

CONTACT INFORMATION	Center for Cosmology and Particle Physics New York University	<i>e-mail:</i> <a href="mailto:grant.remmen@nyu.edu">grant.remmen@nyu.edu</a> <i>web:</i> <a href="http://grantremmen.com">grantremmen.com</a>
POSITIONS	<b>New York University</b> , James Arthur Postdoctoral Fellow <b>University of California, Santa Barbara</b> , Fundamental Physics Fellow <b>Kavli Institute for Theoretical Physics</b> , Postdoctoral Scholar <b>University of California, Berkeley</b> , Miller Research Fellow <b>Harvard University Society of Fellows</b> , Junior Fellow (declined)	2023–present 2020–2023 2017–2020 2017
EDUCATION	<b>California Institute of Technology</b> Ph.D., Physics M.S., Physics Hertz Fellow and NSF Graduate Research Fellow  <b>University of Minnesota, College of Science &amp; Engineering</b> 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
SELECTED HONORS & AWARDS	<b>Appointed as Hertz Fellowship Interviewer</b> <b>Sakurai Dissertation Award in Theoretical Particle Physics</b> 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.” <b>Stemple Memorial Prize in Physics</b> , Caltech <b>United States Delegate to the 66<sup>th</sup> Lindau Nobel Laureate Meeting</b> <b>Hertz Fellow</b> <b>NSF Graduate Research Fellow</b> , National Science Foundation <b>Goldwater Scholar</b> <b>Chambliss Astronomy Achievement Student Award</b> , American Astronomical Society <b>Dean’s Summer International Student Scholarship</b> , University College London <b>National Merit Scholar</b> <b>Byrd Honors Scholar</b> <b>United States Presidential Scholar</b> , White House Commission on Presidential Scholars & U.S. Dept. of Education	2018–present 2018  2016 2016 2012–2017 2012–2017 2010–2012 2011 2011 2008–2012 2008–2011 2008
PRESS	<i>The Current</i>   UCSB <i>Quantum Zeta Epiphany</i>  <i>Physics Magazine</i>   American Physical Society <i>A Physical Match for the Riemann Zeta Function</i>  <i>Quanta Magazine</i> <i>Black Hole Paradoxes Reveal a Fundamental Link Between Energy and Order</i>	January 2022  December 2021  May 2020

- PUBLICATIONS
56. Xi Dong, **Grant N. Remmen**, Diandian Wang, Wayne W. Weng, Chih-Hung Wu  
*Holographic Entanglement from the UV to the IR* under review, JHEP arXiv:2308.07952
  55. Clifford Cheung, **Grant N. Remmen**  
*Bespoke Dual Resonance* under review, Phys. Rev. D arXiv:2308.03833
  54. Gary T. Horowitz, Maciej Kolanowski, **Grant N. Remmen**, Jorge E. Santos  
*Extremal Kerr Black Holes as Amplifiers of New Physics* under review, Phys.Rev.Lett. arXiv:2303.07358
  53. Clifford Cheung, **Grant N. Remmen**  
*Stringy Dynamics from an Amplitudes Bootstrap* Phys. Rev. D **108** (2023) 026011 arXiv:2302.12263
  52. Achilleas P. Porfyriadis, **Grant N. Remmen**  
*Charged Dilatonic Spacetimes in String Theory* JHEP **3** (2023) 125 arXiv:2301.08256
  51. Clifford Cheung, **Grant N. Remmen**  
*Veneziano Variations: How Unique are String Amplitudes?* JHEP **1** (2023) 122 arXiv:2210.12163
  50. Marat Freytsis, Soubhik Kumar, **Grant N. Remmen**, Nicholas L. Rodd  
*Multifield Positivity Bounds for Inflation* under review, JHEP arXiv:2210.10791
  49. Juan Maldacena, **Grant N. Remmen**  
*Accumulation-Point Amplitudes in String Theory* JHEP **8** (2022) 152 arXiv:2207.06426
  48. **Grant N. Remmen**, Nicholas L. Rodd  
*Spinning Sum Rules for the Dimension-Six SMEFT* JHEP **9** (2022) 30 arXiv:2206.13524
  47. Yu-tin Huang, **Grant N. Remmen**  
*UV-Complete Gravity Amplitudes and the Triple Product* Phys. Rev. D **106** (2022) L021902 arXiv:2203.00696
  46. Achilleas P. Porfyriadis, **Grant N. Remmen**  
*Large Diffeomorphisms and Accidental Symmetry of the Extremal Horizon* JHEP **3** (2022) 107 arXiv:2112.13853
  45. **Grant N. Remmen**  
*Exploration of a Singular Fluid Spacetime* Gen. Rel. Grav. **53** (2021) 101 arXiv:2111.08713
  44. Nima Arkani-Hamed, Yu-tin Huang, Jin-Yu Liu, **Grant N. Remmen**  
*Causality, Unitarity, and the Weak Gravity Conjecture* JHEP **3** (2022) 83 arXiv:2109.13937
  43. **Grant N. Remmen**  
*Amplitudes and the Riemann Zeta Function* Phys.Rev.Lett. **127** (2021) 241602, Editors' Suggestion arXiv:2108.07820
  42. Achilleas P. Porfyriadis, **Grant N. Remmen**  
*Horizon Acoustics of the GHS Black Hole and the Spectrum of  $AdS_2$*  JHEP **10** (2021) 142 arXiv:2106.10282
  41. Ning Bao, Aidan Chatwin-Davies, **Grant N. Remmen**  
*Entanglement Wedge Cross Section Inequalities from Replicated Geometries* JHEP **7** (2021) 113 arXiv:2106.02640
  40. Ning Bao, Jonathan Harper, **Grant N. Remmen**  
*Holevo Information of Black Hole Mesostates* Phys. Rev. D **105** (2022) 026010 arXiv:2103.06888
  39. **Grant N. Remmen**, Nicholas L. Rodd  
*Signs, Spin, SMEFT: Sum Rules at Dimension Six* Phys. Rev. D **105** (2022) 036006 arXiv:2010.04723
  38. Rafael Aoude et al. (including **Grant N. Remmen**)  
*On-Shell Methods for the SMEFT* Snowmass 2021 Letter of Interest
  37. Ning Bao, Aidan Chatwin-Davies, **Grant N. Remmen**  
*Warping Wormholes with Dust: a Metric Construction of the Python's Lunch* JHEP **9** (2020) 102 arXiv:2006.10762
  36. **Grant N. Remmen**, Nicholas L. Rodd  
*Flavor Constraints from Unitarity and Analyticity* Phys. Rev. Lett. **125** (2020) 081601 arXiv:2004.02885

- PUBLICATIONS, 35. Clifford Cheung, **Grant N. Remmen** JHEP **5** (2020) 100  
CONTINUED *Entanglement and the Double Copy* arXiv:2002.10470
34. Ning Bao, Aidan Chatwin-Davies, Jason Pollack, **Grant N. Remmen** JHEP **8** (2020) 65  
*Cosmological Decoherence from Thermal Gravitons* arXiv:1911.10207
33. **Grant N. Remmen**, Nicholas L. Rodd JHEP **12** (2019) 32  
*Consistency of the Standard Model Effective Field Theory* arXiv:1908.09845
32. Ning Bao, Aidan Chatwin-Davies, Jason Pollack, **Grant N. Remmen** JHEP **7** (2019) 152  
*Towards a Bit Threads Derivation of Holographic Entanglement of Purification* arXiv:1905.04317
31. Clifford Cheung, Junyu Liu, **Grant N. Remmen** Phys. Rev. D **100** (2019) 046003  
*Entropy Bounds on Effective Field Theory from Rotating Dyon Black Holes* arXiv:1903.09156
30. Raphael Bousso, Yasunori Nomura, **Grant N. Remmen** Phys. Rev. D **99** (2019) 046002  
*Outer Entropy and Quasilocal Energy* arXiv:1812.06987
29. Ning Bao, Aidan Chatwin-Davies, **Grant N. Remmen** JHEP **2** (2019) 110  
*Entanglement of Purification and Multiboundary Wormhole Geometries* arXiv:1811.01983
28. **Grant N. Remmen** Phys. Rev. D **98** (2018) 124008  
*New Spacetimes for Rotating Dust in  $(2+1)$ -Dimensional General Relativity* arXiv:1810.12305
27. Ning Bao, Aidan Chatwin-Davies, Jason Pollack, **Grant N. Remmen** JHEP **11** (2018) 71  
*Traversable Wormholes as Quantum Channels: Exploring CFT Entanglement Structure and Channel Capacity in Holography* arXiv:1808.05963
26. Yasunori Nomura, **Grant N. Remmen** JHEP **8** (2018) 63  
*Area Law Unification and the Holographic Event Horizon* arXiv:1805.09339
25. Venkatesa Chandrasekaran, **Grant N. Remmen**, JHEP **11** (2018) 15  
Arvin Shahbazi-Moghaddam  
*Higher-Point Positivity* arXiv:1804.03153
24. Clifford Cheung, Junyu Liu, **Grant N. Remmen** JHEP **10** (2018) 4  
*Proof of the Weak Gravity Conjecture from Black Hole Entropy* arXiv:1801.08546
23. 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*
22. 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*
21. Clifford Cheung, **Grant N. Remmen**, Chia-Hsien Shen, Congkao Wen JHEP **4** (2018) 129  
*Pions as Gluons in Higher Dimensions* arXiv:1709.04932
20. Clifford Cheung, **Grant N. Remmen** JHEP **9** (2017) 2  
*Hidden Simplicity of the Gravity Action* arXiv:1705.00626
19. Sean M. Carroll, **Grant N. Remmen** Phys. Rev. D **95** (2017) 123504  
*A Nonlocal Approach to the Cosmological Constant Problem* arXiv:1703.09715
18. Ning Bao, **Grant N. Remmen** EPL **121** (2018) 60007, Editor's Choice  
*Bulk Connectedness and Boundary Entanglement* arXiv:1703.00018
17. Clifford Cheung, **Grant N. Remmen** JHEP **1** (2017) 104  
*Twofold Symmetries of the Pure Gravity Action* arXiv:1612.03927

- PUBLICATIONS, CONTINUED
16. Clifford Cheung, **Grant N. Remmen** Phys. Rev. Lett. **118** (2017) 051601  
*Positivity of Curvature-Squared Corrections in Gravity* arXiv:1608.02942
  15. **Grant N. Remmen**, Ning Bao, Jason Pollack JHEP **7** (2016) 48  
*Entanglement Conservation,  $ER = EPR$ ,  
and a New Classical Area Theorem for Wormholes* arXiv:1604.08217
  14. Sean M. Carroll, **Grant N. Remmen** Phys. Rev. D **93** (2016) 124052  
*What is the Entropy in Entropic Gravity?* arXiv:1601.07558
  13. Clifford Cheung, **Grant N. Remmen** JHEP **4** (2016) 2  
*Positive Signs in Massive Gravity* arXiv:1601.04068
  12. Ning Bao, Jason Pollack, **Grant N. Remmen** JHEP **11** (2015) 126  
*Wormhole and Entanglement (Non-)Detection  
in the  $ER = EPR$  Correspondence* arXiv:1509.05426
  11. Brando Bellazzini, Clifford Cheung, **Grant N. Remmen** Phys. Rev. D **93** (2016) 064076  
*Quantum Gravity Constraints from Unitarity and Analyticity* arXiv:1509.00851
  10. Ning Bao, Jason Pollack, **Grant N. Remmen** Fortschr. Phys. **63** (2015) 705  
*Splitting Spacetime and Cloning Qubits:  
Linking No-Go Theorems across the  $ER = EPR$  Duality* arXiv:1506.08203
  9. Ning Bao, ChunJun Cao, Sean M. Carroll, Aidan Chatwin-  
Davies, Nicholas Hunter-Jones, Jason Pollack, **Grant N. Remmen** Phys. Rev. D **91** (2015) 125036  
*Consistency Conditions for an AdS Multiscale Entanglement  
Renormalization Ansatz Correspondence* arXiv:1504.06632
  8. Clifford Cheung, **Grant N. Remmen** JHEP **12** (2014) 87  
*Infrared Consistency and the Weak Gravity Conjecture* arXiv:1407.7865
  7. **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
  6. Clifford Cheung, **Grant N. Remmen** Phys. Rev. Lett. **113** (2014) 051601  
*Naturalness and the Weak Gravity Conjecture* arXiv:1402.2287
  5. **Grant N. Remmen**, Sean M. Carroll Phys. Rev. D **88** (2013) 083518  
*Attractor Solutions in Scalar-Field Cosmology* arXiv:1309.2611
  4. **Grant N. Remmen**, Kris Davidson, Andrea Mehner Astrophys. J. **773** (2013) 27  
*Unexpected Ionization Structure in Eta Carinae's "Weigelt Knots"* arXiv:1302.2659
  3. **Grant N. Remmen**, Kinwah Wu Mon. Not. R. Astron. Soc. **430** (2013) 1940  
*Complex Orbital Dynamics of a Double Neutron Star System  
Revolving around a Massive Black Hole* arXiv:1301.2836
  2. **Grant Remmen**, Elwood McCreary JURP **25** (2012)  
*Measurement of the Speed and Energy Distribution of Cosmic Ray Muons*
  1. **Grant Remmen** JURP **23** (2010)  
*A New Assessment of Dark Matter in the Milky Way Galaxy*

## TALKS

- Amplitudes 2023 | CERN August 2023
- Strings 2023 | Perimeter Institute for Theoretical Physics July 2023
- Kavli Institute for Theoretical Physics | Generalized Symmetries Reading Group June 2023
- Quark Confinement 2023 | University of Minnesota May 2023
- Simons Collaboration on Confinement and QCD Strings
- Kavli Institute for Theoretical Physics | Locals' Lunch Talk April 2023

TALKS, CONTINUED	CERN   Standard Model Electroweak Group Meeting, ATLAS Collaboration (virtual)	April 2023
	McGill University   High Energy Theory Group Meeting (virtual)	April 2023
	University of Chicago, Kadanoff Center for Theoretical Physics   Particle Theory Seminar	April 2023
	Princeton University   High Energy Theory Seminar	March 2023
	California Amplitudes Meeting   UC San Diego	March 2023
	University of Michigan, LCTP   High Energy Theory Seminar (two parts)	March 2023
	Indiana University   High-Energy Physics/Astrophysics Seminar	March 2023
	California Institute of Technology   Amplitudes Group Meeting	February 2023
	Bootstrapping Quantum Gravity Program   Kavli Institute for Theoretical Physics	February 2023
	Stony Brook University, Simons Center for Geometry and Physics   Special Physics Seminar	February 2023
	UC Davis, QMAP   Particles/Cosmology Seminar	January 2023
	Brown University   High Energy Theory Seminar (virtual)	November 2022
	Number Theory and Physics Workshop   Simons Center for Geometry and Physics, Stony Brook University (virtual)	October 2022
	Institute for Advanced Study   Amplitudes Group Meeting	October 2022
	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

TALKS,	University of Chicago   Particle Theory Seminar (virtual)	January 2021
CONTINUED	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
	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

TALKS,	UC Berkeley   String Seminar	February 2018
CONTINUED	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
	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 parts)	October 2014
	20 <sup>th</sup> 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 <sup>th</sup> 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 <sup>th</sup> Meeting of the American Astronomical Society, Seattle, WA   Poster Presentation	January 2011
CONFERENCE	Conference Co-Chair   Kavli Institute for Theoretical Physics (virtual)	October 2020
ORGANIZATION	<i>UV Meets the IR: Effective Field Theory Bounds from QFT to String Theory</i>	



SEMINAR ORGANIZATION	Organizer   KITP Locals' Event Series	2022–2023
	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	<b>UC Santa Barbara, Department of Physics</b>	Fall 2020
	Instructor and organizer of graduate short course <i>Impossible Physics: Constraining the Laws of Nature, from Scattering Amplitudes to Black Holes</i>	
	<b>UC Berkeley, Department of Physics</b>	April 2018
	Guest lecturer in Prof. Petr Hořava's Quantum Field Theory course	
THESES	<b>University of Minnesota, Institute of Technology, Department of Astronomy</b>	Fall 2009
	Teaching assistant to Prof. Robert Gehr, Department Chair	
	<b>Ph.D., Physics</b>   California Institute of Technology	Defended May 2017
	Grant Newton Remmen <i>Defining Gravity: Effective Field Theory, Entanglement, and Cosmology</i> Thesis advisors: Clifford Cheung and Sean M. Carroll, California Institute of Technology	
	<b>B.S., Mathematics, <i>summa cum laude</i></b>   University of Minnesota	Defended May 2012
	Grant N. Remmen <i>Dynamics of a Rigid Spinning Ring in the Schwarzschild Metric: A Solution to a Gravitational Problem in Mathematical Physics</i> 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>B.S., Astrophysics, <i>summa cum laude</i></b>   University of Minnesota	Defended December 2011
	Grant N. Remmen Hubble Space Telescope <i>Subpixel Modeling of Anomalous High-Excitation Emission Lines in the Ejecta of Eta Carinae</i> Thesis advisor: Kris Davidson, MN Institute for Astrophysics, University of Minnesota	
	<b>B.S., Physics, <i>summa cum laude</i></b>   University of Minnesota	Defended April 2010
	Grant Remmen <i>Distortion of Black Holes caused by Motion relative to the Cosmic Microwave Background</i> Thesis advisor: Robert Gehr, Director, MN Institute for Astrophysics, University of Minnesota	
UNDERGRAD. HONORS & AWARDS, UNIVERSITY OF MINNESOTA	<b>Hagstrum Award in Physics</b>	2012
	<b>Outstanding Graduate in Mathematics</b>	2012
	<b>Franklin Scholarship in Physics</b>	2011–2012
	<b>Lando Scholarship in Mathematics</b>	2011–2012
	<b>Richards Scholarship in Mathematics</b>	2011–2012
	<b>Nier Scholarship in Physics</b>	2010–2011
	<b>Thorp Scholarship in Mathematics</b>	2010–2011
	<b>Undergraduate Research Scholarship</b>	2010
	<b>Basford Award in Physics</b>	2009–2010
	<b>Institute of Technology Alumni Award</b>	2009–2010
	<b>Institute of Technology Honors Undergraduate Research Scholarship</b>	2009
	<b>Maroon &amp; Gold Leadership Award</b>	2008–2012
	<b>3M/Alumni Award</b>	2008–2012
	<b>Bentson Scholar</b>	2008–2012
	<b>Dean's List, College of Science &amp; Engineering/Institute of Technology</b>	2008–2012
	<b>McGraw Hill Student Achievement Recognition,</b> Meritorious Work in General Chemistry	2008



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	
SCIENCE OUTREACH	Interacted with various major donors at the request of KITP Outreach talk for KITP administrative staff Guest lecturer for Caltech's <i>Storytelling for Scientists</i> course Presented talks on dark matter to physics classes in rural Minnesota	2022–2023 May 2021 April 2021 2011
JOURNAL REFEREE	Physical Review Letters Physical Review D Journal of High Energy Physics Nuclear Physics B Scientific Reports - Nature Communications in Mathematical Physics	
LEADERSHIP, SERVICE, & CULTURAL ACTIVITIES	Co-author/-composer of a two-act musical, <i>From the Earth to the Moon</i> , based on the Verne novel Caltech production of <i>From the Earth to the Moon</i>   Mainstage production, Assistant to the Director Public reading (virtual), Music Director California Institute of Technology Graduate Student Council Board of Directors Member, Academics Committee and Director at Large Member, Academics Committee and Physics Representative California Institute of Technology Faculty Library Committee, Student Representative Co-author/-composer of a two-act musical, <i>Boldly Go!</i> , a musical parody based upon <i>Star Trek</i> Caltech production of <i>Boldly Go!</i>   Mainstage production, Music Director Public reading, Music Director University Study Abroad May Seminar: <i>Great Minds of the Renaissance</i> , Italy   History of Renaissance scientists (Galileo, da Vinci, etc.) and societal context University of Minnesota Gospel Choir Detroit Lakes Community Summer Band Program University of Minnesota Honors Student Association University of Minnesota volunteer caller for Admissions Office U.S. Department of Education volunteer   Assembled hygiene kits for Washington, D.C. homeless	2022 2021 2021 2013–2017 2016–2017 2013–2016 2013–2017 2016 2015 2011 2008–2010 2008–2010 2008–2012 2008–2009 2008
TEST SCORES	GRE Physics—Perfect Score: 990/990 GRE General—Quantitative: 800/800, Verbal: 720/800, Analytical Writing: 5.5/6.0 SAT—Perfect Score: 2400/2400 SAT II—Perfect Scores: Math Level II 800/800 and Biology–Molecular 800/800	2011 2011 2008 2008