

# CURRICULUM VITAE

Raman Sundrum

July 26, 2019

## CONTACT INFORMATION

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## CAREER

John S. Toll Chair, Director of the Maryland Center for Fundamental Physics, 2012  
- present.

Distinguished University Professor, University of Maryland, 2011-present.

Elkins Chair, Professor of Physics, University of Maryland, 2010-2012.

Alumni Centennial Chair, Johns Hopkins University, 2006- 2010.

Full Professor at the Department of Physics and Astronomy, The Johns Hopkins  
University, 2001- 2010.

Associate Professor at the Department of Physics and Astronomy, The Johns Hop-  
kins University, 2000- 2001.

Research Associate at the Department of Physics, Stanford University, 1999- 2000.  
Advisor – Prof. Savas Dimopoulos.

Postdoctoral Fellow at the Department of Physics, Boston University. 1996- 1999.  
Postdoc advisor – Prof. Sekhar Chivukula.

Postdoctoral Fellow in Theoretical Physics at Harvard University, 1993-1996. Post-  
doc advisor – Prof. Howard Georgi.

Postdoctoral Fellow in Theoretical Physics at the University of California at Berke-  
ley, 1990-1993. Postdoc advisor – Prof. Stanley Mandelstam.

## **EDUCATION**

Yale University, New-Haven, Connecticut  
Ph.D. in Elementary Particle Theory, May 1990  
Thesis Title: ‘Theoretical and Phenomenological Aspects of Effective Gauge Theo-  
ries’  
Thesis advisor: Prof. Lawrence Krauss

Brown University, Providence, Rhode Island  
Participant in the 1988 Theoretical Advanced Summer Institute

University of Sydney, Australia  
B.Sc with First Class Honours in Mathematics and Physics, Dec. 1984

## **AWARDS, DISTINCTIONS**

J. J. Sakurai Prize in Theoretical Particle Physics, American Physical Society, 2019.

Distinguished Visiting Research Chair, Perimeter Institute, 2012 - present.

Moore Fellow, Cal Tech, 2015.

American Association for the Advancement of Science, Fellow, 2011.

American Physical Society Fellow, 2003.

Department of Energy Outstanding Junior Investigator Award, 2001-2002.

## **SOME INVITED TALKS, LECTURES**

‘Fundamental Physics and the Fifth Dimension’, public lecture, Kavli Institute for Theoretical Physics (KITP), Santa Barbara, July 2019

‘Growth and Differentiation of the Embryonic Universe’, public lecture, Philosophical Society of Washington DC, February 2019

‘Fundamental Physics and the Fifth Dimension’, department colloquium, Case Western University, Cleveland, February 2019

‘Gambling Beyond the Standard Model’, invited plenary talk, Johns Hopkins Workshop ‘Beyond the Standard Model: where do we go from here?’, Galileo Galilei Institute, Florence, October 2018

‘Fundamental Physics and the Fifth Dimension’, department colloquium, University of Minnesota, September 2018

‘The Particle Next Door: A Top-Down Perspective on Long-Lived Particles’, invited talk at MATHUSLA Workshop, Simons Center, Stony Brook University, August 2018.

‘Particle Physics Out of the Darkness’, invited plenary talk at HL/HE-LHC Workshop, at Fermilab, April 2018.

‘The Big Bang - Before and After’, invited outreach talk as part of the Nifty Fifty program of the USA Science and Engineering Festival, Dr. Henry A. Wise Jr. High School, Upper Marlboro MD, April 2018.

‘Fundamental Physics and the Fifth Dimension’ department colloquium, University of Toronto, March 2018

Talk to the Mid-Atlantic Senior Group, American Center for Physics, College Park, January 2018

‘Fundamental Physics and the Fifth Dimension’, department colloquium, Arizona State University, October 2017

‘Recreating the Big Bang, Again and Again and Again’, with David Curtin, Public Lecture at Maryland Day, University of Maryland, April 2017

‘Fundamental Physics and the Fifth Dimension’, department colloquium, New York University, March 2017

‘Natural Inclinations and Hidden Motives in Fundamental Physics’, Bay Area Particle Theory Seminar keynote speaker, San Francisco State University, March 2017

‘Particle Physics, the Large Hadron Collider and Beyond’, colloquium at the United States Naval Observatory, Washington DC, March 2017

‘Fundamental Physics and the Fifth Dimension’, Coloquiuo Paso Yndurain, Universidad Autonoma de Madrid, February 2017

‘Ask Us Anything’, Lecture and Q and A at Schrodinger Sessions Science Fiction Writers Workshop, Joint Quantum Institute, University of Maryland, July 2016

‘Inside CERN - A Horizon Special’, appearance as scientific consultant on BBC Horizon TV special, October 2016

‘Extra Dimensions of Spacetime’, invited outreach talk at Winston Churchill High School, Bethesda MD, May 2016

‘Particle Physics, the Large Hadron Collider, and Beyond’, colloquium at NASA Goddard Space Flight Center, Greenbelt, April 2016.

‘Particle Physics, the Large Hadron Collider, and Beyond’, departmental colloquium at University of Maryland, College Park, March 2016.

‘Extra Dimensions of Spacetime’, invited outreach talk as part of the Nifty Fifty program of the USA Science and Engineering Festival, Montgomery Blair High School, Silver Spring MD, February 2016.

‘The Hierarchies of Particle Physics, the LHC and Beyond’, departmental colloquium, Texas A&M, December 2015.

‘Relativity and Quantum Physics’, presentation plus Q&A at the ‘Schrodinger Sessions’ Science Fiction Writer’s workshop, Joint Quantum Institute, University of Maryland, August 2015.

‘Beyond the Standard Model Overview’, plenary talk at the MC4BSM workshop, Fermilab, May 2015.

‘Cosmic Acceleration: Past, Present, Puzzles and Precision’, talk at the NASA Jet Propulsion Laboratory, April 2015.

‘Extra Dimensions and the Hierarchies of Particle Physics’, Inst. of High Energy Physics (IHEP) colloquium, Chinese Academy of Sciences, Beijing, October 2014.

‘Before the Bang’, opening plenary talk at Workshop on String Theory and its Applications, IHEP, Beijing, Oct. 2014.

‘Warped Compactifications, AdS/CFT and the LHC’, ITP/KITPChina colloquium, Beijing, Oct. 2014.

‘The Quest for Naturalness in Particle Physics’, colloquium, Shanghai Jiao Tong University, Sept. 2014.

‘The Quest for Naturalness in Particle Physics’, colloquium, Tsinghua University, Sept. 2014.

‘Physics Opportunities with Higher Energy Proton Colliders’, plenary talk at ‘Next Steps in the Energy Frontier’ workshop, LPC Fermilab, August 2014.

‘SuperNatural versus Other Worldly in Fundamental Physics’, Fermilab Wine and Cheese, August 2014.

‘Electroweak Symmetry Breaking”, Galileo Galilei Institute winter school, lecture series, Florence, January 2014.

‘Vision for Particle Physics’, Prospects in Theoretical Physics summer school for graduate students, Institute for Advanced Study, Princeton, July 2013.

‘The Physics Case for Pursuing the Energy Frontier’, Snowmass panel, Brookhaven National Laboratory, March 2013.

‘Warped Compactification and AdS/CFT’, invited plenary talk at the 50th Anniversary Symposium for the Mathematical Sciences Institute, Chennai, December 2012.

‘From Warped Compactifications to the LHC’, invited lecture series at “From Strings to the LHC” workshop, Puri, India, December 2012.

‘Particle Physics and the Higgs Boson’, departmental colloquium at CALTECH, November 2012.

‘Flavor Physics and New Physics’, invited plenary talk opening the 7th International Workshop on the CKM Unitarity Triangle, Cincinnati, September 2012.

‘High Energy Physics and the Higgs Boson’, public lecture on the discovery of a

Higgs Boson at Melbourne University as part of the International Conference on High Energy Physics (ICHEP), 2012.

‘SUSY: What’s Left’, plenary talk at International Conference on High Energy Physics (ICHEP), Melbourne, 2012.

‘Extra Dimensions and the LHC’, physics department colloquium, University of Sydney, January 2012.’

‘Extra Dimensions and the LHC’, physics department colloquium, EPFL, Lausanne, October 2011.

‘Extra Dimensions and Dark Energy’, invited plenary talk, Benasque workshop on Unsolved Problems in Astrophysics, February 2011.

‘Physics Prospects’, CERN Geneva, October 2010, invited plenary talk at the International Workshop on Linear Colliders.

‘SUSY Splits, But Then Returns’, CERN Geneva, June 2010, invited talk at Planck 2010 conference.

‘Dark Masses and SUSY Breaking’, Boston, June 5, 2009, plenary talk at SUSY 2009 conference.

‘Extra Dimensions and the LHC’, Valencia, April 2009, colloquium at IFIC.

‘Warped Dimensions: The View from the Top’, Geneva, May 2009, CERN theory colloquium.

‘The World of Extra Dimensions’, Santa Barbara, lecture at the 2008 KITP Teachers Conference.

‘BraneWorlds’, Bangalore, Dec. 2007, advanced school on “From Strings to LHC - II”.

‘Dark Energy, Lorentz Violation and Ghosts’, Waterloo, May 2007, Perimeter Institute “Excursions in the Dark” workshop.

‘4D Cosmos from 5D Chaos’, Baltimore, Feb. 2007, colloquium at the Space Telescope Sciences Institute.

‘Particle Physics and Cosmology’, Baltimore, Oct. 2006, presentation to science journalists at “New Horizons in Science Briefing” conference of the Council for the Advancement of Science Writing.

‘Conformal Sequestering’, Santa Barbara Oct. 2006, at KITP workshop on “String Phenomenology”.

‘Warped/Composite Phenomenology Simplified’, Madison 2006, plenary talk at PHENO 2006 Symposium.

‘Extra Dimensions’, Stanford, August 2005, lectures at SLAC Summer Institute.

‘Structure and Safety from Warped Compactifications’, Santa Barbara Nov. 2004, at KITP conference on ‘QCD and String Theory’.

‘To the Fifth Dimension and Back’, Boulder 2004, Lectures at the Theoretical Advanced Summer Institute.

‘Extra Dimensions’, Trieste 2003, Summer School on Particle Physics at the International Centre for Theoretical Physics.

‘The Cosmological Constant Problem in Fundamental Physics’, Albuquerque 2002, plenary talk at the meeting of the American Physical Society.

‘The Cosmological Constant Problem in Fundamental Physics’, Germantown 2002, Department of Energy colloquium.

‘Extra Dimensions’, Snowmass 2001.

‘Physics in Warped Spacetimes’, Sendai Phenomenology Workshop, Japan, 2000.

## WORKSHOPS ORGANIZED

‘Hyperspace, Superspace, Theory Space and Outer Space’, 28th Johns Hopkins Workshop on Current Problems in Particle Theory, organized by J. Bagger, G. Domokos, S. Kovesi-Domokos, D. Kaplan and R. Sundrum, Baltimore, June 2004.

34th Johns Hopkins Workshop on Current Problems in Particle Theory, organized by J. Bagger, G. Domokos, S. Kovesi-Domokos, D. Kaplan, K. Melnikov and R. Sundrum, Baltimore, June 2010.

‘Year One of the LHC’, summer workshop, organized by P. Meade, M. Papucci, J. Thaler and R. Sundrum, Aspen Center for Physics, June-July 2011.

‘Supersymmetry, Exotics And Reaction to Confronting the Higgs (SEARCH)’, workshop in LHC physics, organized by P. Meade, M. Papucci and R. Sundrum, University of Maryland, College Park, March 2012.

‘SEARCH 2013’, workshop on LHC physics, organized by P. Meade, M. Papucci and R. Sundrum, Stonybrook University, Simons Center for Geometry and Physics, August 2013.

‘Nature Guiding Theory’ workshop on naturalness and alternatives, organized by

Prateek Agrawal, Joseph Lykken, Raman Sundrum and Felix Yu, Fermilab, August 2014.

‘Future Circular Colliders Week 2015’ workshop, part of a large organizing and scientific program committee, Washington DC, March 2015.

‘Hidden Naturalness’ workshop, organized by David Curtin, Zackaria Chaco, Rabi Mohapatra, Prashant Saraswat, Raman Sundrum and Yuhsin Tsai, University of Maryland, April 2016.

‘SEARCH 2016’ international LHC workshop, organized by Patrick Meade, Michele Papucci, Ian Shipsey and Raman Sundrum, Oxford University, August 2016.

‘Origins of the Vacuum Energy and Electroweak Scales’, organized by Nima Arkani-Hamed, JiJi Fan and Raman Sundrum, KITP Santa Barbara, Summer 2019.

‘From Inflation to the Hot Big Bang’, organized by Y. Cui, R. Flauger and S. Watson, with scientific advisors R. Brandenberger, A. Linde and Raman Sundrum, to be held at KITP Santa Barbara, Winter 2020.

## PAPERS

‘Supersymmetric Inflation from the Fifth Dimension’, with Kaustubh Deshpande, arXiv:1902.05559, accepted for publication in JHEP

‘Seeing Higher-Dimensional Grand Unification in Primordial Non-Gaussianities’, with Soubhik Kumar, arXiv:1811.11200, JHEP 1904 (2019) 120

‘AdS Asymptotic Symmetries from CFT Mirrors’, with Arif Mohd and Rashmish Mishra, arXiv:1809.07331, JHEP 1903 (2019) 017

‘Primordial Anisotropies in the Gravitational Wave Background From Cosmological Phase Transitions’, with Michael Geller, Anson Hook and Yuhsin Tsai, arXiv:1803.10780, Phys. Rev. Lett. 121 (2018) 201303

‘Heavy-Lifting of Gauge Theories by Cosmic Inflation’, with Soubhik Kumar, arXiv:1711.03988, JHEP 1805 (2018) 011



‘Asymptotic Symmetries, Holography and Topological Hair’, with Rashmish Mishra, arXiv:1706.09080 [hep-th], JHEP 1801 (2018) 014

‘Flashes of Hidden Worlds at Colliders’, with David Curtin, arXiv:1702.02524, Physics Today, June 2017, p. 46

‘Small Vacuum Energy from Small Equivalence Violation in Scalar Gravity’, with Prateek Agrawal, arXiv:1611.07021, JHEP 1705 (2017) 144

‘4D Scattering Amplitudes and Asymptotic Symmetries from 2D CFT’, with Clifford Cheung, Anton de la Fuente, arxiv.org/abs/arXiv:1609.00732, JHEP 1701 (2017) 112

‘Flavor Universal Resonances and Warped Gravity’, with Kaustubh Agashe, Peizhi Du and Sungwoo Hong, arxiv.org/abs/arXiv:1608.00526, JHEP 1701 (2017) 016

‘Naturalness in the Dark at the LHC’, with Nathaniel Craig, Andrey Katz and Matthew Strassler, hep-ph/1502.05310, JHEP 1507 (2015) 105.

‘Natural Inflation and Quantum Gravity’, with Anton de la Fuente and Prashant Saraswat, hep-th/1412.3457, Phys. Rev. Lett. 114 (2015) 15.

‘Holography of the BTZ Black Hole, Inside and Out’, hep-th/1307.7738, JHEP 1409 (2014) 073.

‘Baryogenesis for WIMPs’, with Yanou Cui, hep-ph/1212.2973, Phys. Rev. D87 (2013) 116013.

‘SUSY Stops at a Bump’, with Christopher Brust and Andrey Katz, hep-ph/1206.2353, JHEP 1208 (2012) 059.

‘SUSY, the Third Generation and the LHC’, with Christopher Brust, Andrey Katz and Scott Lawrence, hep-ph/1110.6670, JHEP 1203 (2012) 103.

‘From Fixed Points to the Fifth Dimension’, hep-th/1106.4501, Phys. Rev. D86 (2012) 085025.

‘Flavourful Production at Hadron Colliders’, with Gian Giudice and Ben Gripaios, hep-ph/1105.3161, JHEP 1108 (2011) 055.

‘SUSY Splits, But Then Returns’, hep-th/0909.5430, JHEP 1101 (2011) 062

‘Warped Hybrid Inflation’, with Christopher Wells, hep-ph/0909.3254, JHEP 1002 (2010) 097.

‘Vectorlike Confinement at the LHC’, with Can Kilic and Takemichi Okui, hep-ph/0906.0577, JHEP 1002 (2010) 018.

‘Breaking the Dark Force’, with Andrey Katz, hep-ph/0902.3271, JHEP 0906 (2009) 003.

‘A Common Origin for Neutrino Anarchy and Charged Hierarchies’, with Kaushtubh Agashe and Takemichi Okui, hep-ph/08101277, Phys. Rev. Lett. 102 (2009) 101801.

‘Colored Resonances at the Tevatron: Phenomenology and Discovery Potential in Multijets’, with Can Kilic and Takemichi Okui, hep-ph/08022568, JHEP 0807 (2008) 038.

‘Anomaly-Mediation and Sequestering from a Higer-Dimensional Viewpoint’, with Minho Son, hep-th/08014789, JHEP 0808 (2008) 004.

‘Gravitational Lorentz Violation and Superluminality via AdS/CFT Duality’, hep-th/07081871, Phys. Rev. D77 (2008) 086002.

‘Sequestering in String Theory’, with Shamit Kachru and Liam McAllister, hep-th/0703105, JHEP 0710 (2007) 013.

‘Warped/Composite Phenomenology Simplified’, with Roberto Contino, Thomas Kramer and Minho Son, hep-ph/0612180, JHEP 0705 (2007) 074.

‘Conformal Sequestering Simplified’, with M. Schmlatz, hep-th/0608051, JHEP 0611:011 (2006).

‘To the Fifth Dimension and Back’, hep-th/0508134, published in the 2004 Proceedings of the Theoretical Advanced Summer Institute.

‘A Symmetry for the Cosmological Constant’, with D. E. Kaplan, hep-th/0505265, JHEP 0607:042 (2006).

‘Top Compositeness and Precision Unification’, with K. Agashe and R. Contino, hep-ph/0502222, Phys. Rev. Lett. 95:171804 (2005)

‘Gaugomally Mediated SUSY Breaking and Conformal Sequestering’, hep-th/040612, Phys. Rev. D71:085003 (2005).

‘Gravity’s Scalar Cousin’, hep-th/0312212.

Fat Euclidean Gravity with Small Cosmological Constant, hep-th/0310251, Nucl. Phys. B690 (2004) 302.

‘Local Lagrangian for Exponentially Large Extra Dimensions’, with M. J. May, hep-th/0310222, Phys. Rev. D69 (2004) 104010.

‘RS1, Custodial Isospin and Precision Tests’, with K. Agashe, M. J. May, and A. Delgado, hep-ph/0308036, JHEP 0308: 050 (2003).

‘Fat Gravitons, the Cosmological Constant and Submillimeter Tests’, hep-th/0306106, Phys. Rev. D69: 044014 (2004).

‘Grand Unification in RS1’, with Kaustubh Agashe and Antonio Delgado, hep-ph/0212028, Annals Phys. 304 (2003) 145.

‘Running with the Radius in RS1’, with Adam Lewandowski and Michael May, hep-th/0209050, Phys. Rev. D67 (2003) 024036.

‘Gauge Coupling Renormalization in RS1’, with Kaustubh Agashe and Antonio Delgado, hep-ph/0206099, Nucl. Phys. B643 (2002) 172.

‘Anomaly Mediated Supersymmetry Breaking in Four Dimensions, Naturally’, with Markus Luty, hep-th/0111231, Phys. Rev. D67 (2003) 045007.

‘The Randall-Sundrum I Model, Higher Derivatives and Stability’, with Adam Lewandowski, hep-th/0108025, Physical Review D65 (2002) 044003.

‘Supersymmetry Breaking and Composite Extra Dimensions’, with Markus Luty, hep-th/0105137, Physical Review D65 (2002) p. 066004.

‘Hierarchy Stabilization in Warped Supersymmetry’, with Markus Luty, hep-th/0012158, Physical Review D64 (2001) 065012.

‘A Small Cosmological Constant from a Large Extra Dimension’, with Nima Arkani-Hamed, Savas Dimopoulos and Nemanja Kaloper, hep-th/0001197, Phys. Lett. B480 (2000) p. 193.

‘Radius Stabilization and Anomaly Mediated Supersymmetry Breaking’, with Markus Luty, hep-th/9910202, Phys. Rev. D62 (2000) 035008.

‘An Alternative to Compactification’, with Lisa Randall, hep-th/9906064, Physical Review Letters 83 (1999), p. 4690

‘A Large Mass Hierarchy from a Small Extra Dimension’, with Lisa Randall, hep-ph/9905221, Physical Review Letters 83 (1999), p. 3370.

‘Out of This World Supersymmetry Breaking’, with Lisa Randall, hep-th/9810155, Nuclear Physics B557 (1999) p. 79.

‘Compactification for a Three-Brane Universe’, hep-ph/9805471, Physical Review D59 (1999), p. 085010.

‘Effective Field Theory for a Three-Brane Universe’, hep-ph/9805471, Physical Review D59 (1999), 085009.

‘Towards an Effective Particle-String Resolution of the Cosmological Constant Problem’, hep-ph/9708329, JHEP 9907 (1999), p. 001.

‘ $N = 1$  Field Theory Duality from M-theory’, with Martin Schmaltz, Physical Review D57 (1998), p.6455.

‘Reparameterization Invariance to all orders in Heavy Quark Effective Theory’, Physical Review D57 (1998), p.331.

‘Hadronic String from QCD Confinement’, hep-ph/9702306.

‘A New Lattice Action for Studying Topological Charge’, with Pilar Hernandez, Physics Letters B385 (1996), p.254.

‘Interpolation of Non-Abelian Lattice Gauge Fields’, with Pilar Hernandez, Nuclear Physics B472 (1996), p.334.

‘A Lattice Construction of Chiral Gauge Theories’, with Pilar Hernandez, Nuclear Physics B455 (1995), p.287.

‘Constraints on Light Quark Masses from Heavy Meson Mass Differences’, with Markus Luty, Physical Review D52 (1995), p.5202.

‘Heavy Meson Electromagnetic Mass Differences from QCD’, with Markus Luty, Physical Review D52 (1995), p.1627.

‘ $b \rightarrow s\gamma$  and  $B_s \rightarrow \mu^+\mu^-$  in Extended Technicolor Models’, with Lisa Randall, Physics Letters B312 (1993), p.148.

‘Quarkonium decays and light quark masses’, with Markus Luty, Physics Letters B312 (1993), p.205.

‘Technicolor theories with Negative Values of the Peskin-Takeuchi Electroweak Parameter S’, with Markus Luty, Physical Review Letters 70 (1993), p.529.

‘Walking Gauge Dynamics and Realistic Technicolor’, Proceedings of the XXVI International Conference on High Energy Physics, Dallas, 1992.

‘A Realistic Technicolor Model from 150 TeV down’, Nuclear Physics B395 (1993), p.60.

‘Walking Technicolor and Electroweak Radiative Corrections’, with Stephen D. H. Hsu, Nuclear Physics B391 (1993), p.127.

‘ $\rho$  parameter and Pseudo-Goldstone-boson couplings to the  $Z'$ ’, with Mark Soldate, Physical Review D44 (1991), p.1510.

‘Z Couplings to Pseudo-Goldstone Bosons of Extended Technicolor’ with Mark Soldate, Nuclear Physics B340 (1990), p.1.

‘Non-Abelian Aharonov-Bohm effects, Feynman paths, and Topology’, with L.J. Tassie, Journal of Mathematical Physics 27 (1986), p.1566

‘Anyon Statistics with Single-Valued Wave Functions’, with L.J. Tassie, Physics Letters B 180 (1986), p.381