Robert A. McNees

Curriculum Vitae

August 2025

Loyola University Chicago
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Chicago, IL 60660

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Current

Loyola University Chicago, 2009 - Present
Associate Professor, Department of Physics

Research

General Relativity, Cosmology, String Theory, Particle Physics. Especially topics at the intersection of these areas, like holography and gauge/gravity duality.

Education

University of Texas, Austin, TX
Ph.D. in Physics, 2002

University of North Carolina, Chapel Hill, NC
B.S. in Physics, 1995

Previous Positions

Perimeter Institute for Theoretical Physics, 2007 - 2009
Postdoctoral Researcher

University of Waterloo, 2008 - 2009
Lecturer, Department of Physics

Brown University, 2005 - 2007
Postdoctoral Research Associate, Department of Physics

University of Michigan, 2002 - 2005
Postdoctoral Fellow, Department of Physics

University of Texas, 1998 - 2002
Graduate Research Assistant, Weinberg Theory Group

Teaching Experience

Loyola University Chicago
Physics 111, 112: College Physics
Physics 111L, 112L: College Physics Lab
Physics 121, 122: University Physics
Physics 126F: Freshman Project
Physics 301: Mathematical Methods in Physics
Physics 351: Electricity and Magnetism
Physics 380, 381: Particle Physics
Physics 391: Research

Honors 204: Science and Society - "Honors Modern Physics"
Honors 204: Science and Society - "Federal Funding of the Sciences"

University of Waterloo
Introduction to Physics
Mechanics and Waves 2
Mathematical Physics
Modern Particle Physics

Research Experience

Loyola University Chicago, 2009 - Present
Research projects in General Relativity, Quantum Gravity, Cosmology, Particle Physics, and Undergraduate Physics Education

Perimeter Institute for Theoretical Physics, 2007 - 2009
Postdoctoral Researcher in the String Theory Group

Brown University, 2005 - 2007
Postdoctoral Research Associate in the High Energy Theory Group

University of Michigan at Ann Arbor, 2002 - 2005
Postdoctoral Fellow in the High Energy Theory Group and the Michigan Center for Theoretical Physics

University of Texas at Austin, 1996 - 2002
Graduate Research Assistant in the Weinberg Theory Group

Oak Ridge National Laboratories, 1992 and 1993
Engineering Physics and Mathematics Division

Awards and Nominations

Sujack Award for Teaching Excellence, 2022

Nominee: Loyola University Chicago St. Ignatius Excellence in Teaching Award, 2022

Nominee: Loyola University Chicago Sujack Teaching Award, 2021

Loyola University Chicago Sujack Master Teacher Award, 2014

Nominee: LUC Ignatius Loyola Award for Excellence in Teaching, 2014

Nominee: LUC Provost's Award for Excellence in Teaching Freshman, 2014

KITP Scholar, 2014-2016, Kavli Institute for Theoretical Physics, University of California Santa Barbara

Student Projects

Gunwati Agrawal and Themistoklis Tzellos, Fall 2023-Spring 2024
"An Investigation into General Relativity"
Finalists for the CELTS Learning Portfolio Reflection Award

Gunwati Agrawal, Kiet Nguyen, Andrew Rogers, Tomas Taraby, and Themistoklis Tzellos, Fall 2022 - Fall 2023
"Special and General Relativity"

Collin Dannheim, Luke Ignell, and Brendan O'Donnell, Spring 2019 - 2021
"Modeling a looping pendulum" (with Dr. Constantin Rasinariu)

Andrew Fischer and Alec Lancaster, Fall 2017 - Fall 2018
"The special and general theories of relativity"

Ariana Grymski, Fall 2016 - Fall 2018
"The special and general theories of relativity"

Barbara Skrzypek and Alex Pizzuto, Spring 2016 - Fall 2018
"The Dynamical Chern-Simons Scalar Field on a Kerr Background"
Both students awarded 2016-17 Mulcahy Scholarships

Alex Gilman, Spring 2015 - Summer 2016
"A MATHEMATICA Package for Efficient, Parallelized Calculations in General Relativity"

Edward Varty and Kevin Kadowaki, Summer 2012 - Spring 2014
"Numerical Search for Transient Hubble Acceleration in Quintessence Cosmologies"
Poster presented at Chicago Area Research Symposium, April 2013

Hwi Seon Kim, Summer 2013 - Fall 2013
"Physically Realistic Version of a Paradox in Special Relativity"

Momoko Takahashi, Summer 2012 - Spring 2013
"Physically Realistic Description of the Twin Paradox, Applied to Krugman's Relativistic Theory of Trade"

Stephanie Miller, Fall 2010-Spring 2011
"2+1+1 Decomposition of Maxwell's Equations on a Curved Spacetime"

Eric Wilkinson, Fall 2009-Spring 2010
"Numerical Simulations of Accelerated Hubble Expansion Driven by Quintessence"

College and University Service

Academic Council, 2024 - Present (Co-chair, Election Sub-committee)

CLAS Unit Assessment Lead, 2022 - Present

Sujack Teaching Award Committee, 2015-2017 and 2023 - Present

Academic Technology Committee, 2021 - 2023

Faculty Appeals Committee, 2018 - 2021

Course Evaluation Software Review Committee, 2018-2019

Plan 2020 Interdisciplinary STEM Committee, 2018

Academic Technology Committee (Alternate member), 2017 - 2021

University Library Committee, 2009 - 2017

Digital Repository Advisory Committee, 2011 - 2013

Club Baseball Faculty Advisor, 2010 - 2012

"Loyola on the Road" Alumni Presentation in San Francisco, November 2012

Guest Lectures at LUREC Winter Ecology course, January 2012

Departmental Service

APS Inclusion, Diversity, and Equity Alliance, Loyola delegation, 2020 - Present

Physics Department Assessment Coordinator, 2012 - Present

Physics Department Curriculum Committee, 2019 - Present

Physics Department Rank and Tenure Committee, 2016 - Present (Chair, 2021-22)

Physics Department Representative at Loyola Open House, 2009 - Present

Physics Department Strategic Planning Committee, 2018 - 2022

Chair of Department of Physics Committee on Tenure and Promotion, 2021

Chair of NTT Faculty Search Committee, 2018-2019 (Two positions filled)

TT Faculty Search Committee Member, 2017-2018

Physics Department Chairperson Search Committee Member, 2017

NTT Faculty Search Committee Member, 2012, 2014, and 2016

Member of Physics Department Textbook Committee, 2015 - 2018

Chair of Physics Major Curriculum Reorganization Committee, 2014 - 2015

Departmental advisor for 10-15 physics majors each year, 2009 - Present

Member of the Advanced Lecture Courses Curriculum Committee, 2012 - 2017

Member of the Departmental Web Management Committee, 2013 - 2020

Professional Service

Referee for *American Journal of Physics*, *Physical Review Letters*, *Physical Review D*, *Journal of High Energy Physics*, *Classical and Quantum Gravity*, *Journal of Cosmology and Astroparticle Physics*

External Proposal Reviewer for MIT Press

Professional Affiliations

American Physical Society
Division of Particles and Fields
Topical Group on Gravitation
Inclusion, Diversity, and Equity Alliance

Outreach Activities

Social Media: Sci-comm outreach on Mastodon, Twitter, and other platforms. Focus on physics, astronomy, mathematics, and contributions made by scientists from under represented groups. The 16th most popular account among physicists (Composite Ranking), 2-4 million views per month.

Popular Media: Commentary, interviews, quotes, and background for science stories in Washington Post, gizmodo, inverse, Live Science, Verge, and others. Work featured in ScienceNews, Smithsonian.com, and SciShow.

Elementary and middle school outreach on podcasts and at local schools.

Science Olympiad coach at Sacred Heart Middle School, 2023 - Present

ComSciCon-Chicago, 2016

Adler Planetarium Astro-Science Workshop, 2012 - 2016

Chicago Public Schools Area 19 Science Fair Judge, 2010 - 2015

Quantum to Cosmos Festival 2009
Panel Discussion: "The Art of Guesstimation"

Perimeter Institute for Theoretical Physics, 2008 - 2009
Interviews for popular media, Contributor to outreach website, Q&A sessions for visiting students

U.S. Department of Energy National Science Bowl, 2007 - 2009
Moderator and Speaker

Educational Workshops

Provost's Faculty Retreat, October 2011
"Celebrating Loyola's Teaching Culture"

Center for Ignation Pedagogy series on Exemplary Teaching, October 2011
"Ignation Pedagogy: Tips from Loyola Faculty"

Selected Talks

"dS_2 as excitation of AdS_2"
Vienna University of Technology, July 2022

"Science and Social Media: One Physicist's Experience"
Joint Meeting of the Illinois and Wisconsin sections of the AAPT, Fall 2017

"AdS and the Fefferman-Graham Expansion: Asymptotic Expansions using Mathematica and xTensor"
Vienna University of Technology, January 2014

"Holographic Renormalization of Asymptotically Lifshitz Spacetimes"
21st Midwest Relativity Meeting, University of Illinois, November 2011

"On Quark Masses in Holographic QCD"
Theory Canada 4, University of Montreal, June 2008

"Boundary Terms Unbound! Variational Principles for Gravitational Theories"
University of Chicago, December 2007

"Everything You Ever Wanted to Know about 2-D Black Holes"
Syracuse University, April 2007

"Actions, Boundary Terms, and AdS/CFT"
Massachusetts Institute of Technology, March 2006

"Inflation, Holography, and Diffeomorphisms"
Columbia University, March 2004

"Inflation as a Holographic RG Flow"
University of Pennsylvania, October 2003

"Inflation and Broken Scale Invariance"
Perimeter Institute for Theoretical Physics, June 2003

Selected Conferences

Strings 2022
University of Vienna, July 2022

APS-IDEA Virtual Workshop
American Physical Society / Online, February 2020

APS-IDEA September Workshop
American Physical Society / Online, September 2020

APS-IDEA Workshop on Equity, Diversity, and Inclusion
American Physical Society / Online, June 2020

Strings 2020
University of Cape Town / Online, June-July 2020

Midwest Relativity Meetings
27th Meeting: University of Michigan, October 2017
26th Meeting: Perimeter Institute for Theoretical Physics, October 2016
25th Meeting: Northwestern University, October 2015

Fellows at the Frontiers 2016
Northwestern University, September 2016

Convergence 2015
Perimeter Institute for Theoretical Physics, June 2015

21st Midwest Relativity Meeting
University of Illinois at Urbana Champaign, November 2011

Great Lakes Strings 2011
University of Chicago, April-May 2011

Upcoming Publications

1. "(Anti)-de Sitter with leaky boundaries and corners" with Céline Zwikel. *arXiv submission in August 2025.*

Peer Reviewed Publications

The names of undergraduate collaborators appear in bold.

1. "The symplectic potential for leaky boundaries" with Céline Zwikel. Published in J. High Energ. Phys. 2025, 49 (2025).
2. "Finite charges from the bulk action" with Céline Zwikel. Published in J. High Energ. Phys. 08, 154 (2023).
3. "dS_2 as excitation of AdS_2" with Florian Ecker and Daniel Grumiller. Published in SciPost Phys. 13 (2022) 6, 119.
4. "Dynamics of the looping pendulum: theory, simulation, and experiment" with **Collin Dannheim**, **Luke Ignell**, **Brendan O'Donnell**, and Constantin Rasinariu.

Published in Eur. J. Phys. **42** 065010.

5. "Universal flow equations and chaos bound saturation in 2d dilaton gravity" with Daniel Grumiller. Published in J. High Energ. Phys. **2021**, 112 (2021).

6. "Bounds on extra dimensions from micro black holes in the context of the metastable Higgs vacuum" with Katherine J. Mack. Published in Phys. Rev. D. **99**, 063001 (2019).

7. "Menagerie of AdS_2 Boundary Conditions," with Daniel Grumiller, Jakob Salzer, Carlos Valcárcel, and Dmitri Vassilevich. Published in J. High Energ. Phys. **2017**, 203 (2017).

8. "Extremal Black Holes in Dynamical Chern-Simons Gravity," with Leo Stein and Nicolás Yunes. Class. Quant. Grav. **33**, 235013 (2016).

9. "Cosmological constant as confining U(1) charge in two-dimensional dilaton gravity," with Daniel Grumiller and Jakob Salzer. Phys. Rev. D. **90**, 044032 (2014).

10. "Conformal Gravity Holography in Four Dimensions," with Daniel Grumiller, Maria Irakleidou, and Iva Lovrekovic. Published in Phys. Rev. Lett. **112**, 111102 (2014).

11. "The Electric Field at the Chargeless Interface Between Two Regions of Space," with Asim Gangopadhyaya. Published in Am. J. Phys. **82**, 597 (2014).

12. "Black Holes in the C(an)onical Ensemble," with Daniel Grumiller and Simone Zonetti. Published in Phys. Rev. D **86**, 124043 (2012).

13. "Holographic Renormalization of Asymptotically Lifshitz Spacetimes," with Robert Mann. Published in J. High Energ. Phys. **2011**, 129 (2011).

14. "Boundary Terms Unbound! Holographic Renormalization of Asymptotically Linear Dilaton Gravity," with Robert Mann. Published in Class. Quant. Grav. **27**, 065015 (2010).

15. "Holographic Description of AdS_2 Black Holes," with Alejandra Castro, Daniel Grumiller, and Finn Larsen. Published in JHEP **0811**, 052 (2008).

16. "On Quark Masses in Holographic QCD," with Robert C. Myers and Aninda Sinha. Published in JHEP **0811**, 056 (2008).

17. "On the Stress Tensor for Asymptotically Flat Gravity," with Robert Mann, Donald Marolf, and Amitabh Virmani. Published in Class. Quant. Grav. **25**, 225019 (2008).

18. "Dirichlet Boundary Value Problem for Chern-Simons Modified Gravity," with Robert Mann and Daniel Grumiller. Published in Phys. Rev. D **78**, 081502 (R) (2008).

19. "Black Hole Thermodynamics and Hamilton-Jacobi Counterterm," with Luzi Bergamin, Daniel Grumiller, and Rene Meyer. Proceedings contribution to *Quantum Field Theory Under the Influence of External Conditions*. Published in J. Phys. A **41**, 164068 (2008).

20. "The Thermodynamics of Black Holes in Two (and Higher) Dimensions," with Daniel Grumiller. Published in JHEP **0704**, 074 (2007).

21. "Boundary Counterterms and the Thermodynamics of 2-D Black Holes," with J. Davis. Published in JHEP **0509**, 072 (2005).

22. "Black Hole Mass and Hamilton-Jacobi Counterterms," with A. Batrachenko, J.T. Liu, W.A. Sabra, and W.Y. Wen. Published in JHEP **0505**, 034 (2005).

23. "Holography, Diffeomorphisms, and Scaling Violations in the CMB," with F. Larsen. Published in JHEP **0407**, 062 (2004).

24. "Inflation and De Sitter Holography," with F. Larsen. Published in JHEP **0307**, 051 (2003).

25. "Entropy of the Stiffest Stars," with T. Banks, W. Fischler, A. Kashani-Poor, and S. Paban. Published in Class. Quant. Grav. **19**, 4717-4728 (2002).

26. "String Theory, Holography, and UV-IR Mixing," Ph.D. Dissertation, University of Texas, UMI Publication AAT 3115501 (2002).

27. "The Acceleration of the Universe, A Challenge for String Theory," with W. Fischler, A. Kashani-Poor, and S. Paban. Published in JHEP **0107**, 003 (2001).

28. "The Interplay Between θ and T," with W. Fischler, E. Gorbatov, A. Kashani-Poor, S. Paban, and P. Pouliot. Published in JHEP **0006**, 032 (2000).

29. "Correlation Functions of Operators and Wilson Surfaces in the d=6, (0,2) Theory in the Large N Limit," with R. Corrado and B. Florea. Published in Phys. Rev. D **60**, 085011 (1999).

30. "Cryptosystems Based on Chaotic Dynamics," with V. Protopopescu, R.T. Santoro, and J.S. Tolliver. Oak Ridge National Laboratory Report ORNL/TM-12440 (1993).

Book Chapters

30. "Black holes and thermodynamics — The first half century," with Daniel Grumiller and Jakob Salzer, in *Quantum Aspects of Black Holes*, Ed. Xavier Calmet, Lecture Notes in Physics (Springer, 2016).

Additional Publications

31. "A New Boundary Counterterm for Asymptotically AdS Spacetimes." `http://arxiv.org/abs/hep-th/0512297`

Grey Literature

32. "Conventions, Definitions, Identities, and Formulas," A citable collection of useful and hard-to-find technical results frequently used by researchers in quantum gravity and high-energy theory.

Other Work

33. "gridpapers – Graph paper backgrounds and color schemes" A LaTeX package for typesetting custom grids and graph papers, including specialized grids used in general relativity. Accepted to CTAN, current version and issue tracker available on GitHub.