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Education

12/2001: Ph.D. in Experimental Physics, University of Washington, Seattle, WA
Thesis Title: *Sub-millimeter Tests of the Gravitational Inverse-Square Law*
Thesis Advisor: Prof. Eric Adelberger
12/1997: M.Sc. in Physics, University of Washington, Seattle, WA
05/1996: B.A. in Physics (honors), University of Colorado, Boulder, CO

Relevant Experience

Current

01/2007 – Present Professor of Physics & Astronomy, Cal Poly Humboldt
06/2010 – Present Affiliate Professor of Physics, University of Washington

Past

12/2019 – 07/2020 Visiting Professor, Department of Physics, University of Napoli “Federico II,” Italy
01/2015 – 06/2015 Visiting Professor, Department of Physics, University of Trento, Italy
09/2014 – 12/2014 Visiting Scholar, Department of Physics, Harvard University
05/2004 – 11/2006 Post-Doctoral Fellow, APOLLO project and Eöt-Wash Group, U. of Washington
03/2002 – 03/2004 Post-Doctoral Fellow, LISA Group, University of Trento, Italy
04/1997 – 02/2002 Research Assistant, Eöt-Wash Group, University of Washington
09/1996 – 04/1997 Teaching Assistant, University of Washington
05/1995 – 07/1996 Undergraduate Research Assistant, Exp. Nuclear Phys., University of Colorado

Teaching and Outreach Experience (courses taught are listed in bold)

Current

01/2022 – Present **Physics 210, Physics 324, and Physics 451**, Cal Poly Humboldt
12/2011 – Present Organizer for local “Science on Tap” outreach lecture series, Humboldt State U.

Past

08/2021 – 12/2021 **Physics 210 and Physics 450**, Cal Poly Humboldt
01/2021 – 05/2021 **Physics 210**, Cal Poly Humboldt
08/2020 – 12/2020 **Physics 210 and Physics 324**, Cal Poly Humboldt
01/2019 – 05/2019 **Physics 320 and Physics 451**, Cal Poly Humboldt
08/2018 – 12/2018 **Physics 442 and Physics 450**, Cal Poly Humboldt
01/2018 – 05/2018 **Physics 111, Physics 441, and Physics 451**, Cal Poly Humboldt
08/2017 – 12/2017 **Physics 324, Physics 450, and Physics 485**, Cal Poly Humboldt
01/2017 – 05/2017 **Physics 106, Physics 320 and Physics 480** Cal Poly Humboldt
08/2016 – 12/2016 **Physics 106, Physics 111 and Physics 450**, Cal Poly Humboldt
01/2016 – 05/2016 **Physics 442, Physics 450, and Physics 480**, Cal Poly Humboldt
08/2015 – 12/2015 **Physics 110, Physics 441, and Physics 462**, Cal Poly Humboldt
03/2015 – 03/2015 **Advanced Techniques in Experimental Gravitation**, University of Trento, Italy
01/2014 – 05/2014 **Physics 315, Physics 443, and Physics 450**, Cal Poly Humboldt

08/2013 – 12/2013 **Physics 304, Physics 441, and Physics 442**, Cal Poly Humboldt
01/2013 – 05/2013 **Physics 304 and Physics 450**, Cal Poly Humboldt
08/2012 – 12/2012 **Physics 110 and Physics 324**, Cal Poly Humboldt
01/2012 – 05/2012 **Physics 107 and Physics 315**, Cal Poly Humboldt
08/2011 – 12/2011 **Physics 310 and Physics 324**, Cal Poly Humboldt
01/2011 – 05/2011 **Physics 304 and Physics 107**, Cal Poly Humboldt
08/2010 – 12/2010 **Physics 111 and Physics 304**, Cal Poly Humboldt
01/2010 – 05/2010 **Physics 315 and Physics 320**, Cal Poly Humboldt
08/2009 – 12/2009 **Physics 110 and Physics 111**, Cal Poly Humboldt
01/2009 – 05/2009 **Physics 107, Physics 315, and Physics 324**, Cal Poly Humboldt
08/2008 – 12/2008 **Physics 111 and Physics 304**, Cal Poly Humboldt
01/2008 – 05/2008 **Physics 106 and Physics 107**, Cal Poly Humboldt
08/2007 – 12/2007 **Physics 304 and Physics 315**, Cal Poly Humboldt
01/2007 – 05/2007 **Physics 107 and Physics 315**, Cal Poly Humboldt
01/2006 – 03/2006 **Physics 123**, University of Washington
06/2005 Career Day speaker at the Albert Einstein Middle School in Shoreline, WA.
09/2004 – 12/2004 **Physics 122**, University of Washington
08/2004 Leader of a site visit to LIGO with 15 REU students from the U. of Washington.
09/1996 – 04/1997 Teaching Assistant, University of Washington – responsible for freshman laboratory and recitation sections coordinated with the Physics Education Group.

Fellowships and Awards

- Gordon and Betty Moore Foundation/APS Fundamental Physics Innovation Award (2021)
- Travel Fellowship, Department of Physics, University of Napoli “Federico II,” Italy (2019-20)
- Travel Fellowship, University of Trento Department of Physics (2015)
- Travel Fellowship, Harvard University Department of Physics (2014)
- Mentor for CSU Research Competition winner Holly Leopardi (2014)
- Mentor Advisor for Cal Poly Humboldt Student of the Year Holly Leopardi (2014)
- Gravity Research Foundation Essay Award (2006)
- Henderson Prize for Outstanding Doctoral Dissertation, University of Washington (2002)
- Incoming Graduate Student Fellowship, University of Washington (1996)
- Graduation with Honors, University of Colorado (1996)
- Dean’s List, University of Colorado (1994-1996)

Memberships in Honor Societies and Professional Organizations

- American Physical Society (FWS, GPMFC, DGRAV)
- American Association of Physics Teachers
- International Society of General Relativity and Gravitation
- Phi Beta Kappa
- Sigma Pi Sigma Physics Honor Society

Grants and Other Funds Received	Amount
• Travel Fellowship, University of Napoli “Federico II” Department of Physics (12/2019 – 07/2020)	€6250
• National Science Foundation award #1908502 (08/2019 – 07/2021)	\$80,000
• National Science Foundation award #1708024 (05/2017 – 04/2020)	\$55,000

• National Science Foundation award #1606988 (08/2016 – 07/2019)	\$156,000
• Travel Fellowship, University of Trento, Department of Physics (01/2015 – 06/2015)	€5000
• Travel Fellowship, Harvard University Department of Physics (09/2014 – 12/2014)	\$5000
• National Science Foundation award #1306783 (08/2013 – 07/2016)	\$155,746
• National Science Foundation award #1065697 (08/2011 – 07/2014)	\$117,157
• Cottrell College Science Award CC6839, Research Corporation (06/2007 – 06/2010)	\$43,720
• Internal Start-up, Research, and Travel Grants, Cal Poly Humboldt (01/2007 – present)	\$50,792
Total (approximate due to exchange rates)	\$677,000

Invited Talks

1. “Is Newton's Universal Law of Gravitation Truly Universal?” Colloquium for the University of Napoli “Federico II” Department of Physics (February, 2020)
2. “Is Newton's Universal Law of Gravitation Truly Universal?” Colloquium for the CSU East Bay Physics Department (March, 2019)
3. “Experimental Tests of Gravity and the Equivalence Principle,” Colloquium for the IUPUI Physics Department (April, 2018)
4. “Vignettes in Experimental Gravitation,” Colloquium for the University of Nevada, Reno Physics Department (September, 2017)
5. ““Standing the Test of Time (and Space): 100 Years of General Relativity,” Colloquium for Sonoma State University Physics Department (September, 2015)
6. “Testing the Equivalence Principle in the Laboratory and with LLR,” Seminar for the University of Rome Tor Vergata, Rome, Italy (June, 2015)
7. “Short-range Tests of Gravitational Physics,” Seminar for the INFN Sezione di Napoli, Naples, Italy (June, 2015)
8. “Short-Range Tests of Gravity,” Seminar for Gravitational Physics Group, University of Trento, Trento, Italy (January, 2015)
9. “Testing Gravity at Short Distances: Can Undergraduates Overthrow Einstein?” Colloquium for the Department of Physics, Wellesley College, Wellesley, MA (November, 2014)
10. “Differential Geometry and its Role in Fundamental Physics,” Colloquium for the Mathematics Department, Cal Poly Humboldt (May, 2014)
11. “Geometry in Physics: From Euclid to Einstein,” Colloquium for the Mathematics Department, Cal Poly Humboldt (April, 2012)
12. “Testing Gravity from the Dark Energy Scale to the Moon and Beyond,” Web-based Colloquium for the University of the Virgin Islands (April, 2011)
13. “Testing Gravity from the Dark Energy Scale to the Moon and Beyond,” Cal Poly Humboldt Natural History Museum, Arcata, CA (May, 2009)
14. “Testing Gravity from the Dark Energy Scale to the Moon and Beyond,” California State University Fresno, Fresno, CA (February, 2009)
15. “Testing Gravity from the Dark Energy Scale to the Moon and Beyond,” University of Trento, Trento, Italy (May, 2006)
16. “Testing Gravity from the Dark Energy Scale to the Moon and Beyond,” Cal Poly Humboldt, Arcata, CA (November, 2005)

17. "The Gravity of Gravity," Fall Research Symposium, University of Washington, Seattle, WA (October, 2005)
18. "Two Examples of the Modern Torsion Pendulum in Gravitational Physics," University of Ljubljana (seminar), Ljubljana, Slovenia (December, 2003)
19. "The Experimental Search for Large Extra Dimensions," The First Gunnar Nordström Symposium on Theoretical Physics, Helsinki, Finland (August, 2003)
20. "Sub-millimeter Tests of the Gravitational Inverse-Square Law," University of Trento, Trento, Italy (October, 2001)
21. "Sub-millimeter Test of the Gravitational Inverse-Square Law," Snowmass 2001: The Future of Particle Physics, Snowmass, CO (July, 2001)

Contributed Talks

1. "A New Multi-mode Apparatus to Determine G ," APS April Meeting, Denver, CO (April, 2019)
 2. "A New Experiment to Measure G ," 2018 APS Far West Section Meeting, Fullerton, CA (October, 2018)
 3. "Short-range Tests of Gravitational Physics," 2018 APS April Meeting, Columbus, OH (April, 2018)
 4. "The APOLLO Lunar Laser Ranging Experiment," 21st Pacific Coast Gravity Meeting, Eugene, OR (March, 2005)
 5. "Current Status of the Eöt-Wash Short-Range Gravity Experiment," 21st Pacific Coast Gravity Meeting, Eugene, OR (March, 2005)
 6. "Torsion Pendulum Tests of a Prototype LISA Capacitive Sensor: First Results," 10th Marcel Grossmann Meeting on General Relativity, Rio de Janeiro, Brazil (July, 2003)
 7. "Sub-millimeter Test of the Gravitational Inverse-Square Law," APS April Meeting, Washington, D.C. (April, 2001)
- **In addition, my undergraduate research students have given over 25 talks at national and international conferences including APS, NCUR, and other meetings.**

Publication Bibliography

Peer-reviewed Publications

1. "Experimental progress towards testing the behavior of gravity at the 20-micron distance scale," M.P. Ross, J.S. Johnson, I.S. Guerrero, N. K. Dunkley, H.F. Leopardi, C.D. Hoyle, *Journal of Undergraduate Research and Scholarly Excellence* Pp. 1 – 7 (2018)
2. "Novel Tests of Gravity Below Fifty Microns," Jeremy S. Johnson, Noah K. Dunkley, Gabriela D. Martinez, Anthony E. Sanchez, and C.D. Hoyle (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, 463 – 471 (2017)
3. "An Absolute Calibration System for Millimeter-accuracy APOLLO Measurements," E.G. Adelberger, J.B.R. Battat, K.J. Birkmeier, N.R. Colmenares, R. Davis, C.D. Hoyle, L.R. Huang, R.J. McMillan, T.W. Murphy Jr, E. Schlerman, C. Skrobol, C.W. Stubbs, A. Zach, *Class. Quant. Grav.*, **34**, Number 24 (2017)
4. "Laboratory-Based Gravity Measurement," C.D. Hoyle, *Handbook of Measurement in Science and Engineering*, Volume 3, edited by Myer Kutz, Wiley (2016) <https://doi.org/10.1002/9781119244752.ch60>
5. "Tests of Short-Range Gravity with a Novel Parallel-Plate Torsion Pendulum," Michael P. Ross and C.D. Hoyle (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, 264 – 270 (2015)
6. "Experimental Progress on Tests of Gravity at 20 microns," Crystal Cardenas, Andrew C. Harter, Michael P. Ross and C.D. Hoyle, Jr. (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, 811 – 819 (2014)
7. "Short-range Tests of Gravitational Physics," Holly Leopardi, David Smith and C.D. Hoyle, Jr. (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, 178-186 (2013)
8. "APOLLO: millimeter lunar laser ranging," T.W. Murphy, Jr., E.G. Adelberger, J.B.R. Battat, C.D. Hoyle, N.H. Johnson, R.J. McMillan, C.W. Stubbs and H.E. Swanson, *Class. Quant. Grav.* **29**, 184005 (2012)

9. "Tests of Gravity Below Fifty Microns," Holly Leopardi and C.D. Hoyle, Jr. (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, 357-363 (2012)
10. "Experimental Short-Range Gravitational Tests of the Weak Equivalence Principle and the Inverse-Square Law Using Novel Torsion Pendulums," David W. Shook and C.D. Hoyle, Jr. (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, (2011)
11. "Sub-millimeter Positioning and Sensing for Short-Range Gravity Tests," Bret A. Comnes and C.D. Hoyle, Jr. (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, (2011)
12. "Long-term degradation of optical devices on the Moon," T. W. Murphy, Jr., E. G. Adelberger, J. B. R. Battat, C. D. Hoyle, R. J. McMillan, E. L. Michelsen, R. Samad, C. W. Stubbs, and H. E. Swanson, *Icarus*, **208**, 31-35 (2010)
13. "Testing Gravity below the 50-micron Distance Scale," David W. Shook and C.D. Hoyle, Jr. (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, (2010) 8 pages
14. "High-precision electrolytic capacitance tilt sensor", Holly Edmundson and C.D. Hoyle, Jr. (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, (2009) 8 pages
15. "Precision optical system for short-range tests of gravity", Nathan F. Rasmussen and C.D. Hoyle, Jr. (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, (2009)
16. "The Apache Point Observatory Lunar Laser-ranging Operation: Instrument Description and First Detections," T.W. Murphy, Jr., E.G. Adelberger, J.B.R. Battat, L.N. Carey, C.D. Hoyle, P. LeBlanc, E. L. Michelsen, K. Nordtvedt, A.E. Orin, J.D. Strasburg, C.W. Stubbs, H.E. Swanson, and E. Williams, *Publications of the Astronomical Society of the Pacific*, 120, 20–37 (2008)
17. "Extra-dimensions, dark energy, and the gravitational inverse-square law", Liam J. Furniss and C.D. Hoyle, Jr. (Faculty Advisor), *Proceedings of the National Conference on Undergraduate Research (NCUR)*, 21–28, (2008)
18. "Particle-physics implications of a recent test of the gravitational inverse-square law," E. G. Adelberger, B. R. Heckel, S. Hoedl, C. D. Hoyle, D. J. Kapner, and A. Upadhye, *Phys. Rev. Lett.* **98**, 131104 (2007) **(inSPIRE topcite 100+)** 4 pages
19. "Tests of the Gravitational Inverse-Square Law below the Dark-Energy Length Scale," D.J. Kapner, T.S. Cook, E.G. Adelberger, J.H. Gundlach, B.R. Heckel, C.D. Hoyle, and H.E. Swanson, *Phys. Rev. Lett.* **98**, 021101 (2007) **(inSPIRE topcite 500+)** 4 pages
20. "Analytic Expressions for Gravitational Inner Multipole Moments of Elementary Solids and for the Force between Two Rectangular Solids," E.G. Adelberger, Nathan A. Collins, and C.D. Hoyle, *Class. Quant. Grav.* **23**, 125-136 (2006)
21. "4-Mass Torsion Pendulum for Ground Testing of LISA Displacement Sensors," L. Carbone, A. Cavalleri, R. Dolesi, C.D. Hoyle, M. Hueller, S. Vitale, and W.J. Weber, *Proceedings of the 10th Marcel Grossmann Meeting on General Relativity*, edited by M. Novello, S. Perez-Bergliaffa and R. Ruffini, World Scientific, Singapore (2006) (4 pages, principal author)
22. "Characterization of Disturbance Sources for LISA: Torsion Pendulum Results," L. Carbone, A. Cavalleri, R. Dolesi, C. D. Hoyle, M. Hueller, S. Vitale, and W. J. Weber, *Class. Quant. Grav.* **22**, S509-S519 (2005)
23. "Measuring the LISA Test Mass Magnetic Properties with a Torsion Pendulum," M. Hueller, M. Armano, L. Carbone, A. Cavalleri, R. Dolesi, C. D. Hoyle, S. Vitale, and W. J. Weber, *Class. Quant. Grav.* **22**, S521-S526 (2005)
24. "Sub-millimeter tests of the gravitational inverse-square law," C.D. Hoyle, D.J. Kapner, B.R. Heckel, E.G. Adelberger, J.H. Gundlach, U. Schmidt, and H.E. Swanson, *Phys. Rev. D* **70**, 042004 (2004) **(principal author, inSPIRE topcite 250+)**
25. "Upper limits on stray force noise for LISA," L. Carbone, A. Cavalleri, R. Dolesi, C.D. Hoyle, M. Hueller, S. Vitale, and W.J. Weber, *Class. Quant. Grav.* **21**, S611-S620 (2004)
26. "Measuring random force noise for LISA aboard the LISA Pathfinder mission," D. Bortoluzzi, L. Carbone, A. Cavalleri, M. Da Lio, R. Dolesi, C.D. Hoyle, M. Hueller, S. Vitale, and W.J. Weber, *Class. Quant. Grav.* **21**, S573-S579 (2004)

27. "Current Error Estimates for LISA Spurious Accelerations," R.T. Stebbins, P.L. Bender, J. Hanson, C.D. Hoyle, B.L. Schumaker, and S. Vitale, *Class. Quant. Grav.* **21**, S653-S660 (2004)
28. "Achieving Geodetic Motion for LISA Test Masses: Ground Testing Results," L. Carbone, A. Cavalleri, R. Dolesi, C.D. Hoyle, M. Hueller, S. Vitale, and W.J. Weber, *Phys. Rev. Lett.* **91**, 151101 (2003) ([inSPIRE topcite 50+](#))
29. "Possibilities for Measurement and Compensation of Stray DC Electric Fields Acting on Drag-Free Test Masses," W.J. Weber, L. Carbone, A. Cavalleri, R. Dolesi, C.D. Hoyle, M. Hueller, and S. Vitale, *Advances in Space Research* (2002)
30. "Gravitational Sensor for LISA and its Technology Demonstration Mission," R. Dolesi, D. Bortoluzzi, P. Bosetti, L. Carbone, A. Cavalleri, I. Cristofolini, M. Da Lio, G. Fontana, V. Fontanari, B. Foulon, C.D. Hoyle, M. Hueller, F. Nappo, P. Sarra, D.N.A. Shaul, T. Sumner, W.J. Weber, and S. Vitale, *Class. Quant. Grav.* **20**, S99-S108 (2003) ([inSPIRE topcite 50+](#))
31. "Testing LISA Drag-Free Control with the LISA Technology Package Flight Experiment," D. Bortoluzzi, P. Bosetti, L. Carbone, A. Cavalleri, A. Ciccolella, M. Da Lio, K. Danzmann, R. Dolesi, A. Gianolio, G. Heinzel, D. Hoyland, C.D. Hoyle, M. Hueller, F. Nappo, M. Sallusti, P. Sarra, M. Te Plate, C. Tirabassi, S. Vitale, and W.J. Weber, *Class. Quant. Grav.* **20**, S89-S97 (2003)
32. "Design and Ground Testing of Position Sensors for LISA Drag-Free Control," W.J. Weber, D. Bortoluzzi, A. Cavalleri, L. Carbone, M. Da Lio, R. Dolesi, G. Fontana, C.D. Hoyle, M. Hueller, and S. Vitale, *Proc. SPIE* **4856-4**, (Gravitational Wave Detection) (2002)
33. "Sub-millimeter test of the gravitational inverse-square law: A search for 'large' extra dimensions," C.D. Hoyle, U. Schmidt, B.R. Heckel, E.G. Adelberger, J.H. Gundlach, D.J. Kapner, and H.E. Swanson, *Phys. Rev. Lett.* **86**, 1418-1421 (2001) ([principal author, inSPIRE topcite 250+](#))
34. "Results on the strong equivalence principle, dark matter, and new forces," B.R. Heckel, E. Adelberger, S. Bässler, J. Gundlach, M. Harris, C.D. Hoyle, A. Sharp, G. Smith, and E. Swanson, *Advances in Space Research* **25**, 1225-1230 (2000)
35. "Short-range Tests of the Equivalence Principle," G.L. Smith, C.D. Hoyle, J.H. Gundlach, E.G. Adelberger, B.R. Heckel, and H.E. Swanson, *Phys. Rev. D* **61**, 022001 (2000) ([inSPIRE topcite 100+](#))
36. "Searches for New Long-range Forces: Equivalence Principle Violation and Planck-scale Physics", E.G. Adelberger, S. Bäßler, J.H. Gundlach, B.R. Heckel, C.D. Hoyle, S.M. Merkowitz, G.L. Smith and H.E. Swanson, *Physics Beyond the Standard Model*, eds. P. Herczeg, C.M. Hoffman, and H.V. Klapdor-Kleingrothaus, World Scientific (Singapore) 717-737 (1999)

Other Publications:

1. "APOLLO Performance and Data Quality," T. Murphy, E. Adelberger, J. Battat, N. Colmenares, D. Crossley, C. D. Hoyle, N. Johnson, R. McMillan, C. Stubbs, and E. Swanson, 3061, presented at *19th International Workshop on Laser Ranging*, Annapolis MD, Oct. 27-31, 2014. (2015).
2. "The 'Dark Side' of Gravitational Experiments," C.D. Hoyle, Fourth Award in the 2006 Essay Competition of the Gravity Research Foundation, appears in *General Relativity and Gravitation*, **38**, 1553-1558 (2006) and in the *International Journal of Modern Physics D*, **15** 1-7 (2006)
3. "The Experimental Search for Large Extra Dimensions," C.D. Hoyle, *Proceedings of the Gunnar Nordström Symposium on Theoretical Physics*, eds. C. Cronström and C. Montonen, *Commentationes Physico-Mathematicae* 166/2004, 141 (2004)

Popular Publications:

1. "Testing the Gravitational Inverse-Square Law," Eric Adelberger, Blayne Heckel and C.D. Hoyle, *Physics World* **18**, 41-45 (April, 2005)
2. "The Weight of Expectation," C.D. Hoyle, "News and Views" article, *Nature* **421**, 899-900 (2003)