Curriculum Vitae

Marcos D. (Danny) Caballero

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Contents

1 Summary & Highlights

1.1 Contact Information

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1.2 Education

- Georgia Institute of Technology (Atlanta, GA) Doctor of Philosophy in Physics, 2011
  Thesis: **Evaluating and Extending a Novel Course Reform of Introductory Mechanics**
  Advisor: Prof. Michael F. Schatz [Online]
- Georgia Institute of Technology (Atlanta, GA) Master of Science in Physics, 2007
- University of Texas at Austin (Austin, TX) Bachelor of Science in Physics, 2004

1.3 Academic Experience

1.3.1 Positions

- 2023 – Present, Professor, Department of Computational Mathematics, Science, and Engineering
- 2023 – Present, Lappan-Phillips Professor of Physics Education, Department of Physics and Astronomy, Michigan State University
- 2020 – 2023, Associate Professor, Department of Computational Mathematics, Science, and Engineering
- 2018 – 2023, Lappan-Phillips Associate Professor of Physics Education, Department of Physics and Astronomy, Michigan State University
- 2017 – Present, Adjunct Associate Professor, Department of Physics, University of Oslo
- 2013 – Present, Affiliated Faculty, CREATE for STEM Institute, Michigan State University
- 2013 – 2018, Assistant Professor, Department of Physics and Astronomy, Michigan State University
- 2011 – 2013, Postdoctoral Researcher, Department of Physics, University of Colorado Boulder
- 2011 – 2013, Research Affiliate, School of Physics, Georgia Institute of Technology
- 2005 – 2011, Graduate Teaching and Research Assistant, School of Physics, Georgia Institute of Technology

1.3.2 Awards and Honors

- 2023 – Fellow of the American Physical Society, Group on Physics Education Research [Press]
  "For foundational research and development on the roles of computation in physics education and contributions to research on undergraduate and graduate education in physics."

- 2023 – APS Education Prize, Partnership for the Integration of Computing in Undergraduate Physics, Team Member [Press]
  "For developing an active, inclusive, and supportive community of physics educators dedicated to integrating computation into their instruction; creating, reviewing, and disseminating instructional materials; and generating knowledge of computation in physics curricula and of effective practices."
- 2022 – Physical Review PER Editor's Suggestion (Topic: Computational Physics Education): *Student' perspectives on computational challenges in physics class* [Paper]
- 2022 – Department Award for Improving Undergraduate Physics Education, Team Member, American Physical Society [Press]
- 2021 – Physical Review PER Editor's Suggestion (Topic: Quantitative Methods for Education Research): *Framework for evaluating statistical models in physics education research* [Paper]
- 2021 – Physical Review PER Editor's Suggestion (Topic: Graduate Physics Education): *Physics Graduate Record Exam does not help applicants "stand out"* [Paper]
- 2019 – Physical Review PER Editor's Suggestion (Topic: Computational Physics Education): *Physics computational literacy: An exploratory case study using computational essays* [Paper]
- 2019 – Physics Education Research Conference Notable Paper [Press]
- 2019 – Featured in MSU Today for Teaching Innovation [Press]
- 2018 – President's Distinguished Teaching Award, MSU [Press]
- 2018 – Teacher-Scholar Award, MSU [Press]
- 2017 – Featured in MSU Today for NSF grant [Press]
- 2016 – Physics Education Research Conference Notable Paper [Press]
- 2016 – College of Natural Science Teaching Prize, MSU
- 2015 – Thomas H. Osgood Memorial Awards for Faculty Excellence in Teaching, MSU
- 2014 – STEM Gateway Fellow, College of Natural Science, MSU
- 2011 – Tower Award, Georgia Institute of Technology
- 2010 – CETL/BP Outstanding Graduate TA Award Finalist, Georgia Institute of Technology
- 2009 – CETL/BP Outstanding Graduate TA Award, Georgia Institute of Technology
- 2007 - 2008 – Teaching Assistant of the Year, American Association of Physics Teachers
- 2007 - 2011– Gozuieta Fellow, Georgia Institute of Technology
- 2007 – Travel Grant, Technical University of Denmark
- 2006 – Tower Award, Georgia Institute of Technology

2 Publication List

2.1 Writing in review

4. S. Byun, L. Brennan, J. Christensen, N. Ortiz, D. Reinholz, N. Shah, D. Stroupe, and M.D. Caballero. "Equity-Focused Coaching: Negotiating Teachers' Interpretations of Racialized and Gendered Participation Patterns". In: *Journal of Teacher Education* (2025)
3. Emily Bolger, Marius Nwobi, and Marcos D Caballero. "Characterizing Faculty Online Learning Community Interactions Using Social Network Analysis". In: *Physical Review Physics Education Research* (2025)
2. Hannah C. Sabo, Tor Ole B. Odden, and Marcos D. Caballero. "How do we assess computation in physics?" In: *The Physics Teacher* (2025)
1. D. Stroupe, D. Reinholz, S. Byun, J. Christensen, J. Willison, and M.D. Caballero. "Supporting teachers to integrate computational practices and design opportunities for equitable participation in science classrooms". In: *Cognition & Instruction* (2025)

2.2 Invited papers and book chapters

8. Marcos D. Caballero (editor). "Preparing 21st Century Physicists: Integrating Computation into the Undergraduate Physics Curriculum". 2025
7. Marcos D. Caballero and Tor Ole B. Odden. "Computing in physics education". In: *Nature Physics* 20.3 (Mar. 2024), pp. 339–341. ISSN: 1745-2481. DOI: 10.1038/s41567-023-02371-2
6. Tor Ole B. Odden and Marcos D. Caballero. "Physics Computational Literacy: What, Why, and How?" In: *The International Handbook of Physics Education Research: Learning Physics*. AIP Publishing LLC. ISBN: 978-0-7354-2544-6. DOI: 10.1063/9780735425477_019
5. Alexis V. Knaub, John M. Aiken, and Marcos D. Caballero. "Editorial: Focused Collection: Quantitative Methods in PER: A Critical Examination". In: *Physical Review Physics Education Research* 15 (2 2019), p. 020001. DOI: 10.1103/PhysRevPhysEducRes.15.020001
4. Marcos D. Caballero and Morten Hjorth-Jensen. "Integrating a Computational Perspective in Physics Courses". In: *New Trends in Physics Education Research*. Ed. by Salvatore Magazù. Nova Science Publishers, 2018, pp. 47–76. ISBN: 978-1-53613-894-8
3. Marcos D. Caballero. "Taking A Scientific Approach To Physics Education". In: *Student Journal of Physics* 6.1 (2017). Ed. by L. Sapathy. URL: https://www.iopb.res.in/~sjp/sjp_past_issues/V6N1/1.pdf
2. Marcos D. Caballero, Matthew A. Kohlmyer, and Michael F. "Fostering Computational Thinking". In: *2011 Physics Education Research Conference Proceedings*. Ed. by N. Sanjay Rebello, Paula V. Engelhardt, and Chandralekha Singh. 2011, pp. 15–18. DOI: 10.1063/1.3679982
1. Keith R. Bujak, Marcos D. Caballero, Michael F. Schatz, M. Jackson Marr, and Richard Catrambone. "Comparing the Matter and Interactions Curriculum with a Traditional Physics Curriculum: A Think Aloud Study". In: *2011 AERA Conference Proceedings*. 2011

2.3 Popular Press and Conference Reports

4. Nicholas T. Young, Kirsten Tollefson, and Marcos D. Caballero. "Making graduate admissions in physics more equitable". In: *Physics Today* 76.7 (July 2023), pp. 40–45. ISSN: 0031-9228. DOI: 10.1063/PT.3.5271
3. Marcos D. Caballero, Larry Engelhardt, Alexis V. Knaub, Michelle Kuchera, Marié Lopez del Puerto, Brandon Lunk, Kelly Roos, and Todd Zimmerman. *2021 PICUP Virtual Capstone Conference Report*. Tech. rep. 2022. URL: https://www.compadre.org/picup//events/pdfs/2021_PICUP_Capstone_

Report_Final_Final_220502.pdf
2. Marcos D. Caballero, Larry Engelhardt, Robert Hilborn, Marié Lopez del Puerto, and Kelly Roos. "PICUP: The Partnership for the Integration of Computation into Undergraduate Physics". In: *APS News* 28.3 (2019). URL: https://www.aps.org/publications/apsnews/201903/backpage.cfm
1. Marcos D. Caballero, Dimitri R. Dounas-Frazer, Heather J. Lewandowski, and MacKenzie R. Stetzer. "Labs are Necessary, and We Need to Invest in Them". In: *APS News* 27.5 (2018). URL: https://www.aps.org/publications/apsnews/201805/backpage.cfm

2.4 Articles appearing in peer-reviewed journals

49. Gayle Geschwind, Michael Vignal, Marcos D. Caballero, and H. J. Lewandowski. "Evidence for validity and reliability of a research-based assessment instrument on measurement uncertainty". In: *Phys. Rev. Phys. Educ. Res.* 20 (2 Oct. 2024), p. 020125. DOI: 10.1103/PhysRevPhysEducRes.20.020125. URL: https://link.aps.org/doi/10.1103/PhysRevPhysEducRes.20.020125
48. Gayle Geschwind, Michael Vignal, Marcos D. Caballero, and H. J. Lewandowski. "Using a research-based assessment instrument to explore undergraduate students' proficiencies around measurement uncertainty in physics lab contexts". In: *Phys. Rev. Phys. Educ. Res.* 20 (2 July 2024), p. 020105. DOI: 10.1103/PhysRevPhysEducRes.20.020105. URL: https://link.aps.org/doi/10.1103/PhysRevPhysEducRes.20.020105
47. Melanie M Cooper, Marcos D. Caballero, Justin H. Carmel, Erin M. Duffy, Diane Ebert-May, Cori L. Fata-Hartley, Deborah G. Herrington, James T. Laverty, Paul C. Nelson, Lynmarie A. Posey, Jon R. Stoltzfus, Ryan L. Stowe, Ryan D. Sweeder, Stuart Tessmer, and Sonia M. Underwood. "Beyond Active Learning: Using 3-Dimensional Learning to Create Scientifically Authentic, Student-Centered Classrooms". In: *Plos one* 19.5 (2024), e0295887. DOI: 10.1371/journal.pone.0295887
46. Michael Vignal, Gayle Geschwind, Benjamin Pollard, Rachel Henderson, Marcos D. Caballero, and H. J. Lewandowski. "Survey of physics reasoning on uncertainty concepts in experiments: An assessment of measurement uncertainty for introductory physics labs". In: *Phys. Rev. Phys. Educ. Res.* 19 (2 Oct. 2023), p. 020139. DOI: 10.1103/PhysRevPhysEducRes.19.020139
45. Nicholas T. Young, N. Verboncoeur, Dao Chi Lam, and Marcos D. Caballero. "Rubric-based holistic review represents a change from traditional graduate admissions approaches in physics". In: *Phys. Rev. Phys. Educ. Res.* 19 (1 May 2023), p. 010134. DOI: 10.1103/PhysRevPhysEducRes.19.010134
44. Nicholas T. Young, K. Tollefson, Remco G. T. Zegers, and Marcos D. Caballero. "Rubric-based holistic review: A promising route to equitable graduate admissions in physics". In: *Phys. Rev. Phys. Educ. Res.* 18 (2 Nov. 2022), p. 020140. DOI: 10.1103/PhysRevPhysEducRes.18.020140
43. P. C. Hamerski, Daryl McPadden, Marcos D. Caballero, and Paul W. Irving. "Students' perspectives on computational challenges in physics class". In: *Phys. Rev. Phys. Educ. Res.* 18 (2 Aug. 2022), p. 020109. DOI: 10.1103/PhysRevPhysEducRes.18.020109
42. Daniel P. Weller, Theodore E. Bott, Marcos D. Caballero, and Paul W. Irving. "Development and illustration of a framework for computational thinking practices in introductory physics". In: *Phys. Rev. Phys. Educ. Res.* 18 (2 July 2022), p. 020106. DOI: 10.1103/PhysRevPhysEducRes.18.020106
41. Joseph Wilson, Benjamin Pollard, John M. Aiken, Marcos D. Caballero, and H. J. Lewandowski. "Classification of open-ended responses to a research-based assessment using natural language processing". In: *Physical Review Physics Education Research* (2022). DOI: 10.1103/PhysRevPhysEducRes.18.010141
40. Odd Petter Sand, Marcos D. Caballero, Knut Martin Mørken, and Elise Lockwood. "Three Cases That Demonstrate How Students Connect the Domains of Mathematics and Computing". In: *Journal of Mathematical Behavior* (2022). DOI: 10.1016/j.jmathb.2022.100955
39. Odd Petter Sand, Elise Lockwood, Marcos D. Caballero, and Knut Martin Mørken. "Students' Development of a Logarithm Function in Python Using Taylor Expansions: A Teaching Design Case Study". In: *Digital Experiences in Mathematics Education* (2022). DOI: 10.1007/s40751-022-00104-3
38. Benjamin Pollard, Robert Hobbs, Rachel Henderson, Marcos D. Caballero, and H. J. Lewandowski. "Introductory physics lab instructors' perspectives on measurement uncertainty". In: *Physical Review*

Physics Education Research 17 (1 2021), p. 010133. DOI: 10.1103/PhysRevPhysEducRes.17.010133

37. Nicholas T Young and Marcos D Caballero. "Predictive and Explanatory Models Might Miss Informative Features in Educational Data". In: *Journal of Educational Data Mining* 13.4 (2021), pp. 31–86. DOI: 10.5281/zenodo.5806830
36. Nicholas T. Young and Marcos D. Caballero. "Physics Graduate Record Exam does not help applicants "stand out"". In: *Physical Review Physics Education Research* 17 (1 2021), p. 010144. DOI: 10.1103/PhysRevPhysEducRes.17.010144
35. John M. Aiken, Riccardo De Bin, H. J. Lewandowski, and Marcos D. Caballero. "Framework for evaluating statistical models in physics education research". In: *Physical Review Physics Education Research* 17 (2 2021), p. 020104. DOI: 10.1103/PhysRevPhysEducRes.17.020104
34. Nils J. Mikkelsen, Nicholas T. Young, and Marcos D. Caballero. "Investigating institutional influence on graduate program admissions by modeling physics Graduate Record Examination cutoff scores". In: *Physical Review Physics Education Research* 17 (1 2021), p. 010109. DOI: 10.1103/PhysRevPhysEducRes.17.010109
33. John M. Aiken, Riccardo De Bin, Morten Hjorth-Jensen, and Marcos D. Caballero. "Predicting time to graduation at a large enrollment American university". In: *PLOS ONE* 15.11 (2020). DOI: 10.1371/journal.pone.0242334
32. Paul W. Irving, Daryl McPadden, and Marcos D. Caballero. "Communities of practice as a curriculum design theory in an introductory physics class for engineers". In: *Physical Review Physics Education Research* 16 (2 2020), p. 020143. DOI: 10.1103/PhysRevPhysEducRes.16.020143
31. Tor Ole B. Odden, Alessandro Marin, and Marcos D. Caballero. "Thematic analysis of 18 years of physics education research conference proceedings using natural language processing". In: *Physical Review Physics Education Research* 16 (1 2020), p. 010142. DOI: 10.1103/PhysRevPhysEducRes.16.010142
30. Alanna Pawlak, Paul W. Irving, and Marcos D. Caballero. "Learning assistant approaches to teaching computational physics problems in a problem-based learning course". In: *Physical Review Physics Education Research* 16 (1 2020), p. 010139. DOI: 10.1103/PhysRevPhysEducRes.16.010139
29. Kinsey Bain, Rebecca L. Matz, Cori L. Fata-Hartley, Marcos D. Caballero, Diane Ebert-May, Sonia M. Underwood, Justin H. Carmel, Deborah G. Herrington, James T. Laverty, Erin M. Duffy, Jon R. Stoltzfus, Lydia Bender, Lynmarie A. Posey, Mark Urban-Lurain, Ryan L. Stowe, Ryan D. Sweeder, Stuart H. Tessmer, and Melanie M. Cooper. "Characterizing College Science Instruction: The Three-Dimensional Learning Observation Protocol". In: *PLOS ONE* 15.6 (2020), e0234640. DOI: 10.1371/journal.pone.0234640
28. Tor Ole B. Odden, Elise Lockwood, and Marcos D. Caballero. "Physics computational literacy: An exploratory case study using computational essays". In: *Physical Review Physics Education Research* 15 (2 2019), p. 020152. DOI: 10.1103/PhysRevPhysEducRes.15.020152
27. Kelsey Funkhouser, William Martinez, Rachel Henderson, and Marcos D. Caballero. "Design, Analysis, Tools, and Apprenticeship (DATA) Lab". In: *European Journal of Physics* 40.6 (2019), p. 065701. DOI: 10.1088/1361-6404/ab2f0d
26. Marcos D. Caballero, Norman Chonacky, Larry Engelhardt, Robert C. Hilborn, Marie Lopez del Puerto, and Kelly R. Roos. "PICUP: A Community of Teachers Integrating Computation into Undergraduate Physics Courses". In: *The Physics Teacher* 57.6 (2019), pp. 397–399. DOI: 10.1119/1.5124281
25. John M. Aiken, Rachel Henderson, and Marcos D. Caballero. "Modeling student pathways in a physics bachelor's degree program". In: *Physical Review Physics Education Research* 15 (1 2019), p. 010128. DOI: 10.1103/PhysRevPhysEducRes.15.010128
24. Nicholas T. Young, Grant Allen, John M. Aiken, Rachel Henderson, and Marcos D. Caballero. "Identifying features predictive of faculty integrating computation into physics courses". In: *Physical Review Physics Education Research* 15 (1 2019), p. 010114. DOI: 10.1103/PhysRevPhysEducRes.15.010114
23. Marcos D. Caballero and Laura Merner. "Prevalence and nature of computational instruction in undergraduate physics programs across the United States". In: *Physical Review Physics Education Research* 14 (2 2018), p. 020129. DOI: 10.1103/PhysRevPhysEducRes.14.020129
22. Rebecca L. Matz, Cori L. Fata-Hartley, Lynmarie A. Posey, James T. Laverty, Sonia M. Underwood, Justin H. Carmel, Deborah G. Herrington, Ryan L. Stowe, Marcos D. Caballero, Diane Ebert-May, and Melanie

M. Cooper. "Evaluating the extent of a large-scale transformation in gateway science courses". In: *Science Advances* 4.10 (2018). DOI: 10.1126/sciadv.aau0554

21. David Stroupe, Marcos D. Caballero, and Peter White. "Fostering students' epistemic agency through the co-configuration of moth research". In: *Science Education* (2018), pp. 1–25. DOI: 10.1002/sce.21469
20. James T. Laverty and Marcos D. Caballero. "Analysis of the most common concept inventories in physics: What are we assessing?" In: *Physical Review Physics Education Research* 14 (1 2018), p. 010123. DOI: 10.1103/PhysRevPhysEducRes.14.010123
19. Alanna Pawlak, Paul W. Irving, and Marcos D. Caballero. "Development of the Modes of Collaboration framework". In: *Physical Review Physics Education Research* 14 (1 2018), p. 010101. DOI: 10.1103/PhysRevPhysEducRes.14.010101
18. Paul W. Irving, Michael J. Obsniuk, and Marcos D. Caballero. "P^3: a practice focused learning environment". In: *European Journal of Physics* 38.5 (2017), p. 055701. DOI: 10.1088/1361-6404/aa7529
17. Marcos D. Caballero, Leanne Doughty, Anna M. Turnbull, Rachel E. Pepper, and Steven J. Pollock. "Assessing learning outcomes in middle-division classical mechanics: The Colorado Classical Mechanics and Math Methods Instrument". In: *Physical Review Physics Education Research* 13 (2017), p. 010118. DOI: 10.1103/PhysRevPhysEducRes.13.010118
16. James T. Laverty, Sonia M. Underwood, Rebecca L. Matz, Lynmarie A. Posey, Justin H. Carmel, Marcos D. Caballero, Cori L. Fata-Hartley, Diane Ebert-May, Sarah E. Jardeleza, and Melanie M. Cooper. "Characterizing College Science Assessments: The Three-Dimensional Learning Assessment Protocol". In: *PLOS ONE* 11.9 (2016), e0162333. DOI: 10.1371/journal.pone.0162333
15. Melanie M. Cooper, Marcos D. Caballero, Diane Ebert-May, Cori L. Fata-Hartley, Sarah E. Jardeleza, Joseph S. Krajcik, James T. Laverty, Rebecca L. Matz, Lynmarie A. Posey, and Sonia M. Underwood. "Challenge faculty to transform STEM learning". In: *Science* 350.6258 (2015), pp. 281–282. ISSN: 0036-8075. DOI: 10.1126/science.aab0933
14. Stephanie V. Chasteen, Bethany Wilcox, Marcos D. Caballero, Katherine K. Perkins, Steven J. Pollock, and Carl E. Wieman. "Educational transformation in upper-division physics: The Science Education Initiative model, outcomes, and lessons learned". In: *Physical Review Special Topics – Physics Education Research* 11 (2 2015), p. 020110. DOI: 10.1103/PhysRevSTPER.11.020110
13. Bethany R. Wilcox, Marcos D. Caballero, Charles Baily, Homeyra Sadaghiani, Stephanie V. Chasteen, Qing X. Ryan, and Steven J. Pollock. "Development and uses of upper-division conceptual assessments". In: *Physical Review Special Topics – Physics Education Research* 11 (2 2015), p. 020115. DOI: 10.1103/PhysRevSTPER.11.020115
12. Marcos D. Caballero, Bethany R. Wilcox, Leanne Doughty, and Steven J. Pollock. "Unpacking students' use of mathematics in upper-division physics: where do we go from here?" In: *European Journal of Physics* 36.6 (2015), p. 065004. DOI: 10.1088/0143-0807/36/6/065004
11. Lin Ding and Marcos D. Caballero. "Uncovering the hidden meaning of cross-curriculum comparison results on the Force Concept Inventory". In: *Physical Review Special Topics – Physics Education Research* 10 (2 2014), p. 020125. DOI: 10.1103/PhysRevSTPER.10.020125
10. Anne-Marie Hoskinson, Brian A. Couch, Benjamin M. Zwickl, Kathleen A. Hinko, and Marcos D. Caballero. "Bridging physics and biology teaching through modeling". In: *American Journal of Physics* 82.5 (2014), pp. 434–441. DOI: 10.1119/1.4870502
9. Marcos D. Caballero and Steven J. Pollock. "A model for incorporating computation without changing the course: An example from middle-division classical mechanics". In: *American Journal of Physics* 82.3 (2014), pp. 231–237. DOI: 10.1119/1.4837437
8. Marcos D. Caballero, John B. Burk, John M. Aiken, Brian D. Thoms, Scott S. Douglas, Erin M. Scanlon, and Michael F. Schatz. "Integrating Numerical Computation into the Modeling Instruction Curriculum". In: *The Physics Teacher* 52.1 (2014), pp. 38–42. DOI: 10.1119/1.4849153
7. Bethany R. Wilcox, Marcos D. Caballero, Daniel A. Rehn, and Steven J. Pollock. "Analytic framework for students' use of mathematics in upper-division physics". In: *Physical Review Special Topics – Physics Education Research* 9 (2 2013), p. 020119. DOI: 10.1103/PhysRevSTPER.9.020119
6. Anne-Marie Hoskinson, Marcos D. Caballero, and Jennifer K. Knight. "How can we improve problem solving in undergraduate biology?: Applying lessons from 30 years of physics education research". In: *Cell Biology Education - Life Science Education* 12.2 (2013), pp. 153–161. ISSN: 1931-7913. DOI: 10.

1187/cbe.12-09-0149
5. Stephanie V. Chasteen, Rachel E. Pepper, Marcos D. Caballero, Steven J. Pollock, and Katherine K. Perkins. "Colorado Upper-Division Electrostatics diagnostic: A conceptual assessment for the junior level". In: *Physical Review Special Topics – Physics Education Research* 8 (2 2012), p. 020108. DOI: 10.1103/PhysRevSTPER.8.020108
4. Marcos D. Caballero, Matthew A. Kohlmyer, and Michael F. Schatz. "Implementing and assessing computational modeling in introductory mechanics". In: *Physical Review Special Topics – Physics Education Research* 8 (2 2012), p. 020106. DOI: 10.1103/PhysRevSTPER.8.020106
3. Marcos D. Caballero, Edwin F. Greco, Eric R. Murray, Keith R. Bujak, M. Jackson Marr, Richard Catrambone, Matthew A. Kohlmyer, and Michael F. Schatz. "Comparing large lecture mechanics curricula using the Force Concept Inventory: A five thousand student study". In: *American Journal of Physics* 80.7 (2012), pp. 638–644. DOI: 10.1119/1.3703517
2. Matthew A. Kohlmyer, Marcos D. Caballero, Richard Catrambone, Ruth W. Chabay, Lin Ding, Mark P. Haugan, M. Jackson Marr, Bruce A. Sherwood, and Michael F. Schatz. "Tale of two curricula: The performance of 2000 students in introductory electromagnetism". In: *Physical Review Special Topics – Physics Education Research* 5 (2 2009), p. 020105. DOI: 10.1103/PhysRevSTPER.5.020105
1. Anita L. Cochran, Edwin S. Barker, Marcos D. Caballero, and Judit Györgey-Ries. "Placing the Deep Impact Mission into context: Two decades of observations of 9P/Tempel 1 from McDonald Observatory". In: *Icarus* 199.1 (2009), pp. 119–128. DOI: 10.1016/j.icarus.2008.08.015

2.5 Articles appearing in peer-reviewed conference proceedings

41. Emily Bolger, Ying Wang, Rachel Renbarger, Marcos D. Caballero, Marius Nwobi, Cassandra Lem, Noah Finkelstein, Scott Simkins, Taylor Boyd, Charles Henderson, and Andrea Beach. "Integrating machine learning into systematic reviews: Strengthening evidence synthesis". In: *Proceedings of the 2025 Annual Meeting of the American Educational Research Association*. Denver, CO, USA: American Educational Research Association, 2025
40. Emily Bolger and Marcos Caballero. "Exploring the Impact of Unsupervised Clustering Methods in Systematic Literature Reviews". In: *Proceedings of the 56th ACM Technical Symposium on Computer Science Education V. 2*. SIGCSETS 2025. Pittsburgh, PA, USA: Association for Computing Machinery, 2025, pp. 1391–1392. ISBN: 9798400705328. DOI: 10.1145/3641555.3705184. URL: https://doi.org/10.1145/3641555.3705184
39. Emily Bolger and Marcos Caballero. "Using Natural Language Processing to Explore Instructional Change Strategies in Undergraduate Science Education Literature". In: *Proceedings of the 55th ACM Technical Symposium on Computer Science Education V. 2*. 2024, pp. 1930–1930. DOI: 10.1145/3626253.3635341
38. Devin W Silvia, Marcos D Caballero, Thomas Finzell, Rachel Frisbie, Patti Hamerski, Emily Bolger, Sarah Castle, Rachel Roca, and Paige Tourangeau. "Computing in Support of Disciplinary Learning". In: *Proceedings of the 54th ACM Technical Symposium on Computer Science Education V. 2*. 2023, pp. 1247–1247. DOI: 10.1145/3545947.3573341
37. P. C. Hamerski, Devin Silvia, and Marcos D. Caballero. "Exploring Self-Efficacy in Data Science". In: *Proceedings of the 27th ACM Conference on on Innovation and Technology in Computer Science Education Vol. 2*. ITiCSE '22. Dublin, Ireland: Association for Computing Machinery, 2022, pp. 633–634. DOI: 10.1145/3502717.3532131
36. Julia Willison, Julie Christensen, Sunghwan Byun, David Stroupe, and Marcos D. Caballero. "How do you eat an elephant? How problem solving informs computational instruction in high school physics". In: *Physics Education Research Conference 2022*. PER Conference. Grand Rapids, MI, July 2022, pp. 494–499
35. David Stroupe, Sunghwan Byun, Julia Willson, Julie Christensen, Marcos D. Caballero, and Daniel L. Reinholz. "Teachers' use of resources for equitable integration of computation in science classrooms". In: *Proceedings of the 16th International Conference of the Learning Sciences-ICLS2022*. Ed. by C. Chinn, E. Tan, C. Chan, and Y. Kali. International Society of the Learning Sciences, 2022, pp. 905–909

34. Grace Mackessy, Paul W. Irving, Marcos D. Caballero, and Leanne Doughty. "Comparing student conceptions and construction of while loops in modeling motion". In: *2021 Physics Education Research Conference Proceedings*. Ed. by Michael B. Bennett, Brian W. Frank, and Rebecca E. Vieyra. 2021, pp. 245–250. DOI: 10.1119/perc.2021.pr.Mackessy
33. Alyssa C. Waterson, Rachel Henderson, and Marcos D. Caballero. "Analyzing time-to-degree for transfer students at a Large Midwestern University". In: *2021 Physics Education Research Conference Proceedings*. Ed. by Michael B. Bennett, Brian W. Frank, and Rebecca E. Vieyra. 2021, pp. 438–443. DOI: 10.1119/perc.2021.pr.Waterson
32. Rachel Henderson, Kelsey Funkhouser, and Marcos D. Caballero. "A Longitudinal Exploration of Students' Beliefs about Experimental Physics". In: *2019 Physics Education Research Conference Proceedings*. Ed. by Ying Cao, Steven Wolf, and Michael B. Bennett. 2019, pp. 214–219. DOI: 10.1119/perc.2019.pr.Henderson
31. Nicholas T. Young and Marcos D. Caballero. "Using Machine Learning to Understand Physics Graduate School Admissions". In: *2019 Physics Education Research Conference Proceedings*. Ed. by Ying Cao, Steven Wolf, and Michael B. Bennett. 2019, pp. 669–674. DOI: 10.1119/perc.2019.pr.Young
30. Tor Ole B. Odden and Marcos D. Caballero. "Computational Essays and Computational Literacy at the University of Oslo". In: *2019 Physics Education Research Conference Proceedings*. Ed. by Ying Cao, Steven Wolf, and Michael B. Bennett. 2019, pp. 429–434. DOI: 10.1119/perc.2019.pr.Odden
29. Daniel Weller, Marcos D. Caballero, and Paul W. Irving. "Investigating Teacher Learning Goals Involving Computation in High School Physics". In: *2019 Physics Education Research Conference Proceedings*. Ed. by Ying Cao, Steven Wolf, and Michael B. Bennett. 2019, pp. 627–632. DOI: 10.1119/perc.2019.pr.Weller
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23. Ashleigh Leary, Paul W. Irving, and Marcos D. Caballero. "The difficulties associated with integrating computation into undergraduate physics". In: *2018 Physics Education Research Conference Proceedings*. Ed. by Adrienne Traxler, Ying Cao, and Steven Wolf. 2018. DOI: 10.1119/perc.2018.pr.Leary
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8. John M. Aiken, Shih-Yin Lin, Scott S. Douglas, Edwin F. Greco, Brian D. Thoms, Marcos D. Caballero, and Michael F. Schatz. "Student Use of a Single Lecture Video in a Flipped Introductory Mechanics Course". In: *2014 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2014, pp. 19–22. DOI: 10.1119/perc.2014.pr.001
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6. Shih-Yin Lin, Scott S. Douglas, John M. Aiken, Edwin F. Greco, Brian D. Thoms, Marcos D. Caballero, and Michael F. Schatz. "Peer Evaluation of Video Lab Reports in an Introductory Physics MOOC". in: *2014 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2014, pp. 163–166. DOI: 10.1119/perc.2014.pr.037
5. Marcos D. Caballero and Steven J. Pollock. "Assessing Student Learning in Middle-Division Classical

Mechanics/Math Methods". In: *2013 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2013, pp. 81–84. DOI: 10.1119/perc.2013.pr.008

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3. Marcos D. Caballero, Bethany R. Wilcox, Rachel E. Pepper, and Steven J. Pollock. "ACER: A Framework on the Use of Mathematics in Upper-division Physics". In: *2012 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and N. Sanjay Rebello. 2012, pp. 90–93. DOI: 10.1063/1.4789659
2. Bethany R. Wilcox, Marcos D. Caballero, Rachel E. Pepper, and Steven J. Pollock. "Upper-division Student Understanding of Coulomb's Law: Difficulties with Continuous Charge Distributions". In: *2012 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and N. Sanjay Rebello. 2012, pp. 418–421. DOI: 10.1063/1.4789741
1. John M. Aiken, Marcos D. Caballero, Scott S. Douglas, John B. Burk, Erin M. Scanlon, Brian D. Thoms, and Michael F. Schatz. "Understanding Student Computational Thinking with Computational Modeling". In: *2012 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and N. Sanjay Rebello. 2012, pp. 46–49. DOI: 10.1063/1.4789648

3 Funding

3.1 Summary

- Awarded $15.6M USD total as PI, Co-PI, or Senior Personnel at MSU and UiO
- Awarded $7.1M USD in external funding as PI or Co-PI at MSU

3.2 Under Review

3. Using a Research-Based Assessment on Measurement Uncertainty to Improve Physics Laboratory Education, NSF IUSE, $54,910, M.D. Caballero (subaward PI) – collaborative with H.J. Lewandowski (PI)
2. REU Site: Research Experiences for Undergraduates in Physics, NSF, $904,704, M.D. Caballero (Senior Personnel) – collaborative with S. Tessmer (PI) and R. Zegers (Co-PI)
1. Accessibility in Computing and Collaboration - Equitable Structures in STEM (ACCESS), NSF IUSE, $749,971, M.D. Caballero (Senior Personnel) – collaborative with D. McPadden (PI) and D. Silvia (Co-PI)

3.3 Awarded

27. Collaborative Research: A Faculty Development Approach to Transforming Undergraduate Physics Education through Integrating Computation, NSF IUSE, 7/1/2024 - 6/20/2028, $766,689 (MSU Part), M.D. Caballero (PI), K. Roos (PI, Bradley), L. Engelhardt (PI, FMU), M. Lopez (PI, St. Thomas), R. Ivie (Subaward PI, AAPT)
26. Collaborative Research: Facilitating Change in Undergraduate STEM: A multidisciplinary, multimethod metasynthesis mapping a decade of growth, NSF, 8/1/2022 - 7/31/2026 $854,004 ($343,975, MSU part), M.D. Caballero (PI); N. Finkelstein (PI, CU-Boulder); C. Henderson (PI, WMU)
25. STEM Education Postdoctoral Research Fellows in Participatory and Community-Engaged Research, NSF, 8/1/2022 - 7/31/2025 $2,230,181, Julie Libarkin (PI), NiCole Buchanan (Co-PI), Emiko Blalock (Co-PI), Miles McNall (Co-PI), Aaron Reifler (Co-PI), M.D. Caballero (Senior Personnel)
24. Disciplinary Improvements: THE DBER+ COMMONS - A FAIR/CARE/OS RCN, NSF, $1,499,725, 1/1/2023 - 12/31/2025, K. Fitzpatrick (PI), M.D. Caballero (Co-PI), Shiv Karunakaran (Co-PI), Tammy Long (Co-PI), Julie Libarkin (Co-PI)
23. Research Experience for Undergraduates in Physics, NSF, 06/01/21 - 05/31/24, $469,267, S. Tessmer (PI), R. Zegers (Co-PI), M.D. Caballero (Co-PI), K. Cook (Co-PI)
22. Launching a Computational and Data Science Education Research effort at MSU, MSU CNS, 08/15/2019-08/14/2021, $140,000, B.W. O'Shea (PI), D. Silvia (PI), M.D. Caballero (PI)
21. Collaborative Research: Developing and implementing an assessment of measurement uncertainty, NSF IUSE, 09/01/2019-08/31/2022, $597,795 ($244,378, MSU part), M.D. Caballero (PI), H.J. Lewandowski (PI, CU-Boulder)
20. Laboratory Experiments for Students in Ghana, Michigan State University African Studies Center - Undergraduate Student Award, $2000, G. Moreau (PI), E. Brook (Co-PI), D. Mankel (Co-PI), M. Ring (Co-PI), M.D. Caballero (Faculty Advisor)
19. Laboratory Experiments for Students in Ghana, Michigan State University African Studies Center - Faculty Award, $4000, M.D. Caballero (PI)
18. International partnership for Computing in Science Education, Norwegian Research Council INTPART, 4,500,000 NOK ($526,892), M. Hjorth-Jensen (PI), A. Malthe-Sørenson (Co-PI), M.D. Caballero (Co-PI)
17. Integrating Computation in Science Across the Michigan (Supplement), NSF STEM+C, 08/01/18-07/31/20, $117,000, M.D. Caballero (PI), P.W. Irving (Co-PI), D. Stroupe (Co-PI), N. Shah (Co-PI)
16. Collaborative Research: Conference on Integrating Computational Thinking with K-12 STEM Education,

NSF DRK-12, $96,118 ($3,744 MSU part), Marcos Daniel Caballero (PI), Robert Hilborn (PI), Rebecca Vieyra (Co-PI), Colleen Megowan-Romanowicz (Co-PI)

15. Student-dreven forskning for bedre realfagsutdanning (Student-driven research for better science education), Thon Foundation, NOK 1,500,000 (USD $190,000), Marcos Daniel Caballero (Project leader), Anders Malthe-Sørenssen (Senior Personnel), Sunniva Rose (Senior Personnel)
14. Structured Assessment System for Improved Student Learning, NFR FinnUt, NOK 5,988,000 (USD $751,000), Anders Malthe-Sørenssen (Project leader), Morten Hjorth-Jensen (Project leader), Marcos Daniel Caballero (Senior Personnel), Knut Martin Mørken (Senior Personnel), Ellen Karoline Henriksen (Senior Personnel), Cathrine Wahlstrøm Tellefsen (Senior Personnel)
13. Collaborative Research: Extending A Coherent Gateway to STEM Teaching and Learning, NSF IUSE, 09/01/17 - 08/31/22, $1,323,499, M.M. Cooper (PI), Rebecca Matz (Co-PI), Marcos Daniel Caballero (Co-PI), Cori Fata-Hartley (Co-PI), Diane Ebert-May (Co-PI)
12. Integrating Computation in Science Across the Michigan, NSF STEM+C, 08/01/17-07/31/20, $1,245,351, M.D. Caballero (PI), P.W. Irving (Co-PI), D. Stroupe (Co-PI), N. Shah (Co-PI)
11. WebCAT, CREATE for STEM Seed Grant, 02/01/17-01/31/18, $5000 M.D. Caballero (PI), P.W. Irving (Co-PI)
10. Center for Computing in Science Education, National Research Council of Norway, 01/01/17 - 12/31/26, NOK 10,000,000 (USD $1,500,000) A. Malthe-Sørenssen (PI), Morten Hjorth-Jensen (Co-PI), Ellen Karoline Henriksen (Co-PI), Cathrine Wahlstrøm Tellefsen (Co-PI), Knut Mørken (Co-PI), M.D. Caballero (Research Lead)
9. Integrating Equitable Computational Science into High School Science Courses, Science and Society at State, 01/01/17 - 12/31/17, $10,000 D. Stroupe (PI), N. Shah (Co-PI), M.D. Caballero (Co-PI)
8. Research Experience for Undergraduates in Physics, NSF, 06/01/16 - 05/31/21, $652,201 S. Tessmer (PI), S. Pratt (Co-PI), M.D. Caballero (Co-PI), G. Westfall (Co-PI)
7. Learning Science by Doing Science: Project-based Learning through Urban Entomology, Science and Society at State, 01/01/16 - 12/31/16, $10,000 P. White (PI), D. Stroupe (Co-PI), M.D. Caballero (Co-PI)
6. Collaborative Research: Integrating Computation into Undergraduate Physics: A Faculty Development Approach to Community Transformation, NSF, 09/01/15 - 08/31/19, $1,279,209 ($503,977 MSU Part) M.D. Caballero (PI, MSU), K. Roos (PI, Bradley), L. Engelhardt (PI, FMU), M. Lopez (PI, St. Thomas), R. Hilborn (PI, AAPT)
5. Collaborative Research: Fostering integration of computational methods in physics courses: A local communities approach, NSF, 07/01/15 - 06/30/18 $219,136 ($40,526, MSU Part) M.D. Caballero (PI, MSU), N. Chonacky (PI, Yale), M. Lopez (PI, St. Thomas), R. Hilborn (PI, AAPT)
4. Collaborative Research: Surveying the state of computational physics in courses for physics majors, NSF, 01/01/15 - 12/31/18, $126,320; ($21,380, MSU Part) M.D. Caballero (PI, MSU), N. Chonacky (PI, Yale), R. Hilborn (PI, AAPT)
3. LEVERS: Leveraging Engagement and Vision to Encourage Retention in STEM, HHMI, 09/01/14 - 08/31/19, $1,500,000 S. Chivukula (PI), M.D. Caballero (Co-author & Physics Project Lead)
2. Transforming experiences for science and engineering students: Integrating scientific practices into introductory calculus-based mechanics, LPF-CMP 2, 01/01/14 - 12/31/15, $200,000 M.D. Caballero (PI, MSU), D. Stroupe (Co-PI), S. Tessmer (Co-PI)
1. InvestigAction: Underrepresented Middle School Youth Becoming Community Engineering Experts, LPF-CMP 2, 01/01/14 - 05/01/15, $125,000 A. Calabrese-Barton (PI), S. Calabrese-Barton (Co-PI), M.D. Caballero (Co-PI), B. Geier (Co-PI)

4 Invited Talks

4.1 Conference Invited Talks

26. Computational Teaching and Learning Workshop, Banff International Research Station, Banff, AB, Canada, May 2024
25. Exploring System Dynamics in the Natural World with AI, Oslo, Norway, Sep 2024
24. APS April Meeting, Minneapolis, MN, Apr 2023
23. PICUP Capstone Conference, Virtual Conference due to COVID-19, August 2021
22. American Association of Physics Teachers Summer Meeting, Virtual Conference due to COVID-19, July 2021
21. American Association of Physics Teachers Summer Meeting, Virtual Conference due to COVID-19, July 2020
20. American Association of Physics Teachers Summer Meeting, Provo, UT, July 2019
19. APS April Meeting, Denver, CO, Apr 2019
18. Michigan Science Teacher's Association, Grand Rapids, MI, Mar 2019
17. JupyterCon, New York, NY, Aug 2018
16. Michigan Science Teacher's Association, Lansing, MI, Mar 2018
15. American Association for the Advancement of Science Meeting, Austin, TX, Feb 2018
14. North Carolina section of the American Association of Physics Teachers, Meeting, Greenville, NC, Oct 2017
13. American Association of Physics Teachers Summer Meeting, Cincinnati, Oh, July 2017
12. Transforming Research in Undergraduate STEM Education, St. Paul, MN, July 2017
11. Ohio Section of the American Physical Society Meeting, Ypsilanti, MI, May 2017
10. American Association of Physics Teachers Winter Meeting, Atlanta, GA, Feb 2016
9. SIAM Conference on Applied Mathematics Education, Philadelphia, PA, Oct 2016
8. American Association of Physics Teachers Summer Meeting, Sacramento, CA, Jul 2016
7. APS Division of Atomic, Molecular, and Optical Physics Meeting, Providence, RI, May 2016
6. American Association of Physics Teachers Winter Meeting, New Orleans, LA , Jan 2016
5. American Association of Physics Teachers Summer Meeting, College Park, MD, July 2015
4. American Association of Physics Teachers Winter Meeting, San Diego, CA, Jan 2015
3. American Association of Physics Teachers Summer Meeting, Minneapolis, MN, Jul 2014
2. American Association of Physics Teachers Winter Meeting, Orlando, FL, Jan 2014
1. American Association of Physics Teachers Winter Meeting, Ontario, CA, Feb 2012

4.2 Colloquium and Seminars

75. Departmental Colloquium, Swarthmore College, Swarthmore, PA, Apr 2024
74. Departmental Colloqium, Drexel University, Philadelphia, PA, Apr 2024
73. Institute Seminar, Centre for Computing in Science Education, Oslo, Norway, Oct 2024
72. Departmental Colloquium, Kent State University, Kent, OH, Jan 2024
71. Departmental Colloquium, University of Cincinnati, Cincinnati, OH, Sep 2023
70. Departmental Colloquium, Simon Fraser University, Burnaby, BC, Canada, Mar 2023
69. Departmental Colloquium, University of British Columbia, Vancouver, BC, Canada, Mar 2023
68. Departmental Colloquium, University of Victoria, Victoria, BC, Canada, Mar 2023
67. Research Seminar, University of Colorado, Boulder, CO, Feb 2023
66. Departmental Colloquium, Carnegie Mellon University, Pittsburgh, PA, Nov 2022
65. Kazahk Delegation, Michigan State University, East Lansing, MI, Aug 2022
64. Departmental Colloqium, Lund University, Lund, Sweden, May 2022
63. Departmental Colloquium, Auburn University, Auburn, AL, Feb 2022

62. Departmental Colloquium, Georgetown University, Washington, DC, Nov 2021
61. Departmental Colloquium, The Ohio State University, Columbus, OH, Nov 2021
60. Departmental Colloquium, North Carolina State University, Raleigh, NC, Aug 2021
59. College Retreat, University College Dublin, College of Science, Virtual due to COVID-19, May 2021
58. Departmental Colloquium, University of Michigan Engineering Education Research, Virtual due to COVID-19, Jan 2021
57. Cal-Bridge Public Talk, Cal-Bridge Consortium, Virtual due to COVID-19, Nov 2020
56. Departmental Colloquium, Oregon State University, Virtual due to COVID-19, Oct 2020
55. NatSci Public Talk, Michigan State University, Virtual due to COVID-19, Aug 2020
54. Departmental Colloquium, University of Florida, Gainesville, FL, Feb 2020
53. Departmental Colloquium, Cornell University, Ithaca, NY, Oct 2019
52. Departmental Colloquium, University of Toledo, Toledo, OH, Oct 2019
51. Departmental Colloquium, University of Kansas, Lawrence, KS, Oct 2019
50. Departmental Colloquium, Texas A&M Commerce, Commerce, TX, Sep 2019
49. Departmental Colloquium, Tufts University, Boston, MA, Apr 2019
48. Physics Research Seminar, Boston University, Boston, MA, Apr 2019
47. Biology Research Seminar, Boston University, Boston, MA, Apr 2019
46. Research Seminar, Yale University, New Haven, CT, Mar 2019
45. Research Seminar, University of Bridgeport, Bridgeport, CT, Mar 2019
44. Departmental Colloquium, University of Washington, Seattle, WA, Mar 2019
43. Research Seminar, University of Oslo, Oslo, Norway, Feb 2019
42. Research Seminar, University of Oslo, Oslo, Norway, Dec 2018
41. Departmental Colloquium, Texas Tech University, Lubbock, TX, Mar 2018
40. Departmental Colloquium, Cal Poly San Luis Obispo, San Luis Obispo, CA, Feb 2018
39. Departmental Colloquium, Kansas State University, Manhattan, KS, Nov 2017
38. Departmental Colloquium, Georgia State University, Atlanta, GA, Nov 2017
37. Departmental Colloquium, Western Michigan University, Kalamazoo, MI, Oct 2017
36. Research Seminar, Purdue University, West Lafayette, IN, Mar 2017
35. Departmental Colloquium, Amherst College, Amherst, MA, Feb 2017
34. Research Seminar, University of Michigan, Ann Arbor, MI, Dec 2016
33. Departmental Colloquium, Rochester Institute of Technology, Rochester, NY, Nov 2016
32. Research Seminar, University of Colorado Boulder, Boulder, CO, Nov 2016
31. Departmental Colloquium, Colorado School of Mines, Golden, CO, Nov 2016
30. Teaching Essentials Workshop (w/ M.M. Cooper, C. Fata-Hartley, and J. Carmel), Michigan State University - College of Natural Science, East Lansing, MI, Oct 2016
29. Departmental Colloquium, Texas State University, San Marcos, TX, Apr 2016
28. Departmental Colloquium, Central Michigan University, Mt. Pleasant, MI, Mar 2016
27. Departmental Colloquium, University of St. Thomas, St. Paul, MN, Feb 2016
26. Research Seminar, University of Michigan, Ann Arbor, MI, Nov 2015
25. Research Seminar, The Ohio State University, Columbus, OH, Apr 2015
24. Departmental Colloquium, Saginaw Valley State University, University Center, MI, Feb 2015
23. Teaching Essentials Workshop, Michigan State University - College of Natural Science, East Lansing, MI, Feb 2015
22. Research Seminar, Wayne State University, Detroit, MI, Jan 2015
21. Research Seminar, Michigan State University - Dept. of Physics and Astronomy, East Lansing, MI, Jan 2015
20. Research Seminar (w/ C. Schwarz and T. Long), Michigan State University - CREATE For STEM, East Lansing, MI, Nov 2014
19. Research Seminar (w/ V. Sawtelle), Michigan State University - Dept. of Physics and Astronomy, East Lansing, MI, Aug 2014
18. Research Seminar (w/ D. Stroupe), Michigan State University - CREATE For STEM, East Lansing, MI, Apr 2014
17. Departmental Colloquium, University of Maine, Orono, ME, Apr 2014
16. Research Seminar, Purdue University, West Lafayette, IN, Feb 2014

15. Departmental Colloquium, Indiana University Purdue University Indianapolis, Indianapolis, IN, Feb 2014
14. Research Seminar, American Natural History Museum, Dec 2013
13. Research Seminar, Global Physics Department, globalphysicsdept.org, Dec 2013
12. Keynote address, University of Edinburgh, Edinburgh, UK, May 2013
11. Research Seminar, University of Colorado Boulder, Boulder, CO, Apr 2013
10. Departmental Colloquium, University of Colorado Boulder, Boulder, CO, Mar 2013
9. Research Seminar, Michigan State University, East Lansing, MI, Mar 2013
8. Departmental Colloquium, Rochester Institute of Technology, Rochester, NY, Jan 2013
7. Research Seminar, Global Physics Department, globalphysicsdept.org, Sep 2012
6. Research Seminar, Global Physics Department, globalphysicsdept.org, Apr 2011
5. Departmental Colloquium, Georgia State University, Atlanta, GA, Apr 2011
4. Research Seminar, University of Colorado PER group, Boulder, CO, Mar 2011
3. Research Seminar, Massachusetts Institute of Technology RELATE group, Cambridge, MA,Feb 2011
2. Research Seminar, University of Minnesota PER group, Minneapolis, MN, Feb 2011
1. Departmental Colloquium, Spelman College, Atlanta, GA, Apr 2010

5 Supervised Personnel & Mentees

5.1 Research Associates

16. Hannah Sabo (Physics, w./ T. Odden), April 2022 – August 2023 (Research Librarian, Nord University, Bodø)
15. Patti Hamerski (Computational Science, w./ D. Silvia & B. O'Shea), August 2021 – August 2023 (Assistant Professor, Oregon State University)
14. Rachel Frisbie (Computational Science, w./ D. Silvia & B. O'Shea), October 2020 – August 2023 (Graduate Program Director, CMSE, MSU)
13. Thomas Finzell (Computational Science, w./ D. Silvia & B. O'Shea), August 2020 –August 2023 (Assistant Professor, Carleton College)
12. Paul Bergeron (Physics, w./ M. Cooper and J.T. Laverty), August 2019 – August 2022 (Teaching Faculty, Pasadena City College)
11. Tor Odden (Physics), February 2018 – August 2021 (Associate Professor, Physics, University of Oslo)
10. Dan Weller (Physics, w./ P. Irving), August 2018 – May 2021 (Lecturer, Saginaw Valley State University)
9. Rachel Henderson (Physics), April 2018 – August 2020 (Assistant Professor, Michigan State University)
8. Nathaniel Hawkins (Computational Science), Fall 2018 – Fall 2019 (Data Scientist, Kellogg Corporation, Battle Creek, MI)
7. Daryl McPadden (Physics, w/ P. Irving), April 2017 – May 2019 (Assistant Professor, Michigan State University)
6. John M. Aiken (Physics), August 2016 – August 2017 (Data Scientist, Expert Analytics, Oslo)
5. William Martinez (Physics), August 2015 – August 2017 (Staff Engineer, VINSE - Nanoscale Science and Engineering, Vanderbilt University)
4. Paul W. Irving (Physics), May 2014 – August 2016 (Assistant Professor, Michigan State University, resigned 2022)
3. Leanne Doughty (Physics), January 2014 – January 2016 (Assistant Teaching Professor, Georgetown University)
2. James T. Laverty (Physics), August 2013 – August 2016 (Associate Professor of Physics, Kansas State University)
1. Steven F. Wolf (Physics), August 2013 – August 2014 (Assistant Professor of Physics, Eastern Carolina University)

5.2 Graduate Students – Mentees

5.2.1 Current PhD Students

9. Michael Quail (MSU, PriME, 2025 –) - *Co-supervised with J. Green (MSU, PriME/STT)*
8. Alex Reynolds (MSU, Physics, 2025 –)
7. Dawson Kinsman (MSU, CMSE, 2024 –)
6. Amanda Bowerman (UiO, Physics, 2024 –) - *Co-supervised with T. Odden (UiO, Physics/CCSE)*
5. Sona Chitchyan (MSU, CMSE, 2023 –)
4. Cassie Lem (MSU, CMSE, 2023 –)
3. Karl Henrik Fredly (UiO, Physics, 2021 –) - *Co-supervised with T. Odden (UiO, Physics/CCSE)*
2. Emily Bolger (MSU, CMSE, 2021 –)
1. Rachel Roca (MSU, CMSE, 2021 –) - *Co-supervised with E. Munch (MSU, CMSE/MTH)*

5.2.2 Current Master's Students

1. Maddy Nomer (w/ R. Frisbie, CMSE, MSU 2024 –)

5.2.3 Former PhD Students

8. Odd Petter Sand (UiO, Physics and Mathematics, 2017 – 2021, w/ E. Lockwood)
   PhD earned Fall 2021; IT Professional, University of Oslo
7. Nicholas Young (MSU, Physics, 2017 – 2021)
   PhD earned Summer 2021; Assistant Professor, University of Georgia
6. Sebastian Winther-Larsen (UiO, Physics, 2019 – 2021)
   Left UiO program to join startup
5. Alyssa Waterson (MSU, Physics, 2019 – 2020)
   Now supervised by R. Henderson MSU Physics PhD
4. John Aiken (UiO, Physics, 2017 – 2020)
   PhD earned Fall 2020; Research Data Scientist, Expert Analysis, Oslo
3. Michael Obsniuk (MSU, Physics, 2013 – 2020)
   PhD earned Spring 2020; Instructor, Kettering University
2. Kelsey Funkhouser (MSU, Astrophysics, 2015 – 2019, w/ V. Sawtelle)
   PhD earned Summer 2019, Postdoctoral fellow at CU-Denver
1. Alanna Pawlak (MSU, Physics, 2013 – 2018)
   PhD earned Summer 2018; Assistant Teaching Professor - University of Washington Bothell

5.2.4 Former Masters' Students

3. Amanda Bowerman (MSU, CMSE, 2021 – 2023)
2. Robert Solli (UiO, Physics, Master's Student, 2018 – 2019)
1. John Aiken (Georgia State, Physics, Master's Thesis, 2013)

5.3 Graduate Students – Collaborating

7. Sarah Castle (Math Education, CERL, 2021 – 2023)
6. Julie Christensen (Teacher Education, PERL, 2018 – 2022)
5. Sungwhan Byun (Teacher Education, PERL, 2019 – 2021)
4. May Lee (Teacher Education, PERL, 2013 – 2017)
3. Thomas Finzell (Astrophysics, FAST Fellowship, 2013 – 2014)
2. Adam Fritsch (Physics, FAST Fellowship, 2013 – 2014)
1. James Brian Hancock II (Teacher Education, PERL, 2013 – 2014)

5.4 Undergraduate Students – Research Mentees

48. Ishita LNU (w/ R. Roca, Spring 2025 –)
47. Anthony Kosinski (w/ E. Bolger, Fall 2024 –)
46. Alia Valentine (w/ R. Frisbie, Summer 2023 – Summer 2024)
45. Marius Nwobi (w/ E. Bolger, Summer 2022 – Spring 2024)
44. Jake Rodgers (w/ D. McPadden, Summer 2022 – Spring 2024)
43. Tyler Stump (w/ D. McPadden, Summer 2022 – Spring 2023)
42. Lilli Mack (w/ D. McPadden, Summer 2022 – Spring 2023)
41. Megan Schwartz (w/ D. McPadden, Summer 2022 – Spring 2023)

40. Paige Tourangeau (w/ P. Hamerski, Summer 2021 – Spring 2023)
39. Emily Tobias (w/ D. Silvia, Summer 2021)
38. Julia Willison (Summer 2020 – Summer 2022)
37. Thao Nguyen (Spring 2021 – Spring 2022)
36. Le Nguyen (Fall 2020 – Summer 2021)
35. Dao Lam (Spring 2021 – Summer 2021)
34. Nicole Verbencoeur (Spring 2020 – Summer 2021)
33. Trevor Franklin (Fall 2018 – Fall 2020)
32. River Ward (Fall 2018 – Fall 2020)
31. Tabitha Hudson (Spring 2020 – Summer 2020)
30. Matt Ring (Spring 2018 – Summer 2020)
29. Alex Voetberg (Fall 2018 – Spring 2019)
28. Xu Zhen (Machine Learning REU, UiO, Summer 2019)
27. Zhang Linrui (Machine Learning REU, UiO, Summer 2019)
26. Lucas Charpentier (Machine Learning REU, UiO, Summer 2019)
25. Fu-Anne Wang (Machine Learning REU, UiO, Summer 2019)
24. Gabriel Sigurd Cabrera (Machine Learning REU, UiO, Summer 2019)
23. Nils Johannes Mikkelsen (Machine Learning REU, UiO, Summer 2019)
22. Joseph Wilson (Machine Learning REU, UiO, Summer 2019)
21. Daniel Oleynik (Fall 2016 – Summer 2019)
20. Carissa Myers (REU - Wright State University, w/ V. Sawtelle, Summer 2018)
19. Alyssa Waterson (Fall 2016 – Summer 2019)
18. Kristy Griswold (Spring 2016 – Fall 2018)
17. Ashleigh Leary (Fall 2016 – Fall 2018)
16. Grant Allen (Summer 2017 – Fall 2017)
15. Nathaniel Hawkins (Fall 2015 – Fall 2017)
14. Joseph Seitz (Summer 2017)
13. Anthony Renzaglia (Summer 2017)
12. Justin Gambrell (Summer 2017)
11. Michael Zwartz (REU - Lewis University, Summer 2017)
10. Anna Turnbull (MSU, Fall 2014 - Spring 2017)
9. Sarah Boyer (REU - Spring Arbor University, Summer 2016)
8. Paul Hamerksi (REU - Carnegie Mellon University, Summer 2015)
7. Laura Hunter (REU - Mt. Holyoke College, Summer 2015)
6. Sonny Ly (MSU, Spring 2014 – Spring 2015)
5. Claire Morrison (MSU, Fall 2013 – Spring 2015)
4. Keenan Noyes (MSU, Fall 2013 – Spring 2015)
3. Zach Nusbaum (MSU, Fall 2013 – Spring 2015)
2. Brandon Ewert (MSU, Spring 2014)
1. Max Smith (MSU, Fall 2013 – Spring 2014)

5.5 Undergraduate Students – Teaching Mentees

16. Elish Alemao (Spring 2025)
15. Addy Shaska (Spring 2024)
14. Alia Valentine (Spring 2023 – Spring 2024)
13. Amanda Bowerman (Fall 2020)
12. Jack Haas (Fall 2020)
11. Madelyn Klinkoski (Fall 2015)
10. Brandon Bilinski (Fall 2015)
9. Lauren Constantini (Fall 2015)
8. Brandon Roek (Fall 2015)

7. Ashley O'Brien (Fall 2015)
6. Steven Collareno (Spring 2015, Fall 2015)
5. Katherine Wampler (Spring 2015, Fall 2015)
4. Melissa Buchelli (Spring 2015)
3. Tyler Hoffman (Spring 2015)
2. Karen Davidge (Spring 2014, Spring 2015)
1. Stephanie Schmidt (Spring 2015)

6 Service

6.1 University Committees

- Dept. of Computational Science, Mathematics, and Engineering, Undergraduate Program Committee (chair), Fall 2023 –
- Dept. of Physics and Astronomy, REU Committee, Fall 2022 –
- Dept. of Physics and Astronomy, Advisory Committee to the Chair, Fall 2022 –
- College of Natural Science, Search Committee in Mathematics Education (Affirmative Action Co-Advocate), Fall 2023 – Spring 2024
- Dept. of Physics and Astronomy, Teaching Mentor Committee, Fall 2022 – Spring 2024
- Honor's College, Advisory Committee Member, Fall 2022 – Spring 2023
- Dept. of Computational Mathematics, Science, and Engineering, REU Committee, Fall 2022 – Spring 2023
- Dept. of Physics and Astronomy, Reappointment, Promotion, & Tenure Committee, Fall 2022 – Spring 2023
- Dept. of Physics and Astronomy, Chair Election Committee, Fall 2022 – Spring 2023
- Dept. of Computational Mathematics, Science, and Engineering, Reappointment, Promotion, & Tenure Committee, Fall 2022 – Spring 2023
- Dept. of Physics and Astronomy, HEP Search (DUNE Experiment), Summer 2022 – Spring 2023
- **Sabbatical - 2021-2022 Academic Year**
- Dept. of Physics and Astronomy, Salary and Review AdHoc Committee, Spring 2021 – Fall 2021
- Dept. of Computational Mathematics, Science, and Engineering, Reappointment, Promotion, & Tenure Committee, Fall 2020 – Fall 2021
- College of Natural Science, Educational Technology Committee, Summer 2020 – Fall 2021
- Dept. of Physics and Astronomy, REU Committee, Spring 2016 – Fall 2021
- Dept. of Physics and Astronomy, Undergraduate Program committee, Fall 2013 – Fall 2021
- Dept. of Physics and Astronomy, Physics Education Research Search Committee, Chair, Fall 2019 – Spring 2020
- College of Natural Science, Mission and Vision Committee, Spring 2019 – Spring 2020
- Dept. of Physics and Astronomy, Graduate Program Committee, Fall 2018 – Spring 2020
- Dept. of Physics and Astronomy, Teaching Mentorship Committee, Fall 2018 – Spring 2020
- Dept. of Physics and Astronomy, Transforming Gateway Physics Courses Committee (chair), Fall 2018 – Spring 2020
- Dept. of Physics and Astronomy, Advisory Committee to the Chair, Fall 2018 – Spring 2020
- University Curriculum Committee, Fall 2016 – Spring 2018
- Dept. of Physics and Astronomy, Lyman-Briggs/PA Faculty Search Committee, Fall 2015 – Spring 2016
- Dept. of Physics and Astronomy, Algebra-based Physics Review committee, Spring 2014 – Spring 2016
- Dept. of Physics and Astronomy, Calculus-based Physics Review committee, Spring 2014 – Spring 2016
- Dept. of Physics and Astronomy, Instructor Search Committee, Fall 2014 – Spring 2015
- MSU, Dept. of Physics and Astronomy, Qualifying Exam committee, Fall 2013 – Spring 2014

6.2 National or International Advisory Committees other than Conferences

- Member, Program Committee, Forum on Education, American Physical Society, Summer 2022 – Summer 2023
- Member, Standards for Physics Teachers, American Association of Physics Teachers, Spring 2021 – Spring 2023

- Past Chair, Group on Physics Education Research for the American Physical Society, Winter 2017 – Winter 2018
- Chair, Group on Physics Education Research for the American Physical Society, Winter 2016 – Winter 2017
- Vice-Chair, Group on Physics Education Research for the American Physical Society, Winter 2015 - Winter 2016
- Member, Research in Physics Education Committee for the American Associate of Physics Teachers, Winter 2015 - Winter 2018
- Chair of the Educational Technologies Committee for the American Association of Physics Teachers, Winter 2013-Winter 2014
- American Journal of Physics, Five Year Review Committee, 2012-2013
- Educational Technologies Committee for the American Association of Physics Teachers, Winter 2010-Winter 2014

6.3 Conference Planning and Advisory Committees

- AI in Education Roundtable for Senator Peters (co-organizer w./ S. Walter, MSU federal relations), East Lansing, MI, October 2024
- Oslo PER Summer Institute, University of Oslo (conference organizer), Oslo, Norway, June 13-17, 2022
- Lawrence Technological Univesity, College of Science Advisory Board (2020 –)
- NSF Conference on Computational Thinking in Science Education (leadership team), College Park, MD (2019).
- Michigan AAPT/Ohio Section American Physical Society Spring Meeting, East Lansing, MI (2018).
- Michigan AAPT Section Spring Meeting, East Lansing, MI (2015).
- Physics Education Research Conference, Minneapolis, MN (2014).
- MSP Summer Science Academies Concepts in Physical Science (2011).
- Atlanta Metro Physics Teachers Network, Atlanta, GA (2011).
- Atlanta Metro Physics Teachers Network, Atlanta, GA (2010).
- MSP Summer Science Academies Concepts in Physical Science (2009).
- MSP Summer Science Academies Concepts in Physical Science (2008).

6.4 Editorships, Review Panels, Referee

- Reviewer, National Science Foundation, CAREER, various occasions
- Reviewer, National Science Foundation, Division of Undergraduate Education, various occasions
- Guest Editor, Physical Review Physics Education Research, Quantitative Methods in PER: A Critical Examination, Summer 2017 – Spring 2019
- Referee:
  - Physical Review – Physics Education Research
  - American Journal of Physics
  - The Physics Teacher
  - Computers and Education
  - Journal of Engineering Education
  - Science Advances
  - PloS One
  - Artificial Intelligence Review
  - Physics Education Research Conference proceedings

6.5 Outreach Activities

- MSU/UiO Computational Physics Hack-A-Thon w/ M. Hjorth-Jensen (2019).
- MSU Department of Physics & Astronomy, Physics and Astronomy Day Coordinator w/ K. Hinko (2018).
- MSU Department of Physics & Astronomy, Physics and Astronomy Day Coordinator w/ K. Hinko and T. Finzell (2017).
- MSU Department of Physics & Astronomy, Physics Education Research Seminar coordinator (2014 – Present).
- MSU Department of Physics & Astronomy, Graduate Teaching Assistant Workshop coordinator (2014 – Present).
- Science Olympiad, Session coordinator, East Lansing, MI (2014 – 2016).
- Grandparent's University at MSU, Session coordinator, East Lansing, MI (2014).

6.6 Ph.D. Thesis Committee service

Not supervised/co-supervised students (*Active)

26. *John Byrd (MSU, Physics, Education)
25. *Theo Bott (MSU, Physics, Education)
24. *Carlos Llorente (MSU, Astrophysics, Simulation)
23. *Camila Monsalve (MSU, Physics, Education)
22. *Xinyi Wang (MSU, Physics, Nuclear Experiment)
21. *Ava Hill (MSU, Physics, Nuclear Experiment)
20. *Alyssa Waterson (MSU, Physics, Education)
19. *Julia Hinds (MSU, Physics, High Energy Experiment)
18. *Jack Schulte (MSU, Astrophysics, Observational)
17. *Ian Neuhart (MSU, Physics, Condensed Matter Theory)
16. *Noah Vowell (MSU, Astrophysics, Observational)
15. Sarah Castle (MSU, Math, Education)
14. Bryan Stanley (MSU, Physics, Education)
13. Kathryn Bowen (MSU, Astrophysics, Observational)
12. Justin Gambrell (Drexel University, Physics, Education)
11. Julie Butler (MSU, Physics/CMSE, Nuclear Theory)
10. Felix Ndayisabye (MSU, Physics, Nuclear Experiment)
9. Laura Wood (MSU, Physics, Education)
8. Liangji Zhang (MSU, Physics, Condensed Matter Experiment)
7. Kyle Krowpman (MSU, Physics, High Energy Experiment)
6. Vivian Breslin (MSU, Physics, Condensed Matter Experiment; graduated with M.S.)
5. Patti C. Hamerski (MSU, Physics, Education; PhD 2022)
4. Alex Madden (MSU, Physics, Condensed Matter Experiment; PhD 2022)
3. Forrest Phillips (MSU, Physics, High Energy Experiment; PhD 2019)
2. Christopher Minter (MSU, Chemistry, Education; PhD 2018)
1. Thomas Finzell (MSU, Astronomy, Observational; PhD 2017)