

# Jonathan J. Heckman

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## *Positions Held*

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

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, Quantum Gravity, Mathematics, Information Theory

## *Selected Honors and Awards*

Junior Faculty Development Award, UNC Chapel Hill, 2016

NSF CAREER Grant, 2015 - 2020

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*

UNC Chapel Hill Junior Faculty Development Award, 2016  
 NSF CAREER Grant, 2015 - 2020

*Teaching and Advising Experience***Courses Taught**

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**

Ramon Fowler (UNC Chapel Hill); Expected Graduation Date: Spring 2019  
 Arada Malekian (UNC Chapel Hill); Ph.D. Summer 2016  
*Dissertation:* Theory and Phenomenology of Kinetic Mixing at Strong Coupling

**Visiting Graduate Students**

Luigi Tizzano (Uppsala University); Visitor to UNC Chapel Hill in Spring 2017

**Supervised Postdocs**

Fabio Apruzzi (UNC Chapel Hill); September 2015 - August 2018  
 Falk Hassler (UNC Chapel Hill); September 2015 - August 2018

**Invited Lectures**

“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

*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.

60. J.J. Heckman and L. Tizzano, “6D Fractional Quantum Hall Effect,” hep-th/1708.02250.
59. F. Apruzzi, J.J. Heckman, and T. Rudelius, “Green-Schwarz Automorphisms and 6D SCFTs,” hep-th/1707.06242.
58. M. Del Zotto, J.J. Heckman, and D.R. Morrison, “6D SCFTs and Phases of 5D Theories,” hep-th/1703.02981.
57. L.B. Anderson, J.J. Heckman, S. Katz, and L.P. Schaposnik, “T-Branes at the Limits of Geometry,” hep-th/1702.06137.
56. F. Apruzzi, F. Hassler, J.J. Heckman, and I.V. Melnikov, “From 6D SCFTs to Dynamic GLSMs,” hep-th/1610.00718.
55. J.J. Heckman, P. Jefferson, T. Rudelius, and C. Vafa, “Punctures for Theories of Class  $\mathcal{S}_r$ ,” 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),” 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,” *IJMPA* **30**, 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  $^{129}\text{Xe}$  in a  $1\ \mu\text{T}$  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, “F-theory and Experiment,” *Contemp. Phys.* **51** 331-348 (2010).

*Invited Conference and Workshop Talks*

“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 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<sup>th</sup> 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<sup>th</sup> Itzykson Meeting on String Theory” CEA-Saclay, France
- “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 Holland

“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*

“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 Phenomenology” 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

*Professional Activities***Journal Referee for:**

Journal of High Energy Physics  
European Physical Journal C  
Nuclear Physics B  
Physics Letters B  
Physical Review D

**Grant Reviewer for:**

National Science Foundation (NSF)  
Department of Energy (DOE)  
Deutsche Forschungsgemeinschaft (German Research Foundation)  
Austrian Science Fund (FWF)  
Chilean National Science and Technology Commission (CONICYT)

**Organization**

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 - present  
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

## Outreach

Faculty Mentor for Carolina ADMIRES program for 8<sup>th</sup> and 9<sup>th</sup> 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, April 2017

Interview for Carolina Scientific undergraduate magazine, April 2017

Presentation 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, 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*

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