

CONTACT INFORMATION	Kavli Institute for Theoretical Physics University of California, Santa Barbara	<i>e-mail:</i> remmen@kitp.ucsb.edu <i>web:</i> grantremmen.com
POSITIONS	University of California, Santa Barbara , Fundamental Physics Fellow Kavli Institute for Theoretical Physics , Postdoctoral Scholar University of California, Berkeley , Miller Research Fellow Harvard University Society of Fellows , Junior Fellow (declined)	2020–present 2017–2020 2017
EDUCATION	California Institute of Technology Ph.D., Physics M.S., Physics Hertz Fellow and NSF Graduate Research Fellow University of Minnesota, College of Science & Engineering B.S., Physics, <i>summa cum laude</i> , High Distinction, 4.0 GPA B.S., Astrophysics, <i>summa cum laude</i> , High Distinction, 4.0 GPA B.S., Mathematics, <i>summa cum laude</i> , High Distinction, 4.0 GPA	2012–2017 June 2017 June 2015 2008–2012 May 2012 May 2012 May 2012
HONORS & AWARDS	Appointed as Hertz Fellowship Interviewer Sakurai Dissertation Award in Theoretical Particle Physics American Physical Society award citation: “For his contributions to understanding the structure and self-consistency of gravity and effective field theories using ideas from quantum field theory and holography.” Stemple Memorial Prize in Physics , Caltech Delegate to the 66th Lindau Nobel Laureate Meeting Hertz Fellow NSF Graduate Research Fellow , National Science Foundation Goldwater Scholar Chambliss Astronomy Achievement Student Award , American Astronomical Society Dean’s Summer International Student Scholarship , University College London United States Presidential Scholar , White House Commission on Presidential Scholars & U.S. Dept. of Education National Merit Scholar Byrd Honors Scholar Hagstrum Award in Physics , Univ. of MN Outstanding Graduate in Mathematics , Univ. of MN Franklin Scholarship in Physics , Univ. of MN Lando Scholarship in Mathematics , Univ. of MN Richards Scholarship in Mathematics , Univ. of MN Nier Scholarship in Physics , Univ. of MN Thorp Scholarship in Mathematics , Univ. of MN Undergraduate Research Scholarship , Univ. of MN Basford Award in Physics , Univ. of MN Institute of Technology Alumni Award , Univ. of MN Institute of Technology Honors Undergraduate Research Scholarship , Univ. of MN Maroon & Gold Leadership Award , Univ. of MN 3M/Alumni Award , Univ. of MN Bentson Scholar , Univ. of MN Dean’s List , Univ. of MN College of Science & Engineering/Institute of Technology McGraw Hill Student Achievement Recognition , Univ. of MN, for Meritorious Work in General Chemistry	2018–present 2018 2016 2016 2012–2017 2012–2017 2010–2012 2011 2011 2008 2008–2012 2008–2011 2012 2012 2011–2012 2011–2012 2011–2012 2010–2011 2010–2011 2010 2009–2010 2009–2010 2009 2008–2012 2008–2012 2008–2012 2008–2012 2008–2012 2008

PUBLICATIONS	Juan Maldacena, Grant N. Remmen <i>Accumulation-Point Amplitudes in String Theory</i>	under review, JHEP arXiv:2207.06426
	Grant N. Remmen , Nicholas L. Rodd <i>Spinning Sum Rules for the Dimension-Six SMEFT</i>	under review, JHEP arXiv:2206.13524
	Yu-tin Huang, Grant N. Remmen <i>UV-Complete Gravity Amplitudes and the Triple Product</i>	Phys. Rev. D 106 (2022) L021902 arXiv:2203.00696
	Achilleas P. Porfyriadis, Grant N. Remmen <i>Large Diffeomorphisms and Accidental Symmetry of the Extremal Horizon</i>	JHEP 3 (2022) 107 arXiv:2112.13853
	Grant N. Remmen <i>Exploration of a Singular Fluid Spacetime</i>	Gen. Rel. Grav. 53 (2021) 101 arXiv:2111.08713
	Nima Arkani-Hamed, Yu-tin Huang, Jin-Yu Liu, Grant N. Remmen <i>Causality, Unitarity, and the Weak Gravity Conjecture</i>	JHEP 3 (2022) 83 arXiv:2109.13937
	Grant N. Remmen <i>Amplitudes and the Riemann Zeta Function</i>	Phys. Rev. Lett. 127 (2021) 241602, Editors' Suggestion arXiv:2108.07820
	Achilleas P. Porfyriadis, Grant N. Remmen <i>Horizon Acoustics of the GHS Black Hole and the Spectrum of AdS_2</i>	JHEP 10 (2021) 142 arXiv:2106.10282
	Ning Bao, Aidan Chatwin-Davies, Grant N. Remmen <i>Entanglement Wedge Cross Section Inequalities from Replicated Geometries</i>	JHEP 7 (2021) 113 arXiv:2106.02640
	Ning Bao, Jonathan Harper, Grant N. Remmen <i>Holevo Information of Black Hole Mesostates</i>	Phys. Rev. D 105 (2022) 026010 arXiv:2103.06888
	Grant N. Remmen , Nicholas L. Rodd <i>Signs, Spin, SMEFT: Sum Rules at Dimension Six</i>	Phys. Rev. D 105 (2022) 036006 arXiv:2010.04723
	Rafael Aoude et al. (including Grant N. Remmen) <i>On-Shell Methods for the SMEFT</i>	Snowmass 2021 Letter of Interest
	Ning Bao, Aidan Chatwin-Davies, Grant N. Remmen <i>Warping Wormholes with Dust: a Metric Construction of the Python's Lunch</i>	JHEP 9 (2020) 102 arXiv:2006.10762
	Grant N. Remmen , Nicholas L. Rodd <i>Flavor Constraints from Unitarity and Analyticity</i>	Phys. Rev. Lett. 125 (2020) 081601 arXiv:2004.02885
	Clifford Cheung, Grant N. Remmen <i>Entanglement and the Double Copy</i>	JHEP 5 (2020) 100 arXiv:2002.10470
	Ning Bao, Aidan Chatwin-Davies, Jason Pollack, Grant N. Remmen <i>Cosmological Decoherence from Thermal Gravitons</i>	JHEP 8 (2020) 65 arXiv:1911.10207
	Grant N. Remmen , Nicholas L. Rodd <i>Consistency of the Standard Model Effective Field Theory</i>	JHEP 12 (2019) 32 arXiv:1908.09845
	Ning Bao, Aidan Chatwin-Davies, Jason Pollack, Grant N. Remmen <i>Towards a Bit Threads Derivation of Holographic Entanglement of Purification</i>	JHEP 7 (2019) 152 arXiv:1905.04317
	Clifford Cheung, Junyu Liu, Grant N. Remmen <i>Entropy Bounds on Effective Field Theory from Rotating Dyonic Black Holes</i>	Phys. Rev. D 100 (2019) 046003 arXiv:1903.09156
	Raphael Bousso, Yasunori Nomura, Grant N. Remmen <i>Outer Entropy and Quasilocal Energy</i>	Phys. Rev. D 99 (2019) 046002 arXiv:1812.06987
	Ning Bao, Aidan Chatwin-Davies, Grant N. Remmen <i>Entanglement of Purification and Multiboundary Wormhole Geometries</i>	JHEP 2 (2019) 110 arXiv:1811.01983

- PUBLICATIONS, **Grant N. Remmen** Phys. Rev. D **98** (2018) 124008
CONTINUED *New Spacetimes for Rotating Dust in $(2+1)$ -Dimensional General Relativity* arXiv:1810.12305
- Ning Bao, Aidan Chatwin-Davies, Jason Pollack, **Grant N. Remmen** JHEP **11** (2018) 71
Traversable Wormholes as Quantum Channels: arXiv:1808.05963
Exploring CFT Entanglement Structure and Channel Capacity in Holography
- Yasunori Nomura, **Grant N. Remmen** JHEP **8** (2018) 63
Area Law Unification and the Holographic Event Horizon arXiv:1805.09339
- Venkatesa Chandrasekaran, **Grant N. Remmen**, JHEP **11** (2018) 15
Arvin Shahbazi-Moghaddam arXiv:1804.03153
Higher-Point Positivity
- Clifford Cheung, Junyu Liu, **Grant N. Remmen** JHEP **10** (2018) 4
Proof of the Weak Gravity Conjecture from Black Hole Entropy arXiv:1801.08546
- Ning Bao, Sean M. Carroll, Aidan Chatwin-Davies, Phys. Rev. D **97** (2018) 126014
Jason Pollack, **Grant N. Remmen** arXiv:1712.04955
Branches of the Black Hole Wave Function Need Not Contain Firewalls
- Chris Akers, Raphael Bousso, Illan F. Halpern, Phys. Rev. D **97** (2018) 024018
Grant N. Remmen arXiv:1711.06689
Boundary of the Future of a Surface
- Clifford Cheung, **Grant N. Remmen**, Chia-Hsien Shen, Congkao Wen JHEP **4** (2018) 129
Pions as Gluons in Higher Dimensions arXiv:1709.04932
- Clifford Cheung, **Grant N. Remmen** JHEP **9** (2017) 2
Hidden Simplicity of the Gravity Action arXiv:1705.00626
- Sean M. Carroll, **Grant N. Remmen** Phys. Rev. D **95** (2017) 123504
A Nonlocal Approach to the Cosmological Constant Problem arXiv:1703.09715
- Ning Bao, **Grant N. Remmen** EPL (Europhysics Lett.) **121** (2018) 60007, Editor's Choice
Bulk Connectedness and Boundary Entanglement arXiv:1703.00018
- Clifford Cheung, **Grant N. Remmen** JHEP **1** (2017) 104
Twofold Symmetries of the Pure Gravity Action arXiv:1612.03927
- Clifford Cheung, **Grant N. Remmen** Phys. Rev. Lett. **118** (2017) 051601
Positivity of Curvature-Squared Corrections in Gravity arXiv:1608.02942
- Grant N. Remmen**, Ning Bao, Jason Pollack JHEP **7** (2016) 48
Entanglement Conservation, $ER=EPR$, arXiv:1604.08217
and a New Classical Area Theorem for Wormholes
- Sean M. Carroll, **Grant N. Remmen** Phys. Rev. D **93** (2016) 124052
What is the Entropy in Entropic Gravity? arXiv:1601.07558
- Clifford Cheung, **Grant N. Remmen** JHEP **4** (2016) 2
Positive Signs in Massive Gravity arXiv:1601.04068
- Ning Bao, Jason Pollack, **Grant N. Remmen** JHEP **11** (2015) 126
Wormhole and Entanglement (Non-)Detection arXiv:1509.05426
in the $ER=EPR$ Correspondence
- Brando Bellazzini, Clifford Cheung, **Grant N. Remmen** Phys. Rev. D **93** (2016) 064076
Quantum Gravity Constraints from Unitarity and Analyticity arXiv:1509.00851
- Ning Bao, Jason Pollack, **Grant N. Remmen** Fortschr. Phys. **63** (2015) 705
Splitting Spacetime and Cloning Qubits: arXiv:1506.08203
Linking No-Go Theorems across the $ER=EPR$ Duality

- PUBLICATIONS, Ning Bao, ChunJun Cao, Sean M. Carroll, Aidan Chatwin-Davies, Phys. Rev. D **91** (2015) 125036
 CONTINUED Nicholas Hunter-Jones, Jason Pollack, **Grant N. Remmen** arXiv:1504.06632
Consistency Conditions for an AdS Multiscale Entanglement Renormalization Ansatz Correspondence
- Clifford Cheung, **Grant N. Remmen** JHEP **12** (2014) 87
Infrared Consistency and the Weak Gravity Conjecture arXiv:1407.7865
- Grant N. Remmen**, Sean M. Carroll Phys. Rev. D **90** (2014) 063517
How Many e-Folds Should We Expect from High-Scale Inflation? arXiv:1405.5538
- Clifford Cheung, **Grant N. Remmen** Phys. Rev. Lett. **113** (2014) 051601
Naturalness and the Weak Gravity Conjecture arXiv:1402.2287
- Grant N. Remmen**, Sean M. Carroll Phys. Rev. D **88** (2013) 083518
Attractor Solutions in Scalar-Field Cosmology arXiv:1309.2611
- Grant N. Remmen**, Kris Davidson, Andrea Mehner Astrophys. J. **773** (2013) 27
Unexpected Ionization Structure in Eta Carinae's "Weigelt Knots" arXiv:1302.2659
- Grant N. Remmen**, Kinwah Wu Mon. Not. R. Astron. Soc. **430** (2013) 1940
Complex Orbital Dynamics of a Double Neutron Star System arXiv:1301.2836
Revolving around a Massive Black Hole
- Grant Remmen**, Elwood McCreary JURP **25** (2012)
Measurement of the Speed and Energy Distribution of Cosmic Ray Muons
- Grant Remmen** JURP **23** (2010)
A New Assessment of Dark Matter in the Milky Way Galaxy
- THESES **Ph.D., Physics** | California Institute of Technology Defended May 2017
 Grant Newton Remmen
Defining Gravity: Effective Field Theory, Entanglement, and Cosmology
 Thesis advisors: Clifford Cheung and Sean M. Carroll, California Institute of Technology
- B.S., Mathematics**, *summa cum laude* | University of Minnesota Defended May 2012
 Grant N. Remmen
Dynamics of a Rigid Spinning Ring in the Schwarzschild Metric:
A Solution to a Gravitational Problem in Mathematical Physics
 Thesis advisor: Willard Miller, School of Mathematics, University of Minnesota
 Research supervised by Kinwah Wu, Head of Theory,
 Mullard Space Science Laboratory, University College London.
- B.S., Astrophysics**, *summa cum laude* | University of Minnesota Defended December 2011
 Grant N. Remmen
 Hubble Space Telescope Subpixel Modeling of Anomalous
High-Excitation Emission Lines in the Ejecta of Eta Carinae
 Thesis advisor: Kris Davidson, MN Institute for Astrophysics, University of Minnesota
- B.S., Physics**, *summa cum laude* | University of Minnesota Defended April 2010
 Grant Remmen
Distortion of Black Holes caused by Motion relative to the Cosmic Microwave Background
 Thesis advisor: Robert Gehrz, Director, MN Institute for Astrophysics, University of Minnesota

TALKS	Simons Symposium on Amplitudes Meet Cosmology Scotland	May 2022
	UC Santa Barbara High Energy and Gravity Seminar	May 2022
	Possible and Impossible in Effective Field Theory: From the S-Matrix to the Swampland Workshop Institute for Advanced Study	May 2022
	Argonne National Laboratory High Energy Physics Theory Seminar (virtual)	April 2022
	Kavli IPMU, Univ. Tokyo Mathematics - String Theory Seminar (virtual)	April 2022
	California Amplitudes Meeting UC Davis	March 2022
	California Institute of Technology Amplitudes Group Meeting	February 2022
	UC Irvine Particle Physics Seminar	January 2022
	QCD Meets Gravity Workshop UCLA (virtual)	December 2021
	Kavli Institute for Theoretical Physics Locals' Event	November 2021
	UC Santa Barbara High Energy and Gravity Seminar (virtual)	November 2021
	International Centre for Theoretical Physics High Energy, Cosmology, and Astroparticle Physics Seminar (virtual)	November 2021
	Brandeis University Quantum/Gravity Seminar (virtual)	November 2021
	ETH Zürich QFT, Strings and Beyond Seminar (virtual)	October 2021
	Perimeter Institute Quantum Fields and Strings Seminar (virtual)	October 2021
	Hertz Foundation Innovation Hour (virtual)	June 2021
	California Amplitudes Meeting UCLA (virtual)	March 2021
	New York University Physics Department Colloquium (virtual)	March 2021
	New York University Physics Research Seminar (virtual)	February 2021
	University of Florida High Energy Physics Seminar (virtual)	January 2021
	University of Chicago Particle Theory Seminar (virtual)	January 2021
	Korea Institute for Advanced Study High Energy Physics Seminar (virtual)	December 2020
	UC Santa Barbara High Energy and Gravity Seminar (virtual)	November 2020
	Yale University Particle Theory Seminar (virtual)	October 2020
	Brookhaven National Laboratory High Energy Theory Seminar (virtual)	April 2020
	Kavli IPMU, Univ. Tokyo Astronomy-Cosmology-Particle Physics Seminar (virtual)	April 2020
	UC Davis, QMAP Fields, Strings, Gravity Seminar (virtual)	April 2020
	The String Swampland and Quantum Gravity Constraints on Effective Theories Program Kavli Institute for Theoretical Physics	March 2020
	Brandeis University High-Energy and Gravitational Theory Chalk Talk	January 2020
	Brandeis University Physics Department Colloquium	January 2020
	University of Michigan, LCTP High Energy Theory Seminar	November 2019
	From Scattering to Expansion Workshop Northwestern University	October 2019
	UC Santa Barbara Particle Physics Phenomenology Seminar	October 2019
	UC Santa Barbara High Energy and Gravity Seminar	October 2019
	Navigating the Swampland Conference Instituto de Física Teórica, UAM-CSIC, Madrid, Spain	September 2019

TALKS, CONTINUED	University of Washington AdS/CFT Group Meeting	May 2019
	University of Washington Particle Theory Seminar	May 2019
	University of Minnesota, FTPI High Energy Theory Seminar	April 2019
	Stanford University Stanford Institute for Theoretical Physics Colloquium	April 2019
	UC Berkeley 4D Seminar	April 2019
	California Institute of Technology High Energy Theory Seminar	February 2019
	UC Davis Joint Theory Seminar	January 2019
	Harvard University Black Hole Initiative Colloquium	November 2018
	Cornell University Particle Theory Seminar	October 2018
	Institute for Advanced Study High Energy Theory Seminar	October 2018
	Vistas over the Swampland Conference Instituto de Física Teórica, UAM-CSIC, Madrid, Spain	September 2018
	King's College London Special Seminar, Theoretical Particle Physics & Cosmology	June 2018
	Gravity, Cosmology & Physics Beyond the Standard Model Conference LPNHE, UPMC, Paris, France	June 2018
	Sakurai Thesis Prize Talk American Physical Society April Meeting, Columbus, OH <i>Quantum Gravity Constraints for Effective Field Theories</i>	April 2018
	University of Illinois, Urbana-Champaign Mathematical and Theoretical Physics Seminar	April 2018
	McGill University High Energy Theory Group Seminar (virtual)	March 2018
	California Institute of Technology High Energy Theory Seminar	February 2018
	California Institute of Technology Quantum Spacetime Meeting	February 2018
	UC Berkeley String Seminar	February 2018
	Stanford University Stanford Institute for Theoretical Physics Seminar	January 2018
	SLAC National Accelerator Laboratory Elementary Particle Physics Theory Seminar	October 2017
	Institute for Advanced Study High Energy Theory Seminar	October 2017
	Massachusetts Institute of Technology String/Gravity Theory Seminar	May 2017
	California Institute of Technology Theoretical Physics Research Group Meeting	April 2017
	California Institute of Technology Theoretical Physics Journal Club	April 2017
	UC Berkeley String Seminar	February 2017
	QCD Meets Gravity Workshop UCLA	December 2016
	California Institute of Technology Theoretical Physics Research Group Meeting	November 2016
	California Institute of Technology Theoretical Physics Research Group Meeting	October 2016
	Johns Hopkins University High Energy Theory/Cosmology Seminar	October 2016
	California Institute of Technology Theoretical Physics Research Group Meeting	May 2016
	New York University High Energy Seminar	April 2016
	Harvard University Particle Theory Seminar	April 2016
	California Institute of Technology Theoretical Physics Research Group Meeting	February 2016

TALKS, CONTINUED	California Institute of Technology Theoretical Physics Research Group Meeting	November 2015
	California Institute of Technology Theoretical Physics Journal Club	October 2015
	California Institute of Technology Theoretical Physics Research Group Meeting	April 2015
	California Institute of Technology Theoretical Physics Research Group Meeting	February 2015
	California Institute of Technology Theoretical Physics Research Group Meeting	October 2014
	California Institute of Technology Theoretical Physics Journal Club two-part talk	October 2014
	20 th International Symposium on Particles, Strings and Cosmology (PASCOS 2014) Warsaw, Poland	June 2014
	California Institute of Technology Theoretical Physics Research Group Meeting	May 2014
	California Institute of Technology Theoretical Physics Journal Club	February 2014
	California Institute of Technology Theoretical Physics Research Group Meeting	February 2014
	California Institute of Technology Theoretical Physics Journal Club	September 2013
	Hertz Foundation 50 th Anniversary Symposium Poster Presentation	August 2013
	American Physical Society April Meeting, Denver, CO	April 2013
	Mullard Space Science Laboratory, United Kingdom Theory Group Meeting	August 2011
	Dean's Summer International Student Day of Talks University College London, United Kingdom	August 2011
	217 th Meeting of the American Astronomical Society, Seattle, WA Poster Presentation	January 2011
CONFERENCE ORGANIZATION	Conference Co-Chair Kavli Institute for Theoretical Physics (virtual) <i>UV Meets the IR: Effective Field Theory Bounds from QFT to String Theory</i>	October 2020
SEMINAR ORGANIZATION	Organizer UC Santa Barbara High Energy and Gravity Seminar Series	2020–2021
	Organizer UC Berkeley HEP-QIS Seminar Series	2018–2019
	Organizer UC Berkeley String Seminar Series	2017–2019
TEACHING EXPERIENCE	UC Santa Barbara, Department of Physics	Fall 2020
	Instructor and organizer of graduate short course <i>Impossible Physics: Constraining the Laws of Nature, from Scattering Amplitudes to Black Holes</i>	
	UC Berkeley, Department of Physics	April 2018
	Guest lecturer in Prof. Petr Hořava's Quantum Field Theory course	
JOURNAL REFeree	University of Minnesota, Institute of Technology, Department of Astronomy	Fall 2009
	Teaching assistant to Prof. Robert Gehr, Department Chair	
	Physical Review Letters	
	Physical Review D	
	Journal of High Energy Physics	
SCIENCE OUTREACH	Nuclear Physics B	
	Scientific Reports - Nature	
	Communications in Mathematical Physics	
SCIENCE OUTREACH	Outreach talk for KITP administrative staff	May 2021
	Guest lecturer for Caltech's <i>Storytelling for Scientists</i> course	April 2021
	Presented talks on dark matter to physics classes in rural Minnesota	2011

PRESS	<i>The Current</i> UCSB	January 2022
	<i>Quantum Zeta Epiphany</i>	
	<i>Physics Magazine</i> American Physical Society	December 2021
	<i>A Physical Match for the Riemann Zeta Function</i>	
	<i>Quanta Magazine</i>	May 2020
	<i>Black Hole Paradoxes Reveal a Fundamental Link Between Energy and Order</i>	
SCIENTIFIC & HONORARY AFFILIATIONS	American Physical Society	
	American Astronomical Society	
	International Society on General Relativity and Gravitation	
	Golden Key International Honour Society	
	Sigma Pi Sigma, National Physics Honor Society	
LEADERSHIP, SERVICE, & CULTURAL ACTIVITIES	California Institute of Technology Graduate Student Council Board of Directors	2013–2017
	Member, Academics Committee and Director at Large	2016–2017
	Member, Academics Committee and Physics Representative	2013–2016
	California Institute of Technology Faculty Library Committee, Student Representative	2013–2017
	Co-author/-composer of a two-act musical, <i>From the Earth to the Moon</i> , based on the Verne novel	
	Co-author/-composer of a two-act musical, <i>Boldly Go!</i> , a musical parody based upon <i>Star Trek</i>	
	Music director of Caltech production of <i>Boldly Go!</i> Mainstage production	2016
	Public reading	2015
	University Study Abroad May Seminar: <i>Great Minds of the Renaissance</i> , Italy	2011
	Examined history of Renaissance scientists (Galileo, daVinci, et al.) and their relationship to society	
	University of Minnesota Gospel Choir	2008–2010
	Detroit Lakes Community Summer Band Program	2008–2010
	University of Minnesota Honors Student Association	2008–2012
	University of Minnesota volunteer caller for Admissions Office	2008–2009
	U.S. Department of Education volunteer	2008
	Assembled hygiene kits for Washington, D.C. homeless	
TEST SCORES	GRE Physics—Perfect Score: 990/990	2011
	GRE General—Quantitative: 800/800, Verbal: 720/800, Analytical Writing: 5.5/6.0	2011
	SAT—Perfect Score: 2400/2400	2008
	SAT II—Perfect Scores: Math Level II 800/800 and Biology–Molecular 800/800	2008