings and Geometry" Vrije Universiteit Brussel, Brussels Belgium

"Probing T-Branes" January 2011 "Indian Strings Meeting" Puri India

"Neutrinos and Proton Decay in F-theory GUTs" October 2010 "2010 Workshop on Major DUSEL Physics Topics" South Dakota School of Mines and Technology, Rapid City USA

"F-theory Model Building" September 2010 "Crete Conference on Gauge Theories and the Structure of Spacetime" Orthodox Academy of Crete, Kolymbari Crete

"Evidence for F(uzz) Theory" July 2010 "String Phenomenology Conference" Collège de France, Paris France

"The Fuzzy Side of Decoupling Gravity" June 2010 "Cosmological Frontiers in Fundamental Physics" Perimeter Institute, Waterloo Canada

"Minimal F-theory GUTs at the LHC" March 2010 "Strings at the LHC and in the Early Universe" KITP String Phenomenology Workshop, Santa Barbara USA

"Signatures of Minimal F-theory GUTs" February 2010 "GUTs and Strings" Workshop, Max-Planck-Institut für Physics, Munich Germany

"Particle Physics and F-theory" January 2010 "Workshop on Elliptic Fibrations and F-Theory" IPMU, University of Tokyo, Kashiwa-no-Ha Japan

"The Geometry of Flavor in F-theory GUTs" December 2009 "XV Christmas Workshop: Windows on the Unknown" Universidad Autónoma de Madrid, Madrid Spain

"Geometric Unification in F-theory" September 2009 "15^{th} European Workshop on String Theory" Swiss Federal Institute of Technology, Zürich Switzerland

"Geometric Unification in F-theory" July 2009 "Simons Summer Workshop" State University of New York, Stony Brook USA

"The Point of E_8 in F-theory GUTs" July 2009 "Quantum Theory and Symmetries 6 Conference" (parallel session), University of Kentucky, Lexington USA

"Flavor in F-theory" June 2009 "Strings 2009" Rome Italy

"The Point of E_8 in F-theory GUTs" June 2009 "14^{th} Itzykson Meeting on String Theory"

"The Point of E_8 in F-theory GUTs" June 2009 "String Phenomenology Conference" University of Warsaw, Warsaw Poland

"Flavor Hierarchy From F-theory GUTs" February 2009 "GUTs in Strings" Workshop at DESY, Hamburg Germany

"From F-theory GUTs to the Weak Scale" October 2008 "Stringy Reflections on the LHC" Workshop at Clay Mathematics Institute, Cambridge Massachusetts USA

"GUTs and Exceptional Branes in F-theory" (parallel session) June 2008 "PASCOS Meeting" Perimeter Institute, Waterloo Canada

"GUTs and Exceptional Branes in F-theory" July 2008 "Amsterdam Summer Workshop on String Theory" Center for Mathematical Physics, Amsterdam The Netherlands

"Stringy Standard Models" August 2007 "Simons Summer Workshop" State University of New York, Stony Brook USA

"Apker Award Talk" April 2005 Meeting of American Physical Society, Tampa Bay USA

Invited Seminars, Colloquia, and Lectures

"Symmetries Approach to Quantum Fields and Quantum Gravity" April 30 Special Seminar, Fine Theoretical Physics Institute at University of Minnesota

"¿What is an R7-Brane?" February 2026 Princeton Gravity Initiative Seminar, Princeton University

"Using Holography to get Branes from Symmetries" May 2025 Fields, Strings, and Gravity Seminar, UC

Davis, Online Seminar

"On the Holographic Dual of Symmetries at Finite Temperature" April 2025 High Energy Theory Seminar, Texas A&M University

"Cobordism Utopia" February 2025 High Energy Theory Seminar, IAS at Princeton

"How to Falsify String Theory at a Collider" January 2025 Mathematics - String Theory Seminar, Kavli IPMU, University of Tokyo, Kashiwa-no-Ha Japan

"On the Fate of Global Symmetries in Gravity" October 2024 Swampland Seminar, Harvard University

"Top Down Generalizations of Symmetry Theories" May 2024 String Theory Seminar, DESY, Hamburg Germany

Eisenbud Lectures in Mathematics and Physics April 2024, Brandeis University

Lecture 1: "Geometric Approach to Quantum Fields"

Lecture 2: "Top Down Approach to Global Categorical Symmetries"

Lecture 3: "Topological Approach to Symmetries in Quantum Gravity"

"Discussion on Generalized Symmetries and String Theory" March 2024 "What is String Theory? Weaving Perspectives Together" program at KITP, Santa Barbara

"SymTrees and Multi-Sector QFTs" October 2023 Algebraic Geometry, Dualities and Strings Seminar Series, Yau Mathematical Sciences Center at Tsinghua university, Beijing China

"IIB Determined" October 2023 High Energy Theory Seminar, Peking University, Beijing China

"Topological Aspects of String Phenomenology: Verlinde's Monopole Revisited" May 2023 (Online Talk) Oxford Theoretical Particle Physics Seminar, Oxford UK

"IIBordia" May 2023 Swampland Online Seminar Series

"IIB Determined" May 2023 String / Gravity Seminar, MIT Center for Theoretical Physics

"Top Down Approach to Categorical Symmetries" March 2023 String-Math Seminar, UC Berkeley

"IIB Determined" February 2023 New High Energy Theory Center Seminar, Rutgers University

"Top Down Approach to Generalized Symmetries" February 2023 String Theory Seminar, Virginia Tech

"Top Down Approach to Ensemble Averaging" March 2022 Queen Mary University of London High Energy Theory Seminar, Online Seminar Series

"Top Down Approach to Ensemble Averaging" March 2022 University of British Columbia High Energy Theory Seminar, Online Seminar Series

"Top Down Approach to Ensemble Averaging" March 2022 CERN High Energy Theory Seminar, Online Seminar Series

"Higher Symmetries of 5D Orbifold SCFTs" March 2022 Imperial College London Quiver Meeting, Online Seminar Series

"Geometric Engineering Ensemble Averages" December 2021 High Energy Theory Seminar, Simons Center for Geometry and Physics, Online Seminar Series

"Disorder Averaging and its UV (Dis)Contents" October 2021 High Energy Theory Seminar, Texas A&M University

"A Model of Couplings" July 2021 High Energy Theory Seminar at University of Liverpool Online Seminar Series

"Speculations on Physical Discretization and Arithmetic Geometry" May 2021 Mathematics and String Theory Seminar at Kavli IPMU Online Seminar Series

"On 6D RG Flows" May 2021 Mathematics and String Theory Seminar at Kavli IPMU Online Seminar Series

"A Model of Couplings" April 2021 High Energy Physics Seminar at University of Michigan Online Seminar Series

"A Model of Couplings" March 2021 High Energy Physics Seminar at McGill University Online Seminar Series

"6D SCFTs and Spin Chains" November 2020 Theoretical Elementary Particle Physics Seminar at UCLA Online Seminar Series

"Top Down Approach to Quantum Fields" October 2020 Colloquium Talk at Harvard CMSA Online Seminar Series

"Physical Discretization and Arithmetic Geometry" October 2020 Arithmetic Geometry and Quantum Field Theory Online Seminar Series

"QFT in $D > 4$ and its $D \leq 4$ Descendants" March 2020 High Energy Physics Seminar, Ohio State University (cancelled due to COVID-19)

"QFT in $D > 4$ and its $D \leq 4$ Descendants" March 2020 Cosmology / High Energy Physics Seminar, Johns Hopkins University

"Top Down Approach to Quantum Fields" October 2019 Colloquium Talk at Department of Physics and Astronomy, University of Pennsylvania

"Proximity of Field Theories and Coarse Graining" June 2019 Informal Blackboard Talk, ITS at CUNY Graduate Center

"F-theory and Dark Energy" March 2019 Swampland Seminar Series, Harvard University

"F-theory and Dark Energy" November 2018 LEPP High Energy Theory Seminar, Cornell University

"Top Down Approach to Quantum Fields" October 2018 Colloquium Talk at Department of Physics and Astronomy, University of Alabama, Tuscaloosa

"4D Gauge Theories with Conformal Matter" June 2018 High Energy Theory Seminar, Texas A&M University

"String Theory and 6D SCFTs" January 2017 High Energy Theory Seminar, University of Pennsylvania

"String Theory and the Real World" November 2016 Colloquium Talk at Department of Physics and Physical Oceanography, University of North Carolina, Wilmington

"UV Completions for Super-Critical Strings" March 2016 New High Energy Theory Center Seminar, Rutgers University

"UV Completions for Super-Critical Strings" March 2016 Theory Seminar, City College of New York

"The Big List of Little Strings" December 2015 Theory Seminar, YITP State University of New York at Stony Brook

"What is a 6D SCFT?" October 2015 Fundamental Theory Seminar, Syracuse University

"String Theory and the Real World" September 2015 Theory Seminar, University of Virginia at Charlottesville

"All 6D SCFTs From String Theory" September 2015 Theory Seminar, Columbia University

"All 6D SCFTs From F-theory" April 2015 Theory Group Seminar, University of Texas at Austin

"Effective Field Theories From String Compactification" March 2015 Theory Seminar, UC Davis

"Classification of All 6D SCFTs" December 2014 Theory HEP Seminar, McGill University

"Classification of All 6D SCFTs" December 2014 String Theory Seminar, Berkeley Center for Theoretical Physics

"On the Matter of 6D SCFTs" October 2014 Web Seminar for String Seminar at Seoul National University, Seoul Korea

"String Theory and the Real World" April 2014 Center for Neutrino Physics Seminar, Virginia Tech

"What is a T-Brane?" April 2014 Geometry, Algebra, Singularities, Combinatorics Seminar, Northeastern University

"On the Classification of 6D SCFTs" March 2014 High Energy Theory Seminar, University of Pennsylvania

"Covariant Non-Commutative Spacetime" February 2014 High Energy Theory Blackboard Talk, University of North Carolina, Chapel Hill

"String Theory and the Real World" February 2014 Physics and Astronomy Colloquium, University of North Carolina, Chapel Hill

"On the Classification of 6D SCFTs" November 2013 String Group Meeting, Harvard University

"Statistical Inference and String Theory" September 2013 String / Gravity Seminar, MIT Center for Theoretical Physics

"Strings and the Standard Model" May 2013 Seminar at DAMTP, University of Cambridge

"Global T-Branes" May 2013 String Group Meeting, Harvard University

"Covariant Non-Commutative de Sitter Space" April 2013 Joint SISSA / ICTP String Seminar, SISSA Trieste Italy

"Covariant Non-Commutative Spacetime" March 2013 High Energy Theory Seminar, IAS at Hong Kong University of Science and Technology

"Simplifying The Search For A Stringy Standard Model" March 2013 Physics Seminar, Hong Kong University of Science and Technology

"Covariant Non-Commutative de Sitter Space" February 2013 Quantum Gravity Seminar, Radcliffe Institute for Advanced Study at Harvard University

"Lorentz Invariant Fuzz and String Theory" September 2012 String Group Meeting, Harvard University

"Instantons, Twistors and 4D Gravity" May 2012 High Energy Theory Seminar, Niels Bohr Institute, Copenhagen University

"Instantons, Twistors and 4D Gravity" May 2012 High Energy Theory Seminar, IAS at Princeton

"4D Gravity from a Matrix Model" April 2012 Particle Theory Group Seminar, University of Chicago

"4D Gravity from a Matrix Model" April 2012 Theory Seminar, Columbia University

"4D Gravity as a Twistor Matrix Model" March 2012 String Theory Seminar, Brandeis University

"Beyond the Standard Model with Strongly Coupled Strings" March 2012 High Energy Theory Seminar, University of California San Diego

"Emergent Gravity from a Twistor Matrix Model" February 2012 String Theory Seminar, Perimeter Institute

"Connecting Strings to Things" January 2012 High Energy Theory Seminar, Princeton University

"Quasi-Hidden Sectors From Strongly Coupled Strings" April 2011 New High Energy Theory Center Seminar, Rutgers University

"Quasi-Hidden Sectors From Strongly Coupled Strings" March 2011 String Theory Seminar, Berkeley Center for Theoretical Physics

"Visible and Hidden Sectors of F-theory GUTs" February 2011 String/Gravity Seminar, MIT Center for Theoretical Physics

"$\mathcal{N} = 1$ SCFTs from Brane Monodromy" September 2010 Physics Group Meeting, IAS at Princeton

"Fuzzy Fenomenology" April 2010 LEPP High Energy Theory Seminar, Cornell University

"Signatures of Minimal F-theory GUTs" March 2010 High Energy Theory Seminar McGill University

"Signatures of Minimal F-theory GUTs" March 2010 String Theory Seminar, Perimeter Institute

"Signatures of Minimal F-theory GUTs" February 2010 New High Energy Theory Center Seminar, Rutgers University

"Signatures of Minimal F-theory GUTs" February 2010 High Energy Theory Seminar, Bartol Research Institute, University of Delaware

"Signatures for F-theory" October 2009 CMS group, CERN

"Signatures for F-theory" October 2009 ATLAS group, CERN

"Aspects of F-theory GUTs" October 2009 Theory Group Seminar, Caltech

"Geometric Unification in the F-theory GUT II" October 2009 Physics Group Meeting, IAS at Princeton

"Geometry and Unification in F-theory GUTs" September 2009 High Energy Physics Seminar, NYU

"Geometric Unification in the F-theory GUT I" September 2009 Physics Group Meeting, IAS at Princeton

"Flavor Hierarchy From F-theory GUTs" April 2009 Theory Group Seminar, University of New Hampshire

"Flavor Hierarchy From F-theory GUTs" March 2009 Theory Group Seminar, University of Texas at Austin

"Flavor Hierarchy From F-theory GUTs" March 2009 Particle Theory Group Seminar, University of Chicago

"Flavor Hierarchy From F-theory GUTs" February 2009 High Energy Theory Seminar, Michigan Center For Theoretical Physics, University of Michigan

"F-theory GUTs II" December 2008 In House Phenomenology Seminar, Harvard University

"Flavor Hierarchy From F-theory" December 2008 String Group Meeting, Berkeley Center for Theoretical Physics

"Flavor Hierarchy From F-theory" November 2008 Math/Physics Seminar, University of Pennsylvania

"Flavor Hierarchy From F-theory" November 2008 String Lunch Seminar, MIT

"F-theory GUTs I" November 2008 In House Phenomenology Seminar, Harvard University

"From F-theory GUTs to the Weak Scale" October 2008 High Energy Theory Seminar, Texas A&M University

"From F-theory GUTs to the Weak Scale" September 2008 High Energy Theory Seminar, IAS at Princeton

"GUTs and Exceptional Branes in F-theory" February 2008 Theoretical Physics Seminar, Brown University

"GUTs and Exceptional Branes in F-theory" February 2008 String Group Meeting, Harvard University

"Cascading to the MSSM" November 2007 String Meets Phenomenology Seminar, Harvard University

"A Cascading Quiver and the MSSM" October 2007 Theory Group Seminar, Caltech

"D-branes, Quivers and the MSSM" October 2007 String Meets Phenomenology Seminar, Harvard University

"Phase Structure of a Brane/Anti-Brane System at Large N" April 2007 SITP Seminar, Stanford University

"Phase Structure of a Brane/Anti-Brane System at Large N" February 2007 String Group Meeting, Harvard University

"Metastable Branes and a New Stringy Monopole" January 2007 Graduate String Seminar, Harvard University

"Crystal Melting and Black Holes" October 2006 String Group Meeting, Harvard University

"Dimer Models in Gauge and String Theories" April 2006 Graduate String Seminar, Harvard University

Invited Lectures at Specialized Schools

"Top Down Approach to Symmetries in Quantum Field Theory and Gravity" (Four Review Lectures) January 2025 "19th Asian Winter School on Strings, Particles and Cosmology" Sanya China

"Lectures on Geometric Engineering" (Four Review Lectures) May 2019 "Graduate Summer School on the Mathematics and Physics of Hitchin Systems" Simons Center for Geometry and Physics, Stony Brook USA

"6D SCFTs via String Theory" (Three Review Lectures) July 2016 "School on String Theory, Quantum Field Theory, and Geometry of Spacetime" Tsinghua University, Beijing China

"6D SCFTs from String Compactification" (Four Review Lectures) April 2016 "School on the Mathematics of String Theory" Centre International de Rencontres Mathematiques, Marseille France

"Top Down Approach to 6D SCFTs" (Four Review Lectures) February 2016 "CERN Winter School on Supergravity, Strings, and Gauge Theory" CERN

"6D SCFTs from F-theory" (Two Review Lectures) November 2015 "8th Taiwan String Workshop" National Tsing Hua University, Hsinchu Taiwan

"6D Superconformal Field Theories" (Two Web Seminar Review Lectures) September 2015 "Liouville, Integrability and Branes" APCTP, Pohang Korea

"F-theory" (Five Review Lectures) July 2012 "Graduate Summer School on String Phenomenology" Simons Center for Geometry and Physics, Stony Brook USA

"Particle Physics and F-theory" (Three Review Lectures) January 2011 "Fifth Asian Winter School on Strings, Particles and Cosmology" Jeju Korea

Professional Activities

Journal Referee for:

Journal of High Energy Physics

European Physical Journal C

European Physical Journal Plus

Nuclear Physics B

Physics Letters B

Physical Review D

International Journal of Modern Physics A

Communications in Mathematical Physics

Notices of the American Mathematical Society

Grant Reviewer for:

National Science Foundation (NSF)

Department of Energy (DOE)

European Research Council (ERC)

Belgian Fonds de la Recherche (FNRS)

Austrian Science Fund (FWF)

Chilean National Science and Technology Commission (CONICYT)

Deutsche Forschungsgemeinschaft (German Research Foundation)

German-Israeli Foundation for Scientific Research and Development

United States-Israel Binational Science Foundation (BSF)

Israel Science Foundation (ISF)

Irish Research Council

Netherlands Veni Domain Science (NWO)

United Kingdom Science and Technology Facilities Council (STFC)

University of Pennsylvania Center for Undergraduate Research and Fellowships (CURF)

Junior Faculty Mentorship Committees

Hayden Lee, Fall 2024 - Present

Martin Claassen, Fall 2020 - Present

First Year Graduate Student Mentor

Khalid AlDossari, Fall 2025 - Spring 2026

Douglas Li, Fall 2024 - Spring 2025

Dissertation Committees

Luis Gutierrez; University of Pennsylvania, Fall 2025

Qingyue (Austin) Wu; University of Pennsylvania, Spring 2025

Noah Braeger; Ph.D. University of Pennsylvania, Spring 2025 (Advisor to Noah)

Jianrong Tan; Ph.D. University of Pennsylvania, Spring 2025

Valerie J. Yoshioka; Ph.D. University of Pennsylvania, Summer 2024

Sicong Lu; Ph.D. University of Pennsylvania, Summer 2024

David Last; Ph.D. University of Pennsylvania, Spring 2024

Qiuyue Liang; Ph.D. University of Pennsylvania, Summer 2023 (Chair of Committee)

Cathy Li; Ph.D. University of Pennsylvania, Summer 2023

Hao Y. Zhang; Ph.D. University of Pennsylvania, Summer 2023 (Co-Advisor to Hao)

Ethan Torres; Ph.D. University of Pennsylvania, Spring 2023 (Advisor to Ethan)

Shivam Pandey; Ph.D. University of Pennsylvania, Spring 2022

Benjamin Rosser; Ph.D. University of Pennsylvania, Fall 2021

Lucas Flores; Ph.D. University of Pennsylvania, Summer 2021

Muyang Liu; Ph.D. University of Pennsylvania, Summer 2021 (Chair of Committee)

Matt Decross; Ph.D. University of Pennsylvania, Spring 2021 (Chair of Committee)

Thomas Rochais; Ph.D. University of Pennsylvania, Spring 2021 (Advisor to Thomas)

Mariana Carrillo González; Ph.D. University of Pennsylvania, Spring 2020

Arjun Kar; Ph.D. University of Pennsylvania, Spring 2020 (Chair of Committee)

Ramon Fowler; Ph.D. UNC Chapel Hill, Spring 2020 (Advisor to Ramon)

Rachael Creager; Ph.D. University of Pennsylvania, Fall 2019

Elodie Deborah Resseguie; Ph.D. University of Pennsylvania, Spring 2019

Yichen Hu; Ph.D. University of Pennsylvania, Spring 2019

Rehan Deen; Ph.D. University of Pennsylvania, Summer 2018

Yanchun Ling; Ph.D. UNC Chapel Hill, Spring 2017

Arada Malekian; Ph.D. UNC Chapel Hill, Summer 2016 (Advisor to Arada)

Yang Sun; Ph.D. UNC Chapel Hill, Spring 2015

Prelim Exam Committees

Charlie Cummings; University of Pennsylvania, Fall 2025

Noah Braeger; University of Pennsylvania, Spring 2025 (Advisor to Noah)

Thomas Gosart; University of Pennsylvania, Spring 2024

Qingyue (Austin) Wu; University of Pennsylvania, Spring 2024

Andie Wall; University of Pennsylvania, Spring 2024

Gwen Gardner; University of Pennsylvania, Spring 2024

Lauren Osojnak; University of Pennsylvania, Spring 2023

Ethan Torres; University of Pennsylvania, Spring 2022 (Advisor to Ethan)

Hao Y. Zhang; University of Pennsylvania, Fall 2021 (Co-Advisor to Hao, Chair of Committee)

Riley Xu; University of Pennsylvania, Fall 2021

Luis Gutierrez; University of Pennsylvania, Fall 2020

Cathy Li; University of Pennsylvania, Spring 2020

Muyang Liu; University of Pennsylvania, Fall 2019

Benjamin Rosser; University of Pennsylvania, Spring 2019

Thomas Rochais; University of Pennsylvania, Fall 2018 (Advisor to Thomas)

Lucas Flores; University of Pennsylvania, Fall 2018

Yichen Hu; University of Pennsylvania, Summer 2018

Arjun Kar; University of Pennsylvania, Spring 2018

Elodie Deborah Resseguie; University of Pennsylvania, Fall 2017

Ramon Fowler; UNC Chapel Hill, Summer 2017 (Advisor to Ramon)

Chelsea Bartram; UNC Chapel Hill, Spring 2015

Organization

Co-Organizer for TASI 2027, UC Boulder, June 2027

Lead Organizer for workshop on Cobordisms, Quantum Fields, and Quantum Gravity; Banff International Research Station, February 2027

Co-Organizer for workshop on "Mirror symmetry, Calabi–Yau threefolds, and connections to physics" at ICERM, Brown University, Late September - Early October 2026

Co-Organizer for JHU / UPenn joint formal theory meetings, September 2024 - Present

Co-Organizer for "Ending Inflation and the Hot Big Bang" Workshop, Simons Center for Geometry and Physics, June 2023

Co-Chair for "Strings and Geometry" Conference, University of Pennsylvania, March 2023

Steering Committee for "Strings and Geometry" annual conference series, May 2022 - Present

Co-Organizer (also in charge of diversity) for "Geometrization of (S)QFTs in $D \leq 6$," Aspen Center for Physics, February 2022

Co-Organizer for "Ending Inflation and the Hot Big Bang" Online Workshop hosted by SCGP, November 2021

Co-Organizer for "Recent Advances in QFT and Geometry" Online Mini-Workshop, December 2020

Co-Organizer for Online Summer School on QFT and Geometry, July 2020

Co-Organizer for Online Seminar Series on QFT and Geometry, March 2020 - Present

Co-Organizer for Derbes-Fest; University of Chicago Laboratory Schools, Chicago, September 2019

Co-Organizer for Joint Theory / Experiment Seminar Series; University of Pennsylvania, October 2018 - Present

Co-Organizer for Summer Journal Club on Conformal Bootstrap; University of Pennsylvania, May 2018 - August 2018

Co-Organizer for workshop on Reheating and Particle Production; University of Pennsylvania, February 2018

Co-Organizer for workshop on Geometry and Physics of F-theory; Banff International Research Station, January 2018

Co-Organizer for String Phenomenology Conference; Virginia Tech, July 2017

Organizer for CoSMS workshop on Naturalness; UNC Chapel Hill, October 2016

Co-Organizer for Physics and Astronomy Colloquia; UNC Chapel Hill, September 2016 - June 2017

Organizer for CUNY Symposia on Quantum Fields and Strings; CUNY Initiative for the Theoretical Sciences, September 2015 - June 2016

Scientific Advisory Committee for "F-theory at 20" Conference; Caltech, February 2016

Organizer for joint UNC / Duke seminar in String Theory; UNC Chapel Hill, September 2014 - June 2017

Co-Organizer for Southeastern Strings Meeting, September 2014 - 2019

Co-Organizer for Physics and Astronomy Colloquia; UNC Chapel Hill, September 2014 - June 2015

Co-Organizer for Postdoc and Graduate Student Strings meets Cosmology Seminar; Harvard University, March 2014 - June 2014

Co-Organizer for String Duality Seminar; Harvard University, August 2013 - May 2014

Organizer for Postdoc Journal Seminar; Institute for Advanced Study, June 2011 - June 2012

Co-Organizer for String Meets Phenomenology Seminar; Harvard University, September 2007 - June 2008

Organizer for Graduate Student Seminar on Stringy Standard Models; Harvard University, June 2007 - August 2007

Committee Work at University of Pennsylvania in 2025-2026

Undergraduate Committee

Curriculum Committee

Committee Work at University of Pennsylvania in 2024-2025

Graduate Committee

Bridge Space Representative for Theory Group

Curriculum Committee

Committee Work at University of Pennsylvania in 2023-2024

Particle Cosmology / High Energy Theory Faculty Search

Graduate Committee

Undergraduate Committee

Committee Work at University of Pennsylvania in 2022-2023

University of Pennsylvania's Phi Beta Kappa Board

Undergraduate Committee

Committee Work at University of Pennsylvania in 2021-2022

University of Pennsylvania's Phi Beta Kappa Board

Undergraduate Committee

High Energy Experiment Faculty Search

Committee Work at University of Pennsylvania in 2020-2021

University of Pennsylvania's Phi Beta Kappa Board

Department Website Committee (Chair)

Committee Work at University of Pennsylvania in 2019-2020

Department Website Committee (Chair)

Graduate Committee

Committee Work at University of Pennsylvania in 2018-2019

Undergraduate Committee

Committee Work at University of Pennsylvania in 2017-2018

Interviewer for Graduate Admissions

Committee Work at UNC Chapel Hill in 2016-2017

Nuclear Theory Faculty Search

Graduate Admissions

Physics and Astronomy Colloquia

Committee Work at UNC Chapel Hill in 2015-2016

Graduate Admissions

Committee Work at UNC Chapel Hill in 2014-2015

Physics 118/119 Implementation Team

Graduate Admissions

Physics and Astronomy Colloquia

Library

Outreach and Public Talks

Interview on Phymaths podcast, Phymaths podcast, February 2026

Presentation for high school students on "High Energy Theoretical Physics" Experimental Physics Research Academy at University of Pennsylvania, Philadelphia PA, July 2025

Article describing work on testing / falsifying string theory, July 2025

Zoom interview with middle school student from Gary K. Herberger Young Scholars Academy on string theory and quantum gravity, January 2025

Presentation for high school students on "Quantum Field Theory and Quantum Gravity" Experimental Physics Research Academy at University of Pennsylvania, Philadelphia PA, July 2024

Presentation for high school students on "Quantum Field Theory and Quantum Gravity" Experimental Physics Research Academy at University of Pennsylvania, Philadelphia PA, July 2023

Interview with Temple University student on physics as a career path, May 2023

Interview for "Wormhole-like Dynamics" article describing recent misleading wormhole claims misleading wormhole claims, December 2022

Online Seminar on "The Big Bang – It's Still With Us" at sempercurious.com, October 2022

Presentation for kindergartners on "Fun with Magnets" at the Haverford School, Haverford PA, October 2022

Presentation for high school students on "Quantum Fields and Strings" Experimental Physics Research Academy at University of Pennsylvania, Philadelphia PA, July 2022

"The First 60 Seconds of the Universe" Penn 60 Second Lecture Series, April 2022

Online Seminar on "The Big Bang – It's Still With Us" at sempercurious.com, December 2021

Online Seminar on "Muon $g-2$ and the Search for New Fundamental Physics" at sempercurious.com, July 2021

Online Presentation for high school students on "Quantum Fields and Strings" Experimental Physics Research Academy at University of Pennsylvania, Philadelphia PA, July 2021

Online Seminar on "Muon $g-2$ and the Search for New Fundamental Physics" at sempercurious.com, May 2021

Online Interview with "Connecting the Young World Fair" (CYWF), November 2020

Online Presentation for high school students on "Top Down Approach to Quantum Fields" Experimental Physics Research Academy at University of Pennsylvania, Philadelphia PA, July 2020

Online Presentation for undergraduates "Top Down Approach to Quantum Fields" SURF @ Cosmic DAWN Center, Denmark Copenhagen, July 2020

"When a SAIL (Structured, Active, In-Class Learning) Course Moves Online"
article describing active learning in an online teaching format in
`https://omnia.sas.upenn.edu/story/when-sail-structured-active-class-learning-course-moves-online`,
May 2020

"Where math meets physics" article describing math / physics collaborations at UPenn in

https://penntoday.upenn.edu/news/where-math-meets-physics, February 2020

"My Universe Is Bigger Than Yours" presentation on quantum gravity and the cosmological constant problem. Derbes Fest at University of Chicago, Chicago IL, September 2019

Creator (with M. Klinger) of YouTube Channel and website "Particle Experience" June 2019 - Present

Presentation for high school students on "What is String Theory?" Experimental Physics Research Academy at University of Pennsylvania, Philadelphia PA, July 2019

Panel discussion participant for graduate students and postdocs on early career advice. Sponsored by Diversity and Inclusion in Physics (DIP) program in the Department of Physics and Astronomy at University of Pennsylvania, Philadelphia PA, April 2019

Public Lecture: "High Energy Theory" presentation on the electroweak hierarchy problem and the cosmological constant problem. Ivy League Undergraduate Research Symposium at University of Pennsylvania, Philadelphia PA, April 2019

Public Lecture: "My Universe Is Bigger Than Yours. And So Is My Higgs Boson" presentation on the cosmological constant problem, and the quantum stability of the electroweak scale. Nerd Nite, Philadelphia PA, February 2019

Two presentations on the Higgs Boson, Particle Physics and the Hierarchy Problem during visit to Harriton High School, Bryn Mawr PA, January 2019

Presentation on the Higgs Boson, Particle Physics and the Hierarchy Problem, field trip by Sun Valley High School students (via QuarkNet), at University of Pennsylvania, Philadelphia PA, January 2019

Panel Discussion Participant for graduate students and postdocs on early career advice. Sponsored by Career Services program at the University of Pennsylvania, Philadelphia PA, October 2018

"Physicist strums string theory at Philly high school" article describing outreach in `https://penntoday.upenn.edu/features/physicist-strums-string-theory-at-philly-high-school`, March 2018

Two presentations on the Higgs Boson, Particle Physics and the Hierarchy Problem during visit to String Theory Charter School, Philadelphia PA, February 2018

Public Lecture: "After the Higgs Boson: What's next for fundamental physics at the Large Hadron Collider?" Penn Science Cafe, hosted by World Live Cafe, Philadelphia PA, February 2018

Two presentations on the Higgs Boson, Particle Physics and the Hierarchy Problem during visit to Penn Alexander School, Philadelphia PA, December 2017

Faculty Mentor for Carolina ADMIRES program for 8^{th} and 9^{th} graders interested in pursuing research in STEM, Spring 2017
Additional information: Advisee Madison Carter awarded first prize for scientific excellence on her poster "Warp Drive: Science Fiction or Reality?"

Faculty Volunteer for the Department of Physics and Astronomy at the UNC Science Expo, Chapel Hill NC, April 2017

Interview for Carolina Scientific undergraduate magazine, April 2017

Three presentations on the Higgs Boson and Particle Physics during visit to Neal Middle School STEM Academy of Engineering & Design via the Novozymes SciMatch Invite a Scientist Program during the NC Science Festival, March 2017

Pizza Lunch discussion with undergraduate physics majors at UNC Wilmington on string theory, particle physics, and science as a career, October 2016

Public Lecture: "After the Higgs Boson: What's next for fundamental physics at the Large Hadron Collider?" Carolina Science Cafe, hosted by Morehead Planetarium and Science Center, Chapel Hill NC, May 2016

Interview with Wakefield High School (North Carolina) students on science as a career, and discussion

of the physics of radioactive materials, October 2014

Professional References

Professor Cumrun Vafa (Ph.D. Advisor)
Department of Physics
Harvard University
Cambridge, MA 02138
vafa@g.harvard.edu
Phone: (617)-496-8207

Professor David R. Morrison
Departments of Mathematics and Physics
University of California at Santa Barbara
Santa Barbara, CA 93106
drm@math.ucsb.edu
drm@physics.ucsb.edu
Phone: (805)-893-8309

Professor Herman Verlinde
Department of Physics
Princeton University
Princeton, NJ 08544
verlinde@princeton.edu
Phone: (609)-258-5585

Professor Edward Witten
School of Natural Sciences
Institute for Advanced Study
Princeton, NJ 08540
witten@ias.edu