Oliver DeWolfe

Department of Physics, 390 UCB
University of Colorado
Boulder, CO 80309
Office: 303-492-3272 Fax: 303-492-5119
Email: Oliver.DeWolfe@colorado.edu

Research Interests

- Theoretical particle and gravitational physics, string theory, quantum information.

Positions Held

- Professor, 2023–present
  Associate Professor, 2013–2023
  Assistant Professor, 2006–2013
  Department of Physics, University of Colorado Boulder.
- Postdoctoral Researcher, 2003–2005
  Department of Physics, Princeton University.
- Postdoctoral Researcher, 2000–2003,
  Kavli Institute for Theoretical Physics, University of California at Santa Barbara.

Education

- Massachusetts Institute of Technology
  Ph.D. Physics, 2000; Barton Zwiebach, Advisor. Thesis: *Quantum Field Theories and Higher-Dimensional Gravitational Dynamics.*
- Wesleyan University
  B.A. Physics and Astronomy, high honors, *summa cum laude*, 1995; John Salzer, Advisor. Thesis: *Elemental Abundances In Blue Compact Dwarf Galaxies.*

Financial Support and Grants

- PI on theoretical task of Department of Energy grant since 2006, "Elementary Particle Physics and High Energy Phenomena" currently renewed through 2024 as DOE de-sc0010005, $226K/yr for 4 investigators (research)
- Co-PI on high energy physics/quantum information consortium through Department of Energy "Complex quantum systems and the quantum universe", de-sc0020360, 2021-2024, CU "node" is $160K/yr for 2 investigators (research)
- Co-PI on Theoretical Advanced Summer Institute grant through National Science Foundation, PHY-1819655, 2018-2023, $120K/year for 5 years (summer school)

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Publication Metrics

- Citations: 4628
- Citations/paper: 105.2
- h-index: 28

Data from inspirehep.net, published papers only, as of Feb 18, 2024.

Ph.D Students

- Charles Max Brown, 2006-10, PhD Spring 2010. Instructional designer, Dept of Physics, University of Kentucky.
- Christopher Rosen, 2008-12, PhD Spring 2012. Postdoc at Crete Center for Theoretical Physics/Imperial College, London/University of Barcelona.
- Oscar Henriksson, 2012-17, PhD Spring 2017. Postdoc at University of Helsinki.
- Daniel Spiegel, direct advisor 2017-19, titular advisor 2019-2023 (working with Markus Pflaum, math), PhD Spring 2023. Postdoc at University of California Davis.
- Kenny Higginbotham, 2019-present, PhD estimated Spring 2024.
- Gracemarie Buehlmann, 2023-present, PhD estimated Spring 2027.

Undergraduate Students

- Atakan Firat, 2018-19, B.S. Spring 2019. Winner, Stephen Halley White Undergraduate Research Award, 2019 PhD student, Massachusetts Institute of Technology.

Postdoctoral Researchers

- Benjamin Shlaer, 2006-08. Postdoc at Tufts Institute of Cosmology/Auckland University.
- Chaolun Wu, 2015-17. Postdoc at Trinity College Dublin.
- Konstantinos Rigatos, 2021-22. Postdoc at KITPC Beijing.

Teaching Honors

- Boulder Faculty Assembly Excellence in Teaching Award, April 2012.
- "Professor of the Year", Sigma Pi Sigma undergraduate honors society, May 2015
- Voted one of "favorite faculty members" by Sigma Pi Sigma undergraduate honors society, Spring 2007, Spring 2008, Spring 2009, Fall 2009, Spring 2010, Fall 2010, Spring 2011, Fall 2011, Spring 2012, Spring 2015, Fall 2015, Fall 2016
- Marinus Smith Award, 2018

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Departmental Service

- Vice Chair, 2023-present.
- Teaching Evaluation Committee, 2016-17, 2018-19, 2019-20, 2020-21, 2021-22, 2022-23, 2023-24; Chair Fall 2019-present.
- Quantum Information Theory Faculty Search Committee, chair, 2022-23.
- Quality Teaching Initiative Committee, 2021-22, 2022-23.
- Graduate Student Mentoring Committee, 2021-22.
- Arts & Sciences Undergrad Advising Committee, 2011-12, 2012-13, 2014-15, 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21; Chair Spring 2017 - Spring 2019.
- Strongly Coupled Systems Faculty Search Committee, 2017-18.
- High Energy Experiment Faculty Search Committee, 2016-17.
- Evaluations Panel, 2015-16.
- Graduate Admissions Committee, 2005-6, 2006-7, 2014-15.
- High Energy Theory Faculty Search Committee, 2012-13.
- Comprehensive Exam Committee, 2007-8, 2008-9, 2009-10, 2010-11.
- Junior Faculty Steering Committee, 2005-6, 2006-7, 2007-8, 2008-9, 2009-10, 2010-11, 2011-12, 2012-13.

University and Professional Service

- Director, Center for Theory of Quantum Matter, 2019-20.
- Co-director, Theoretical Advanced Study Institute (TASI), 2021-present. Local organizing committee, 2006-present.
- Co-Editor, TASI 2015 proceedings volume.
- Referee for Journal of High Energy Physics, Physical Review D, Physical Review Letters, Nuclear Physics B, Physics Letters B, Annals of Physics, European Physical Journal C, Journal of Cosmology and Astroparticle Physics.

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Teaching

- Physics 2010 (General Physics I), recitation/lab coordinator, Spring 2006.
- Physics 5770 (Gravitational Theory), Spring 2007.
- Physics 3220 (Quantum Mechanics I), Fall 2007.
- Physics 4410 (Quantum Mechanics II), Spring 2008.
- Physics 3220 (Quantum Mechanics I), co-taught with Prof. Steve Pollock, transformed course to include concept tests and tutorials, Fall 2008.
- Physics 3220 (Quantum Mechanics I), Spring 2009.
- Physics 4410 (Quantum Mechanics II), Fall 2009.
- Physics 3310 (Electricity and Magnetism I), Spring 2010.
- Physics 2020 (General Physics II), recitation/lab coordinator, Fall 2010.
- Physics 5770 (Gravitational Theory), Spring 2011.
- Physics 2020 (General Physics II), primary lecturer, Fall 2011.
- Physics 5770 (Gravitational Theory), Spring 2012.
- Physics 7270 (Quantum Field Theory), Fall 2012.
- Physics 7810 (General Relativity II), Spring 2013
- Physics 7270 (Quantum Field Theory), Fall 2014.
- Physics 3220 (Quantum Mechanics I), Spring 2015.
- Physics 4410 (Quantum Mechanics II), Fall 2015.
- Physics 2010 (General Physics I), primary lecturer, Spring 2016.
- Physics 2010 (General Physics I), primary lecturer, Fall 2016.
- Physics 3220 (Quantum Mechanics I), Spring 2017.
- Physics 4410 (Quantum Mechanics II), Fall 2017.
- Physics 7230 (Statistical Mechanics I), Spring 2018.
- Physics 4230 (Thermodynamics and Statistical Mechanics), Fall 2018.
- Physics 7230 (Statistical Mechanics I), Spring 2019.
- Physics 7270 (Quantum Field Theory), Fall 2019.
- Physics 4230 (Thermodynamics and Statistical Mechanics), Spring 2020.
- Physics 7320 (Electromagnetic Theory II), Spring 2021.
- Physics 7310 (Electromagnetic Theory I), Fall 2021.
- Physics 7320 (Electromagnetic Theory II), Spring 2022.
- Physics 7310 (Electromagnetic Theory I), Fall 2022.
- Physics 7320 (Electromagnetic Theory II), Spring 2023.
- Physics 7570 (Quantum Information and Quantum Computation), Fall 2023.
- Physics 5770 (Gravitational Theory), Spring 2024.

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Reading courses

- Reading course on string theory in Spring 2008 with Benjamin Safdi
- Reading course on quantum field theory, summer 2010, Anna Lieb and Colin West
- Reading course on advanced quantum field theory in Fall/Spring 2012-13 with 4-6 graduate students
- Reading course on advanced quantum field theory in Summer/Fall 2018 with 8-10 graduate students

Publications

Names of supervised graduate students marked with asterisk (*)

Published in peer-reviewed journals, also available at arXiv preprint server (http://arXiv.org):

- 1. O. DeWolfe and B. Zwiebach, "String junctions for arbitrary Lie algebra representations," Nucl. Phys. B **541**, 509 (1999) [arXiv:hep-th/9804210].
- 2. O. DeWolfe, T. Hauer, A. Iqbal and B. Zwiebach, "Constraints on the BPS spectrum of N = 2, D = 4 theories with A-D-E flavor symmetry," Nucl. Phys. B **534**, 261 (1998) [arXiv:hep-th/9805220].
- 3. O. DeWolfe, "Affine Lie algebras, string junctions and 7-branes," Nucl. Phys. B **550**, 622 (1999) [arXiv:hep-th/9809026].
- 4. O. DeWolfe, T. Hauer, A. Iqbal and B. Zwiebach, "Uncovering the symmetries on (p,q) 7-branes: Beyond the Kodaira classification," Adv. Theor. Math. Phys. **3**, 1785 (1999) [arXiv:hep-th/9812028].
- 5. O. DeWolfe, T. Hauer, A. Iqbal and B. Zwiebach, "Uncovering infinite symmetries on (p,q) 7-branes: Kac-Moody algebras and beyond," Adv. Theor. Math. Phys. **3**, 1835 (1999) [arXiv:hep-th/9812209].
- 6. O. DeWolfe, A. Hanany, A. Iqbal and E. Katz, "Five-branes, seven-branes and five-dimensional E(n) field theories," JHEP **9903**, 006 (1999) [arXiv:hep-th/9902179].
- 7. O. DeWolfe, D. Z. Freedman, S. S. Gubser and A. Karch, "Modeling the fifth dimension with scalars and gravity," Phys. Rev. D **62**, 046008 (2000) [arXiv:hep-th/9909134].
- 8. M. Bianchi, O. DeWolfe, D. Z. Freedman and K. Pilch, "Anatomy of two holographic renormalization group flows," JHEP **0101**, 021 (2001) [arXiv:hep-th/0009156].
- 9. O. DeWolfe, D. Z. Freedman, S. S. Gubser, G. T. Horowitz and I. Mitra, "Stability of AdS(p) x M(q) compactifications without supersymmetry," Phys. Rev. D **65**, 064033 (2002) [arXiv:hep-th/0105047].

- 10. O. DeWolfe, D. Z. Freedman and H. Ooguri, "Holography and defect conformal field theories," Phys. Rev. D **66**, 025009 (2002) [arXiv:hep-th/0111135].
- 11. R. Bousso, O. DeWolfe and R. C. Myers, "Unbounded entropy in spacetimes with positive cosmological constant," Found. Phys. **33**, 297 (2003) [arXiv:hep-th/0205080].
- 12. O. DeWolfe and S. B. Giddings, "Scales And Hierarchies In Warped Compactifications And Brane Worlds," Phys. Rev. D **67**, 066008 (2003) [arXiv:hep-th/0208123].
- 13. O. Aharony, O. DeWolfe, D. Z. Freedman and A. Karch, "Defect Conformal Field Theory and Locally Localized Gravity," JHEP **0307** 030 (2003) [arXiv:hep-th/0303249].
- 14. O. DeWolfe, R. Roiban, M. Spradlin, A. Volovich, J. Walcher, "On the S-Matrix of Type 0 String Theory," JHEP **0311** 012 (2003) [arXiv:hep-th/0309148].
- 15. O. DeWolfe and N. Mann, "Integrable Spin Chains in Defect Conformal Field Theories," JHEP **0404** 035 (2004) [arXiv:hep-th/0401041].
- 16. O. DeWolfe, S. Kachru and H. Verlinde, "The Giant Inflaton," JHEP **0405** 017 (2004) [arXiv:hep-th/0403123].
- 17. O. DeWolfe, A. Giryavets, S. Kachru and W. Taylor, "Enumerating Flux Vacua with Enhanced Symmetries," JHEP **0502** 037 (2005) [arXiv:hep-th/0411061].
- 18. O. DeWolfe, A. Giryavets, S. Kachru and W. Taylor, "Type IIA Moduli Stabilization," JHEP **0507** 066 (2005) [arXiv:hep-th/0505160].
- 19 .O. DeWolfe, "Enhanced symmetries in multiparameter flux vacua," JHEP **0510** 066 (2005) [arXiv:hep-th/0506245].
- 20. O. DeWolfe, L. McAllister, G. Shiu and B. Underwood, "D3-brane Vacua in Stabilized Compactifications," JHEP **0709** 121 (2007) [hep-th/0703088].
- 21. O. DeWolfe, S. Kachru and M. Mulligan, "A Gravity Dual of Metastable Dynamical Supersymmetry Breaking," Phys. Rev. D **77**, 065011 (2008), [arXiv:0801.1520 (hep-th)].
- 22. C. M. Brown* and O. DeWolfe, "Nonsupersymmetric brane vacua in stabilized compactifications," JHEP **0901** 039 (2009), [arXiv:0806.4399 (hep-th)].
- 23. C. M. Brown* and O. DeWolfe, "Brane/flux annihilation transitions and nonperturbative moduli stabilization," JHEP **0905** 018 (2009), [arXiv:0901.4401 (hep-th)].
- 24. O. DeWolfe and C. Rosen*, "Robustness of Sound Speed and Jet Quenching for Gauge/ Gravity Models of Hot QCD," JHEP **0907** 022 (2009), [arXiv:0903.1458 (hep-th)].
- 25. A. Adams, C. M. Brown*, O. DeWolfe and C. Rosen*, "Charged Schrödinger Black Holes," Phys. Rev. D **80**, 125018 (2009), [arXiv:0907.1920 (hep-th)].

- 26. A. Adams, O. DeWolfe and W. Taylor, "String universality in ten dimensions," Phys. Rev. Lett. **105**, 071601 (2010). [arXiv:1006.1352 (hep-th)].
- 27. O. DeWolfe, S. S. Gubser and C. Rosen*, "A holographic critical point," Phys. Rev. D **83**, 086005 (2011) [arXiv:1012.1864 [hep-th]].
- 28. O. DeWolfe, S. S. Gubser and C. Rosen*, "Dynamic critical phenomena at a holographic critical point," Phys. Rev. D **84**, 126014 (2011) [arXiv:1108.2029 [hep-th]].
- 29. C. M. Brown* and O. DeWolfe, "The Godel-Schrodinger Spacetime and Stringy Chronology Protection," JHEP **1201**, 032 (2012) [arXiv:1110.3840 [hep-th]].
- 30. O. DeWolfe, S. S. Gubser and C. Rosen*, "Fermi surfaces in maximal gauged supergravity," Phys. Rev. Lett. **108** (2012) 251601, [arXiv:1112.3036 [hep-th]].
- 31. O. DeWolfe, S. S. Gubser and C. Rosen*, "Fermi surfaces in N=4 Super-Yang-Mills theory," Phys. Rev. D **86** 106002 (2012), [arXiv:1207.3352 [hep-th]].
- 32. O. DeWolfe, S. S. Gubser, C. Rosen and D. Teaney, "Heavy ions and string theory," Prog. Part. Nucl. Phys. **75**, 86 (2014) [arXiv:1304.7794 [hep-th]].
- 33. O. DeWolfe, S. S. Gubser and C. Rosen, "Fermionic response in a zero entropy state of N=4 super-Yang-Mills," accepted to Phys. Rev. D, arXiv:1312.7347 [hep-th].
- 34. O. DeWolfe, O. Henriksson* and C. Rosen, "Fermi surface behavior in the ABJM M2-brane theory," Phys. Rev. D **91** (2015) 12 [arXiv:1410.6986 [hep-th]].
- 35. O. DeWolfe, S. S. Gubser, O. Henriksson* and C. Rosen, "Fermionic Response in Finite-Density ABJM Theory with Broken Symmetry," Phys. Rev. D **93** (2016) no.2, 026001 [arXiv:1509.00518 [hep-th]].
- 36. O. DeWolfe, S. S. Gubser, O. Henriksson* and C. Rosen, "Gapped Fermions in Top-down Holographic Superconductors ," Phys. Rev. D **95** (2017) no.8, 086005, [arXiv:1609.07186 [hep-th]].
- 37. O. DeWolfe, O. Henriksson* and C. Wu, "A Holographic Model for Pseudogap in BCS-BEC Crossover (I): Pairing Fluctuations, Double-Trace Deformation and Dynamics of Bulk Bosonic Fluid," Annals Phys. **387** (2017) 75-120 , [arXiv:1611.07023 [hep-th]] .
- 38. O. DeWolfe, "TASI Lectures on Applications of Gauge/Gravity Duality," Proceedings of Science **TASI2017** (2018) 014, [arXiv:1802.08267 [hep-th]].
- 39. O. DeWolfe and P. Romatschke, "Strong Coupling Universality at Large N for Pure CFT Thermodynamics in 2+1 dimensions," JHEP **1910** (2019) 272, [arXiv:1905.06355 [hep-th]].

- 40. J. Levin, O. DeWolfe and G. Smith, "Correlation measures and distillable entanglement in AdS/CFT" Phys. Rev. D **101**, no.4, 046015 (2020), [arXiv:1909.04727 [hep-th]].
- 41. O. DeWolfe, J. Levin and G. Smith, "Multipartite optimized correlation measures and holography," Phys. Rev. D **102**, no.6, 066001 (2020), [arXiv:2007.11587 [hep-th]].
- 42. O. DeWolfe and K. Higginbotham*, "Generalized symmetries and 2-groups via electromagnetic duality in AdS/CFT," Phys. Rev. D **103**, no.2, 026011 (2021), [arXiv:2010.06594 [hep-th]].
- 43. S. Agrawal, O. DeWolfe, J. Levin and G. Smith, "Phase Transitions of Correlations in Black Hole Geometries," Phys.Rev.D **105**, no.10, 106002 (2022), [arXiv:2112.09704 [hep-th]].
- 44. O. DeWolfe and K. Higginbotham*, "Entanglement entropy and non-local duality: quantum channels and quantum algebras," Annals Phys. **448** (2023), 169196, [arXiv:2207.12436 [hep-th]].
- 45. O. DeWolfe and K. Higginbotham*, "Non-isometric codes for the black hole interior from fundamental and effective dynamics," JHEP **09** (2023) 068, [arXiv:2304.12345 [hep-th]].

Submitted to peer-reviewed journals:

- 46. O. DeWolfe and K. Higginbotham*, "Bulk reconstruction and non-isometry in the backwards-forwards holographic black hole map," submitted to JHEP, [arXiv:2311.12921 [hep-th]].

Appearing on arXiv preprint server only:

- 47. O. DeWolfe, "Minimal area nonorientable string diagrams," arXiv:hep-th/9708084
- 48. O. DeWolfe and D. Z. Freedman, "Notes on fluctuations and correlation functions in holographic renormalization group flows," arXiv:hep-th/0002226.