Suzanne White Brahmia

Education

Ph.D. Physics, Rutgers University 2014
Dissertation title: Mathematization in Introductory Physics
Dissertation Advisor: Eugenia Etkina

M.S. Physics, Rutgers University 2013

ABD; PhD program, Physics, Cornell University 1993
Thesis title: Premelting in a Li:Al Alloy
Research Advisor Robert Cotts

B.S. Physics, University of Washington 1986

Professional Experience

Associate Professor 2021-present
University of Washington, Department of Physics

Associate Chair for Climate and Diversity 2024-present

Assistant Professor 2017-2021
University of Washington, Department of Physics

Associate Professor of Teaching 2015-2016
Director, STEM TRIAD (Transformations, Research, Instructional practices, Assessment and Dissemination) Coalition
Rutgers University, School of Arts and Sciences

Director, Physics Gateway Program 1993 - 2016
Rutgers University Physics Department, Piscataway, NJ

Associate Director, Math and Science Learning Center 1993 –2015
Rutgers University Physics Department, Piscataway, NJ

Teaching Assistant 1990-1993
Cornell University Department of Physics, Ithaca, New York.

Peace Corps Volunteer 1987-1989
United States Peace Corps, Gabon, Africa.

Funding

Funded Projects

1. National Science Foundation DUE IUSE-2417104; Collaborative Research: Physics Quantitative Literacy: Model-driven Activity Development; with T.I. Smith 2024-2026 (Grant total award $300,000, PI 70% at UW)
2. National Science Foundation DUE IUSE-2422144; Collaborative Research: Measuring and Improving Physics Quantitative Literacy throughout the Undergraduate Curriculum; *Supplemental funding* 2022-2025 (Supplemental award $49,406, PI 100% at UW)

3. APS Conference for Undergraduate Women in Physics 2022-2023 (CUWiP) (Grant award $40,000, additional funds raised from private and corporate donors $70,000)
4. National Science Foundation DUE IUSE-2214765; Collaborative Research: Measuring and Improving Physics Quantitative Literacy throughout the Undergraduate Curriculum; with T.I. Smith 2022-2025 (Initial grant total award $300,000, PI 88% at UW)
5. University of Washington Student Technology Fee Winter 2022, Virtual Reality Student Developer Group: Furthering UW VR Education Research & Curricular Innovation, with Jared Canright and David Aplin (Grant total award $ 78,605, PI)
6. University of Washington Curricular Commons Innovation Fund 2020, Facilitating and guiding collaborative group dynamics to help improve students' collective intelligence in the large-enrollment calculus-based introductory physics course, (Grant total award $27,637, PI)
7. National Science Foundation DUE IUSE-1939021; Collaborative Research: Physics Inventory of Quantitative Literacy; *Supplemental funding* 2019-2021 (Supplemental award $43,941, PI 100% at UW)
8. National Science Foundation DUE IUSE-1832836; Collaborative Research: Physics Inventory of Quantitative Literacy; with T.I. Smith and A. Boudreaux 2018-2021 (Grant total award $300,000, PI 74% at UW)
9. University of Washington Student Technology Fee Winter 2019, Virtual Reality Hardware for VR Education, Outreach, and Education Research, with Jared Canright (Grant total award $14,938, PI)
10. NJ DOEd Math Science Partnership: NGSS Implementation; with E. Etkina, R. Duncan, C. Chin, D. Shernoff, 2016-2018 (Grant total award $720,000, Co-PI)
11. National Science Foundation TUES-1045250, 1045227, 1045231 — Collaborative Project: Developing Proportional Reasoning in a Physics Context with Invention Tasks with A. Boudreaux and S. Kanim 2011-2014 (Grant total award $200,000, PI 33% at Rutgers)
12. National Science Foundation DRL-0733140-- PUM (Physics and Mathematics) Exploration, with E.Etkina, A.Van Heuvelen 2008-2010 (Grant total award $300,000, Co-PI)
13. National Science Foundation CCLI-EMD DEU-0088906 — ISLE Investigative Science Learning Environment: Science and Cognition Combined, with A.Van Heuvelen, E.Etkina, and X. Zou. 2001-2003 (Grant total award $500,000, Co-PI)
14. Rutgers Teaching Excellence Center – Laboratory Improvements for Engineering Physics 1998 (Grant award $10,000, PI)

Publications

Peer-reviewed Journal articles

1. M. Baylor, and **S. White Brahmia**, "Practicing Professionalism Framework: A Coherent Course Structure Aligned with Effective Practices for Physics Programs (EP3) Guidelines", *Educ. Sci. (in press)*
2. **S., White Brahmia**, P. Thompson (2025), "Framing the Fundamental Theorem of Calculus Through Physics-Based Quantities". *Int. J. Res. Undergrad. Math. Ed*. 11, 819–851, https://doi.org/10.1007/s40753-025-00282-6
3. **S. White Brahmia** and G. L. Cochran (2025).. "Underprepared for Physics: Reframing the narrative on readiness and instruction in calculus-based, introductory physics courses". *Physics Today*, issn: 0031-9228. doi:10.1063/pt.qflo.wdfw.

4. C. Zimmerman, A. Olsho, T. I. Smith, P. Eaton, and **S. White Brahmia** (2025), "Assessing physics quantitative literacy development in algebra-based physics". *Phys. Rev. Phys. Educ. Res.,* **21**, p. 020108. doi: 10.1103/lnd6-pxyt. url: https://link.aps.org/doi/10.1103/lnd6-pxy
5. Jared Canright, and **Suzanne White Brahmia** (2024), "Modeling novel physics in virtual reality labs: An affective analysis of student learning" *Phys. Rev. Phys. Educ. Res.,* **20**, doi: https://doi.org/10.1103/PhysRevPhysEducRes.20.010146
6. Alexis Olsho, Trevor I. Smith, Philip Eaton, Charlotte Zimmerman, Andrew Boudreaux, and **Suzanne White Brahmia**; (2023) Online test administration results in students selecting more responses to multiple-choice-multiple-response items, *Phys. Rev. Phys. Educ. Res., 19,* 013101*,* doi: 10.1103/PhysRevPhysEducRes.19.013101
7. **White Brahmia, S.,** Olsho, A., Smith, T.I., Boudreaux, A., Eaton, P., & Zimmerman, C. (2021) The Physics Inventory of Quantitative Literacy: A tool for assessing mathematical reasoning in introductory physics, *Phys. Rev. Phys. Educ. Res., 17,* 020129*,* 17 pages. **[Editor's choice]** doi: 10.1103/PhysRevPhysEducRes.17.020129
8. Olsho, A., **White Brahmia, S.**, Smith, T.I., & Boudreaux, A. (2021). When negative is not "less than zero": electric charge as a signed quantity. *The Physics Teacher*, 59, 253, 6 pages. doi: 10.1119/10.0004149
9. **White Brahmia, Suzanne**, Olsho, Alexis, Smith, Trevor I., & Boudreaux, Andrew (2020). Framework for the natures of negativity in introductory physics. *Phys. Rev. Phys. Educ. Res., 16,* 010120*,* 14 pages. doi:10.1103/PhysRevPhysEducRes.16.010120
10. **White Brahmia, S.**, Boudreaux, A., & Kanim, S.E. (2020). Developing Mathematization with Physics Invention Tasks. *American Journal of Physics (accepted for publication).*14 pages. https://arxiv.org/abs/1602.02033
11. **White Brahmia, S.** (2019). Quantification and its importance to modeling in introductory physics. Invited paper, Focus Collection on Modeling in Physics Instruction, *European Journal of Physics, 40*(4)*,* 044001. 13 pages doi:10.1088/1361-6404/ab1a5a
12. Eugenia Etkina, Alan Van Heuvelen, **Suzanne White Brahmia**, David T. Brookes, Michael Gentile, Sahana Murthy, David Rosengrant, & Aaron Warren (2006). Scientific abilities and their assessment. *Phys. Rev. ST Phys. Educ. Res., 2*(2). 15 pages. **[Top 10 cited articles in journal as of 03/2025]** doi: 10.1103/PhysRevSTPER.2.020103
13. **Suzanne Brahmia**, & Eugenia Etkina (2001). Switching Students ON to Science: An Innovative Course Design for Physics Students. *Journal of College Science Teaching, 31*(3)*,* 183–187. http://www.jstor.org/stable/42992220

Peer-reviewed conference proceedings

1. G. L. Cochran, K. A. Imroz, Q. Liu, M. Chen, R. Montalvo, B. Nainabasti, **S. White Brahmia,** "Addressing Inequitable Access to Collegiate Level Physics Education in the U.S.," Proceedings of GIREP Conference (Leiden 2025), *(in press)*

2. C. Flynn and **S. White Brahmia**, "Exploring Aspects of Student Facility with Taylor Series in the Context of the Electric Dipole", RUME Conference Proceedings (Alexandria, VA 2025) *(in press)*

3. **S. White Brahmia**, “Calculus quantities and conservation laws in physics,” The Learning and Teaching of Calculus Across Disciplines 2, *(in press)*.

4. C. Zimmerman and **S. White Brahmia**, “Accumulation as a tool towards blending reasoning about quantity and rate of change in physics contexts,” The Learning and Teaching of Calculus Across Disciplines 2, *(in press)*.

5. Boyle, B, T. Smith, C. Zimmerman, and **S. White Brahmia**. "Validating Shorter Versions of the Physics Inventory of Quantitative Literacy." Paper presented at the Physics Education Research Conference 2024, Boston, MA, July 10-11, 2024. https://www.per-central.org/items/detail.cfm?ID=16870

6. **White Brahmia, S** (2023). Introductory physics: Drawing inspiration from the mathematically possible to characterize the observable . In T. Dreyfus, A. S. GonzálezMartín, E. Nardi, J. Monaghan & P. W. Thompson (Eds.), The Learning and Teaching of Calculus Across Disciplines – Proceedings of the Second Calculus Conference (pp. 69-82). MatRIC. https://matriccalcconf2.sciencesconf.org/

7. T. Smith, P. Eaton, **S. White Brahmia,** A. Olsho, C. Zimmerman, and A. Boudreaux, “Analyzing Multiple-Choice-Multiple-Response Items Using Item Response Theory”, Physics Education Research Conference 2022 proceedings, Grand Rapids, MI, 2022. doi: 10.1119/perc.2022.pr.Smith

8. C. Zimmerman, A. McCarty**, S. White Brahmia,** A. Olsho, M. De Cock, A. Boudreaux, T. Smith, and P. Eaton, “Assessing physics quantitative literacy in algebra-based physics: lessons learned”, Physics Education Research Conference 2022 proceedings, Grand Rapids, MI, 2022, doi:10.1119/perc.2022.pr.Zimmerman

9. A. Olsho, C. Zimmerman, A. Boudreaux, T. Smith, P. Eaton, and **S. White Brahmia**, “Characterizing covariational reasoning in physics modeling”, Physics Education Research Conference 2022 proceedings, Grand Rapids, MI, 2022, **(selected as Notable Paper)** doi: 10.1119/perc.2022.pr.Olsho

10. Canright, J.P, and **White Brahmia, S.,** Developing expertlike epistemologies about physics empirical discovery using virtual reality, 2021 PERC Proceedings [Virtual Conference, August 4-5, 2021], edited by M. B. Bennett, B. W. Frank, and R. E. Vieyra, doi:10.1119/perc.2021.pr.Canright.

11. Elhady, Y. W., Zimmerman, C., and **White Brahmia**, **S. ,** Effects of facilitating collaboration in large-enrollment introductory physics courses, 2021 PERC Proceedings [Virtual Conference, August 4-5, 2021], edited by M. B. Bennett, B. W. Frank, and R. E. Vieyra, doi:10.1119/perc.2021.pr.Elhady.

12. Zimmerman, C., Olsho, A., Smith,T.I., Eaton, P., Boudreaux, A., & **White Brahmia, S.** (2020). Exploring student facility with “goes-like” reasoning in introductory physics. In *Physics Education Research Conference 2020,* 4 pages. doi:10.1119/perc.2020.pr.Zimmerman https://www.compadre.org/per/items/detail.cfm?ID=15549

13. Smith,T.I., Eaton, P., Boudreaux, A., Zimmerman, C., Olsho, A., & **White Brahmia, S.** (2020). Toward a valid instrument for measuring physics quantitative literacy. In *Physics Education Research Conference 2020*, 4 pages. doi:10.1119/perc.2020.pr.Smith_T https://www.compadre.org/per/items/detail.cfm?ID=15531

14. Olsho, A., **White Brahmia, S.**, Zimmerman, C., Smith,T.I., Eaton, P., & Boudreaux, A. (2020). Online administration of a reasoning inventory in development. In *Physics Education Research Conference 2020,* 4 pages. doi:10.1119/perc.2020.pr.Olsho
https://www.compadre.org/per/items/detail.cfm?ID=15512

15. Boudreaux, A., Kanim, S. E., Olsho, A., **White Brahmia, S.**, Zimmerman, C., & Smith,T.I. (2020). Toward a framework for the natures of proportional reasoning in introductory physics. In *Physics Education Research Conference 2020,* 4 pages. doi:10.1119/perc.2020.pr.Boudreaux
https://www.compadre.org/per/items/detail.cfm?ID=15457

16. Canright, J.P., Olsen, J.R, **White Brahmia, S.** (2020). Leveraging virtual reality for student development of force models in the introductory lab. In *Physics Education Research Conference 2020,* 4 pages. doi:10.1119/perc.2020.pr.Canright
https://www.compadre.org/per/items/detail.cfm?ID=154562

17. **White Brahmia, S.**, Olsho, A., Boudreaux, A., Smith,T.I, & Zimmerman, C. (2020). A Conceptual Blend Analysis of Physics Quantitative Literacy Reasoning Inventory Items. In *Proceedings of the 23rd Annual Conference on RUME* (pp.853-858).
http://sigmaa.maa.org/rume/RUME23.pdf

18. Smith,T.I., Eaton, P., **White Brahmia, S.**, Olsho, A., & Boudreaux, A. (2020). Physics Students' Implicit Connections Between Mathematical Ideas. In *Proceedings of the 23rd Annual Conference on RUME* (940-946). http://sigmaa.maa.org/rume/RUME23.pdf

19. Zimmerman, C., Olsho, A., Loverude, M., & **White Brahmia, S.** (2020). Identifying Covariational Reasoning Behaviors in Expert Physicists in Graphing Tasks. In *Proceedings of the 23rd Annual Conference on RUME* (976-981)
http://sigmaa.maa.org/rume/RUME23.pdf

20. Olsho, A., Zimmerman, C., & **White Brahmia, S.** (2020). A framework of covariational reasoning in introductory physics. In *Proceedings of the 23rd Annual Conference on RUME* (pp. 1263-1264).
http://sigmaa.maa.org/rume/RUME23.pdf

21. Smith,T.I., Eaton, P., **White Brahmia, S.**, Olsho, A., & Boudreaux, A. (2019). Using psychometric tools as a window into students' quantitative reasoning in introductory physics. In *Physics Education Research Conference 2019,* 4 pages.
https://www.per-central.org/items/detail.cfm?ID=15219

22. Zimmerman, C., Olsho, A., **White Brahmia, S.**, Loverude, M., Boudreaux, A., & Smith,T.I. (2019). Towards understanding and characterizing expert covariational reasoning in physics. In *Physics Education Research Conference 2019,* 4 pages.
https://www.compadre.org/per/perc/2019/Detail.cfm?id=7830

23. **White Brahmia, S.**, Olsho, A., Smith, T.I., & Boudreaux, A. (2019). A framework for the natures of negativity in introductory physics. In *Proceedings of the 22nd Annual Conference on RUME* (pp. 68-75).
http://sigmaa.maa.org/rume/RUME22_Proceedings.pdf

24. Olsho, A., **White Brahmia, S.**, Boudreaux, A., & Smith, T.I. (2019). The physics inventory of quantitative reasoning: Assessing student reasoning about sign. In *Proceedings of the 22nd Annual Conference on RUME* (pp. 992-997).
http://sigmaa.maa.org/rume/RUME22_Proceedings.pdf

25. **White Brahmia, S.**, Olsho, A., Smith, T.I., & Boudreaux, A. (2018). NoNIP: Natures of Negativity in Introductory Physics. In *Physics Education Research Conference 2018,* 4 pages. https://www.per-central.org/items/detail.cfm?ID=14763

26. **White Brahmia, S.**, & Boudreaux, A. (2017). Signed Quantities: Mathematics Based Majors Struggle to Make Meaning. In *Proceedings the 20th Annual Conference on RUME* (pp. 1158-1163). http://sigmaa.maa.org/rume/RUME20.pdf

27. **White Brahmia, S.** (2017). Negative quantities in mechanics: a fine-grained math and physics conceptual blend?. In *Physics Education Research Conference 2017,* 4 pages. https://www.per-central.org/items/detail.cfm?ID=14570

28. **Brahmia, S.**, & Boudreaux, A. (2016). Exploring student understanding of negative quantity in introductory physics contexts. In *Proceedings of the 19th Annual Conference of RUME* (pp. 79-83). http://sigmaa.maa.org/rume/RUME19v3.pdf

29. **Brahmia, S.** (2015). Developing expert mathematization in the introductory physics course: an impedance mismatch. In *Proceedings of 2nd International Conference On Research, Implementation And Education Of Mathematics And Sciences (2nd ICRIEMS)*. 10 pages. https://faculty.washington.edu/brahmia/media/publications/1505ICRIEMS_Keynote.pdf

30. **White Brahmia, S.** (2008). Improving Learning for Underrepresented Groups in Physics for Engineering Majors. In *Physics Education Research Conference 2008* (pp. 7-10). DOI: 10.1063/1.3021279

31. **Suzanne White Brahmia**, & Eugenia Etkina (2001). Emphasizing the Social Aspects of Learning to Foster Success of Students at Risk. In *Physics Education Research Conference 2001,* 4 pages. https://www.per-central.org/items/detail.cfm?ID=4382

Book Chapter

32. **White Brahmia, S.,** Olsho, A., Operationalizing and assessing quantitative reasoning in introductory physics, Book Chapter in Quantitative Reasoning in Mathematics and Science Education, published by Springer in their Series "Mathematics Education in the Digital Era" https://link.springer.com/book/10.1007/978-3-031-14553-7

Online curricular projects

33. **White Brahmia, S.**, Boudreaux, A., & Kanim, S.E. (2017). Physics Invention Tasks. http://faculty.washington.edu/pits

34. Etkina, E., Van Heuvelen, A., **White Brahmia, S.**, Brookes, D., Gentile,M., Murthy, S., Rosengrant, D., & Warren, A. (2017). Scientific Abilities Rubrics. https://sites.google.com/site/scientificabilities/rubrics

35. Etkina, E., **White Brahmia, S.**, Zisk, R., Flakker, J., Bugge, D., Robinson, S., & D'Amato, C.and Blackman, M. (2017). Physics Union Mathematics. http://pum.rutgers.edu

36. Lancaster, K., Blanco, J., Reid, S., Barbera, J., **White Brahmia, S.**, Loeblein, P., Parson, R., & Perkins, K. (2011). Build an Atom PhET Simulation. https://phet.colorado.edu/en/simulation/build-an-atom

Other Publications

37. **White Brahmia, S.** (2014). Mathematization in introductory physics. *Doctoral Dissertation, Rutgers University Department of Physics.* doi:10.7282/T3FB51D8

38. National Research Council (2013). *Adapting to a Changing World: Challenges and Opportunities in Undergraduate Physics Education.* Washington, DC: The National Academies Press. doi:10.17226/18312 https://www.nap.edu/catalog/18312/adapting-to-a-changing-world-challenges-and-opportunities-in-undergraduate

39. Lindenfeld, P., & **White Brahmia, S.** (2012). *Physics, the First Science.* Rutgers University Press. http://www.physics.rutgers.edu/firstscience/

40. Lindenfeld, P., & **White Brahmia. S**. (2012). Is the textbook obsolete?. *APS Forum on Education Newsletter, Spring 2012.* https://www.aps.org/units/fed/newsletters/spring2012/lindenfeld.cfm

41. **White Brahmia, S.**, Docktor, J., & & Mestre, J. (2011). FFPER Working Group Report: NRC commissioned report on Undergraduate Physics Education. *APS Forum on Education Newsletter, Fall 2011.* https://www.aps.org/units/fed/newsletters/fall2011/scherr.cfm

Articles Under Preparation

42. Zimmerman, A., Olsho, A., Loverude, M., and **White Brahmia, S**., "Expert covariational reasoning resources in physics graphing tasks", *Phys. Rev. Phys. Educ. Res.* (Revise and resubmit)
43. Olsho, A., Zimmerman, C., **White Brahmia, S**. "A framework for covariational reasoning in introductory physics*", Phys. Rev. Phys. Educ. Res.* (Revise and resubmit)
44. Zimmerman, A., Olsho, A., Loverude, M., and **White Brahmia, S**., "Empirical evidence of the inseparability of mathematics and physics in expert reasoning about novel graphing tasks", *Phys. Rev. Phys. Educ. Res.* (Revise and resubmit)
45. Boudreaux, A**, White Brahmia, S**., "A framework for the natures of proportional reasoning in introductory physics", to be submitted in Phys. Rev. Phys. Educ. Res.

Invited Talks

1. James Gerhart Memorial Lecture: "Physics Education Research at the University of Washington", Pacific NW Association for College Physics Annual meeting 2026, *KEYNOTE ADDRESS*
2. "A Research View on Mathematical Reasoning in Physics: From Characterizing Thinking to Designing Instruction," The Ohio State University, Department of Physics Colloquium (2025)

3. "A Research View on Mathematical Reasoning in Physics: From Characterizing Thinking to Designing Instruction," University of Washington, Department of Physics Colloquium (2025)
4. "Physics Quantitative Literacy (PQL): One story of assessment informing instruction", APS Global Physics Summit; Anaheim, CA (2025)
5. "Revisiting mathematical readiness: Creating pathways for learning equity", Frontiers and Foundations in Physics Education Research Conference NW 2024, *PLENARY*; Diablo, WA (2024) *PLENARY*
6. "Introductory physics: Drawing inspiration from the mathematically possible to characterize the observable" CalcConf 2023: The Learning and Teaching of Calculus Across Disciplines; Bergen, Norway (2023) *PLENARY*
7. "Physics Inventory of Quantitative Literacy: A tool for assessing mathematical reasoning in introductory physics" Physical Review Physics Education Research (PRPER) online journal club.(2023)
8. "Measuring and enhancing quantitative reasoning in physics instruction", Washington State University, Department of Physics Colloquium, (2022)
9. "Measuring and enhancing quantitative reasoning in physics instruction", The University of Toronto, Department of Physics Colloquium, (2022)
10. "Measuring and enhancing quantitative reasoning in physics instruction", Etkinists, organization of high school physics teachers in the Northeast U.S., (2022)
11. "Mentoring Professional Collaboration and Communication in the Physics Laboratory", Advanced Laboratory Physics Association (ALPhA) Beyond First-Year Labs Conference, Virtual, 2021 *PLENARY*
12. "Measuring and enhancing quantitative reasoning in physics instruction", The College of New Jersey, Department of Physics Colloquium, (2021)
13. "Measuring and enhancing quantitative reasoning in physics instruction", University of Colorado, Boulder; Physics Education Group (2021)
14. "Finding Potential Pathways between Expert and Student Physics Quantitative Reasoning", American Association of Physics Teachers (AAPT), Winter meeting 2020
15. "Measuring and enhancing quantitative reasoning in physics instruction", University of Washington, Department of Physics Colloquium, (2021)
16. "A conceptual blend analysis of Physics Inventory of Quantitative Literacy (PIQL) items", Physics Education Research Conference, 2020
17. "Physics quantitative literacy and learning equity", Frontiers and Foundations in Physics Education Research Conference NW 2020, *PLENARY* – cancelled due to COVID
18. "Assessing the math+physics conceptual blend: A new mathematical reasoning inventory for introductory physics", Physics Education Research Conference, 2019
19. "PIQL: A New Assessment of Mathematical Reasoning Development in Physics Instruction", American Physical Society (APS)_ NW Meeting, Bellingham, WA 2019
20. "PIQL: A New Assessment of Mathematical Reasoning Development in Physics Instruction", Jackson State University, Department of Physics 2019
21. "PIQL: A New Assessment of Mathematical Reasoning Development in Physics Instruction", Oregon State University, Department of Physics Colloquium 2019
22. "PIQL: A New Assessment of Mathematical Reasoning Development in Physics Instruction", Ohio State University, Department of Physics Colloquium 2019

23. “PIQL: A New Assessment of Mathematical Reasoning Development in Physics Instruction”, University of Oregon, Department of Physics Colloquium 2019
24. “Assessing physics quantitative literacy development”, American Association of Physics Teachers (AAPT), Winter meeting 2019
25. “NoNIP: Natures of Negativity in Introductory Physics”, Physics Education Research Conference, 2018
26. “Equity and inclusion by design in calculus-based introductory physics “, North Dakota State University, Department of Physics 2018
27. “Student reasoning about signed quantities in introductory-level physics “, APS NW Annual Meeting 2018
28. “Equity and inclusion by design in calculus-based introductory physics”, APS April Meeting 2018
29. “Developing Mathematical Creativity: Physics Invention Tasks”, Yale University, 2017, Helmsley Trust, STEM Education Series *ENDOWED LECTURE*
30. “Physics Invention Tasks: Developing Mathematical Creativity as a Scientific Practice”, University of Bridgeport, 2017, Invited Special Lecture
31. “A tight conceptual blend of physics context, symbols and operations: Example of Negative Work”, Physics Education Research Conference, 2017
32. “Promoting Student Mathematization using Physics Invention Tasks”, Physics Education Research Conference, 2017
33. “Reducing the DFW rate by design in calculus-based physics”, AAPT Summer Meeting, 2017
34. “Mathematization: A tight cognitive blend of content and practices”, Western Washington University, 2017, Irwin L. Slesnick Symposium *KEYNOTE ADDRESS*
35. “Physics Invention Tasks in Introductory Physics”, South Seattle College, 2017, Invited Special Lecture
36. “Quantification with Physics Invention Tasks”, Research in Undergraduate Mathematics Education National Conference 2017
37. “Mathematization: Enhancing learning by fostering physics creativity”, University of Washington, Seattle, Department of Physics Colloquium 2016
38. “Mathematization: Enhancing learning by fostering physics creativity”, Western Washington University, Department of Physics Colloquium 2016
39. “PER efforts to promote diversity: Challenges and opportunities”, APS April Meeting 2015
40. “From Papergirl to Physicist – the Road Less Traveled”, APS Conference for Undergraduate Women in Physics 2015, *PLENARY*
41. **“**Developing expert mathematization in the introductory physics course: an impedance mismatch.”, Yogyakarta State University, Yogyakarta, Indonesia, 2015, *KEYNOTE ADDRESS*
42. “Physics invention tasks: Development and impact”, Oregon State University, Department of Physics Colloquium 2015
43. “NGSS, CCSS-Math and the new AP: An opportunity to develop physicists’ ways of thinking”, AAPT - New Jersey Section Spring Meeting 2014, *PLENARY*
44. “Mathematization in Physics Through a Socioeconomic Lens”, Purdue University, West Lafayette, Indiana, 2014
45. “Mathematization in Physics Through a Socioeconomic Lens”, AAPT Summer Meeting, 2014

46. "Adapting to a changing world: Building learning equity in physics", University of California, Irvine, Department of Physics Colloquium 2014
47. "Establishing a path to mathematization in introductory physics", AAPT Winter Meeting 2014
48. "Building learning equity through mathematization", Frontiers and Foundations in Physics Education Research Conference 2013, *PLENARY*
49. James Gerhart Memorial Lecture: "Establishing a path to mathematization in introductory physics, Pacific NW Association for College Physics Annual meeting 2013, *KEYNOTE ADDRESS*
50. "Establishing a path to mathematization in introductory physics", University of Oregon Department of Physics Colloquium 2013
51. "Using invention tasks to promote students' proportional reasoning in a physics context", National Science Foundation TUES- PI Conference 2013
52. "Using Mathematics to Make Sense in Undergraduate Physics" , APS March Meeting 2012
53. "Using Invention Tasks to Promote Sense-making and Proportional Reasoning", APS and AAPT Physics Teachers Education Coalition Conference 2012
54. "Sense-making in physics: What assumptions are we making about the students?", AAPT Winter Meeting 2011
55. "Developing Mathematical Reasoning within the Physics Curriculum", Physics Education Research Conference Summer 2010
56. "Gender and Ethnic Equity in Engineering: How Can Physics Help?", APS March meeting 2010
57. "Improving Learning for Underrepresented Groups in Physics for Engineering Majors", AAPT Winter 2009
58. "Physics Textbooks: How and Why are They Used?", AAPT Summer 2007
59. "Improving Learning for Underprepared Students in Physics", Princeton University Department of Physics, 2005
60. **"**From Zululand to the Jersey Shore: Comparing Physics Education in Africa and the U.S.", AAPT Summer 2004
61. "Recruiting and Retaining Underrepresented Populations: How Can We Help? – the Rutgers Story", APS/AAPT ; Spring Joint Meeting 2004 New York State Section , *PLENARY*
62. "Fostering Success of At-Risk Students in a Large Enrollment Mechanics Course", Rutgers University Northeast Regional Teaching Workshop 2000

Contributed talks (sole author, since 2017)

1. "Developing Mathematical Reasoning in Introductory Physics: Early Results from a PQL Intervention'', APS Global Physics Summit, Denver,CO, March 18, 2026
2. "The mixed messaging of algebraic variables in physics", American Association of Physics Teachers (AAPT), Summer Meeting Virtual, 08/02/21
3. "Physics Invention Tasks", American Association of Physics Teachers (AAPT), Summer Meeting Covington, KY, 07/23/17
4. "MLOP: Measurable Learning Objectives Project", AAPT Summer Meeting Covington, KY 07/25/17

5. "Facilitating and Assessing the Development of Scientific Abilities and Habits of Mind: Introductory E&M and Modern Physics Course Transformation around ISLE Labs and Measurable Learning Objectives", American Physical Society (APS) MidAtlantic Meeting, Newark, NJ 11/03/17
6. "The new AP Physics 1 & 2 exams: three-year update", APS National Meeting Columbus, OH 04/14/18
7. "Quantification and its importance to modeling", APS NW Regional Meeting, Tacoma, WA 06/02/18
8. "PIQL Physics Inventory of Quantitative Literacy" AAPT, Washington DC 07/30 /18
9. "Learning Mathematization in Physics", UW Physics Department: Phys 528 - Introduction to Research for first year grad students 11/02/18
10. "A Framework for the Natures of Negativity in Introductory Physics", Research in Undergraduate Mathematics Education (RUME), Oklahoma City, OK 03/02/19
11. "The Physics Inventory of Quantitative Reasoning: Assessing student reasoning about sign", RUME, Oklahoma City, OK 03/01/19
12. "The new AP Physics 1 & 2 exams", APS Denver, CO, 04/14/19
13. "PIQL: A New Assessment of Mathematical Reasoning Development in Physics Instruction", APS Denver, CO, 04/14/19
14. "Teaching Gauss' Law using Virtual Reality: Motivation and Implementation", APS NW, Bellingham, WA 05/18/19
15. "The natures of covariational reasoning in introductory physics", APS N, Bellingham, WA, 05/18/19
16. "Comparing Covariational Reasoning of Experts in Physics and in Mathematics", AAPT, Provo, UT 07/23/19
17. "A Method for Measuring Resource Activation in Physics Quantitative Literacy", AAPT, Provo, UT 07/23/19
18. "A Conceptual Blend Analysis of Physics Quantitative Literacy Reasoning Inventory Items", RUME, Boston, MA 02/29/20
19. "Identifying Covariational Reasoning Behaviors in Expert Physicists in Graphing Tasks", RUME, Boston, MA, 02/27/20
20. "Physics Students' Implicit Connections Between Mathematical Ideas", RUME, Boston, MA, 02/29/20
21. "PIQL: A New Assessment of Mathematical Reasoning Development in Physics Instruction", APS April Meeting, Virtual, 04/19/20
22. "Assessing Mathematical Reasoning: The Physics Inventory of Quantitative Reasoning" AAPT, Summer Meeting 07/21/20

Poster Presentations (since 2017)

1. Andres, D., Ruggieri, C.,Etkina,E., **White Brahmia, S**. A large-enrollment course transformation centered on ISLE labs: learning objectives help develop a shared vision with non-PER faculty. Poster presented at: Physics Education Research Conference; July 26th-27th , 2017; Covington, KY.
2. Emenike, M., **White Brahmia, S.,** Faerovitch,M., Ruggieri, C., Introductory chemistry and physics: investigating cognitive and affective domains. Poster presented at: Transforming Research in Undergraduate STEM Education (TRUSE) Conference, July 5 - July 9, 2017; University of St. Thomas, Minnesota.

3. Ruggieri, C., **White Brahmia, S**. Catalyzing Sustained Transformations in a Large Enrollment Introductory Electromagnetism Course. Poster presented at: Transforming Research in Undergraduate STEM Education (TRUSE) Conference, July 5 - July 9, 2017; University of St. Thomas, Minnesota.

4. T. I. Smith**, S. W. Brahmia,** A. Olsho, A. Boudreaux, P. Eaton, P. J. Kelly, K. J. Louis, M. A. Nussenbaum, and L. J. Remy, Developing a reasoning inventory for measuring physics quantitative literacy, Poster presented at: American Association of Physics Teachers (AAPT) Conference, July 28 – Aug 1, 2018; Washington, D.C.
5. **White Brahmia, S**., Olsho, A., Smith, T.I., Boudreaux, A, Natures of Negativity in Introductory Physics (NoNIP), Poster presented at: American Association of Physics Teachers (AAPT) Conference, July 28 – Aug 1, 2018; Washington, D.C.
6. **White Brahmia, S**., Olsho, A., Smith, T.I., Boudreaux, A, Assessing physics quantitative literacy development, Poster presented at: American Association of Physics Teachers (AAPT) Winter Conference, Jan 12-15, 2019; Houston, TX
7. T. I. Smith**, S. W. Brahmia,** A. Olsho, A. Boudreaux, P. Eaton, Developing a Reasoning Inventory for Measuring Physics Quantitative Literacy, Poster presented at: Research in Undergraduate Mathematics (RUME) Conference, Feb 28-March 3, 2019, Oklahoma City, OK.
8. T. I. Smith, P. Eaton, **S. W. Brahmia**, A. Olsho, A. Boudreaux, C. DePalma, V. LaSasso, C. Whitener, and S. Straguzzi, Using psychometric tools as a window into students' quantitative reasoning in introductory physics, Poster presented at: Physics Education Research Conference, July 28 – Aug 1, 2019; Provo Utah.
9. Zimmerman, C., Olsho, A., Loverude, M., Boudreaux, A., Smith, T. I. and **White Brahmia, S.,** Toward Understanding and Characterizing Expert Physics Covariational Reasoning, Poster presented at: Physics Education Research Conference, July 28 – Aug 1, 2019; Provo Utah.
10. Olsho, A., **White Brahmia, S**., Zimmerman, C., A Framework of Covariational Reasoning in Introductory Physics, Poster presented at: Research in Undergraduate Mathematics (RUME) Conference, Feb 27-Feb 29, 2020, Boston, MA.
11. Zimmerman, C., Olsho, A., Smith,T.I., Eaton, P., Boudreaux, A., & **White Brahmia, S.** (2020). Exploring student facility with "goes-like" reasoning in introductory physics. Poster presented at: Physics Education Research Conference, July 22 – July 23, 2020 (Virtual).

12. Boudreaux, A., Kanim, S. E., Olsho, A., **White Brahmia, S.**, Zimmerman, C., & Smith,T.I. (2020). Toward a framework for the natures of proportional reasoning in introductory physics. Poster presented at: Physics Education Research Conference, July 22 – July 23, 2020 (Virtual).

13. Canright, J.P., Olsen, J.R, **White Brahmia, S.** (2020). Leveraging virtual reality for student development of force models in the introductory lab. Poster presented at: Physics Education Research Conference, July 22 – July 23, 2020 (Virtual).

14. Smith,T.I., Eaton, P., Boudreaux, A., Zimmerman, C., Olsho, A., & **White Brahmia, S.** (2020). Toward a valid instrument for measuring physics quantitative literacy. Poster presented at: Physics Education Research Conference, July 22 – July 23, 2020 (Virtual).

15. Olsho, A., **White Brahmia, S.**, Zimmerman, C., Smith,T.I., Eaton, P., & Boudreaux, A. (2020). Online administration of a reasoning inventory in development. Poster presented at: Physics Education Research Conference, July 22 – July 23, 2020 (Virtual).

16. Canright, J., **White Brahmia,** S., Collaboratively Developing Experimental Physics Skills in Hybrid Virtual Reality Labs, Contributed poster presented at: UW Symposium on Teaching and Learning, April 20 2021, (Virtual).
17. Elhady, Y., Zimmerman, C., & **White Brahmia, S.**, Effects of facilitating collaboration in large-enrollment introductory physics courses. Contributed poster presented at: UW Symposium on Teaching and Learning, April 20 2021, (Virtual).

18. Elhady, Y., Zimmerman, C., & **White Brahmia, S.** (2021). Effects of facilitating collaboration in large-enrollment introductory physics courses. Poster presented at: Physics Education Research Conference, July 2021 (Virtual).

19. Canright, J.P., **White Brahmia, S.** (2021). Developing expertlike epistemologies about physics empirical discovery using virtual reality. Poster presented at: Physics Education Research Conference, July 2021 (Virtual).

20. Alexandria Joan Cobb, Charlotte Zimmerman, **Suzanne White,Brahmia**, "Students' Use of Variable Notation and Its Impact on Quantitative Reasoning", UW Undergraduate Research Symposium, May 2022, UW Seattle.
21. Emily Elise Graham, Charlotte Zimmerman, **Suzanne White,Brahmia**, "Student Development of Reasoning and Interpretation of Slope in Introductory Physics Labs", UW Undergraduate Research Symposium, May 2022, UW Seattle.
22. T. Smith, P. Eaton, **S. White Brahmia,** A. Olsho, C. Zimmerman, and A. Boudreaux, "Analyzing Multiple-Choice-Multiple-Response Items Using Item Response Theory", presented at the Physics Education Research Conference 2022, Grand Rapids, MI, 2022.
23. C. Zimmerman, A. McCarty**, S. White Brahmia,** A. Olsho, M. De Cock, A. Boudreaux, T. Smith, and P. Eaton, "Assessing physics quantitative literacy in algebra-based physics: lessons learned", presented at the Physics Education Research Conference 2022, Grand Rapids, MI, 2022.
24. A. Olsho, C. Zimmerman, A. Boudreaux, T. Smith, P. Eaton, and **S. White Brahmia,** "Characterizing covariational reasoning in physics modeling", presented at the Physics Education Research Conference 2022, Grand Rapids, MI, 2022.
25. Ella Henry, Charlotte Zimmerman, John Goldak, **Suzanne White Brahmia**, "Exploring Mathematical Intuition and its Role in Physics Problem-Solving", Research in Undergraduate Mathematics Education Conference Proceedings (2024).
26. Qirui Guo, Charlotte Zimmerman, **Suzanne White Brahmia**, "The Journey of Quantitative Literacy Development: Insights from Physics Majors", Research in Undergraduate Mathematics Education Conference Proceedings (2024).
27. Trevor I. Smith, Zachary Bischoff, Brett Boyle, Jack Sayers, Charlotte Zimmerman, Philip Eaton, Alexis Olsho, **Suzanne White Brahmia**, "Creating Statistically Equivalent Versions of a Test of Quantitative Literacy in Physics Contexts", Research in Undergraduate Mathematics Education Conference Proceedings (2024).
28. **Suzanne White Brahmia** and Trevor I. Smith, "Measuring and Improving Physics Quantitative Literacy throughout the Undergraduate Curriculum", NSF Improving Undergraduate STEM Education (IUSE) Summit (2024).
29. **S. White Brahmia**, T. Smith, C. Zimmerman, A. Olsho, "Assessing and supporting physics quantitative literacy", AAPT Winter Meeting, Las Vegas, NV (2026)

Honors, Awards and Certificates

1. Education Equal Opportunity Fund (EOF) Champion (2004)
   State of New Jersey Commission of Higher EOF Fund Board of Directors, awarded for "developing new approaches that have a significant impact on EOF students."
2. Outstanding Teacher of the Year (2000)
   Awarded by Rutgers University chapter of the Society of Physics Students
3. Rutgers University Outstanding Professor (2000)
   Rutgers chapter of the Delta Gamma sorority, "for motivating female students to reach their highest potential"
4. US Department of Education GAANN Fellowship (1992-93)
5. Certificate of Secondary School Teacher Preparation (1987)
   U.S. Peace Corps Teacher Training Program
6. University of Washington Department of Physics, Departmental Honors (1986)

Professional Service

UW Departmental, College and University Committees

1. Conference for Undergraduate Women in Physics (CUWIP) Co-Chair, held at the UW 2023
2. Conference for Undergraduate Women in Physics (CUWIP) Co-PI, held at the UW 2019
3. UW Department of Biology Search Committee (BER TT faculty search*) (2023-2024)*
4. UW Department of Physics Committees:
   a) Executive Committee *(2024-present)*
   b) Climate and Diversity Committee, Chair *(2024-present)*
   c) Instructional Quality Committee *(2023-present)*
   d) Majors Committee *(2021-present)*
   e) Strategic Planning Committee *(2020-2021)*
   f) First Year Graduate Student Advising Committee *(2018-present)*
   g) Physics 12x Committee *(2017-2023)*
   h) Physics Lab Transformation Sub-Committee *(2017-present)*
   i) Physics Colloquium Committee *(2016-2019)*
   j) Physics Graduate Admissions Committee *(2016-2018)*
5. Dissertation Committees *ongoing*
   a) Department of Physics (Lisa Goodhew, Sheh Lit Chang) (2018-2020)
   b) Department of Applied Mathematics (Charles Fieseler) (2019-2020)
   c) Outside Committee member:
      - Eugene Geiss in the Department of Psychometrics in the Graduate School of Education , Rutgers University (2017-2020)
      - Trevor Volkwyn in the Department of Physics and Astronomy, Uppsala University (2020)
6. Research Advisor
   a) Graduate students
      - Yasmene Elhady, University of Washington, Dept of Physics, 2020-2021
      - Charlotte Zimmerman, University of Washington, Dept of Physics, (2018-2023)
      - Jared Canright, University of Washington, Dept of Physics, (2018-2023)
      - Qirui Guo, University of Washington, Dept of Physics, (2022-2024)
      - Ella Henry, University of Washington, Dept of Physics, (2022-2024)
      - Cameron Flynn, University of Washington, Dept of Physics, (2023-present)
   b) Post docs
      - Alexis Olsho, University of Washington, Dept of Physics, (2017-2021)

- Chaz Ruggieri , Rutgers, Dept of Physics and Astronomy, (2016-2018)
- Charlotte Zimmerman, University of Washington, Dept of Physics, (2023-2024)

National Committees

1. Physics Education Research Conference *Organizing Committee (2020-2021)*
2. American Physical Society Topical Group on Physics Education Research
   Executive Board Member-at-large, (2019-2021)
3. American Association of Physics Teachers - Diversity and Inclusion
   Website Task Force(2019-2021)
4. College Board Advanced Placement(AP)
   a) AP Physics 1 - Development Committee *Higher Education Co-Chair (2017-present)*
   b) AP Physics 1&2 — Special Articulation Committee *(2017-2018)*
   c) AP Physics 1 - Development Committee *Higher Education Representative (2016-2017)*
   d) AP Physics 2 — Standards Setting Committee for new AP physics *Higher Education Representative (2015)*
5. Physics Education Research Conference *Organizing Committee (2016-2017)*
6. Project Evaluator: Foundational Research on Problem Mathematization in Undergraduate Physics; NSF-DUE #1430967 *(2015-2017)*
7. National Research Council *Committee on Undergraduate Physics Education (2010-2013)*
8. Next Generation Science Standards
   New Jersey representative for college readiness in physics and for NGSS implementation. (2012-2016)
9. Reviewer
   a) Book reviewer - *Springer*
   b) Grant proposal reviewer - *National Science Foundation*
   c) Manuscript reviewer - *Physical Review-Physics Education Research, American Journal of Physics, American Physical Society - Physics Education Research Conference Proceedings, The Physics Teacher, European Journal of Physics, Research for Undergraduate Mathematics Education Conference Proceedings*

Professional Development Workshops (leader)

1. American Association of Physics Teachers (AAPT), Summer Meeting; Sacramento, CA, July 2023, Workshop, "Novel Observations in Mixed Reality (Virtual Reality in the Physics Lab)", Co-organized with Jared Canright
2. American Association of Physics Teachers (AAPT), Winter Meeting; Portland, OR, January 2023, Workshop, "Teaching Collaborative Mathematical Modeling in VR with NOMR (Novel Observations in Mixed Reality) Labs, Co-organized with Jared Canright
3. Jackson State University, Jackson, MS, 2019, Workshop, "Problem Solving Readiness: Linking Disparate Knowledge to Expedite Undergraduate Transitions from STEM Aspirations to STEM Learning."
4. University of Bridgeport, Bridgeport, CT, November 2017, Workshop, "Physics Invention Tasks"
5. AAPT Workshop, Summer 2017
   "Physics Invention Tasks: Developing Mathematical Creativity as a Scientific Practice"
6. Western Washington University, Bellingham, WA, April 2017, Irwin L. Slesnick Symposium
   "Physics Invention Tasks"

7. Research in Undergraduate Mathematics Education National Conference, San Diego, CA, Feb 2017, "Education Research at the Interface of Mathematics and Physics: Mathematization of Introductory Physics"
8. NJ_DOEd MSP July 2016 "Mathematization and NGSS"
9. FFPER Puget Sound July 2016 "Physics Invention Tasks"
10. AAPT Workshop, Summer 2015 "Strengthening Mathematical Sensemaking in Physics"
11. Yogyakarta State University, Yogyakarta, Indonesia, May 2015 "Using Invention Instruction to Develop Mathematical Sensemaking"
12. AAPT Workshop Summer 2014 "Strengthening Mathematical Sensemaking in Physics"
13. AAPT Workshop Summer 2014 "Physics Union Mathematics (PUM)"
14. PUM Workshop 2014 For Nj Middle School And High School Teachers "Invention Instruction To Develop Proportional Reasoning"
15. University of California, Irvine 2014 "Reducing the Achievement Gap Using Invention Instruction"
16. AAPT Workshop Winter 2014 "Using Invention Tasks to Promote Mathematical Thinking"
17. AAPT Workshop Summer 2013 "Using Invention Tasks to Promote Sensemaking and Proportional Reasoning"
18. PUM Workshop 2013 for NJ middle school and high school teachers "Invention instruction to develop proportional reasoning"
19. AAPT Workshop Winter 2013 "Reducing the Achievement Gap Using Invention Instruction"
20. Physics Teachers Education Coalition Workshop 2012, "Using Invention Tasks to Promote Sense-making and Proportional Reasoning"
21. PUM Workshop 2012 for NJ middle school and high school teachers "Invention instruction to develop proportional reasoning" PUM Workshop 2011 for NJ middle school and high school teachers "Invention instruction to develop proportional reasoning"
22. PUM Workshop 2010 for NJ middle school and high school teachers "Invention instruction to develop proportional reasoning"

Teaching Experience

2024-present	Introductory Physics: E&M, thermodynamics and fluids – University of Washington
2019-present	Introduction to Experimental Physics– University of Washington
2019	Graduate Ind. Study: Mathematization in introductory physics - University of Washington
2019	Graduate Ind. Study: Learning with Virtual Reality in E&M - University of Washington
2018	Graduate Ind. Study: Student Design in Introductory Labs - University of Washington
2017	Graduate Ind. Study: Affective measures in introductory physics - University of Washington
2018-present	Introductory Physics Laboratory – University of Washington
2017-2018	Introductory Physics: mechanics – University of Washington
2014-2016	Intro. Physics: mechanics, thermodynamics, waves, E&M, Modern Physics - Rutgers Univ.
2010-2012	High school Physics – Noor Ul Iman School, NJ
2009-2010	High school Physical Science – Noor Ul Iman School, NJ
2008-2009	7^{th} grade physical science – Noor Ul Iman School, NJ

1993-2016	Gateway Physics course: introductory mechanics, thermodynamics, waves - Rutgers Univ.
1992 (spring)	Intro. Physics for Scientists: Mechanics and Thermo. – Cornell University
1991 (spring)	Intro. Physics for Engineers: Waves and Modern Physics – Cornell University
1990 (fall)	Intro. Physics for Engineers: Electricity and Magnetism – Cornell University
1987-1989	Middle School Physical Science– Lycee d'Etat Makokou Gabon
1987-1989	High school Physics– Lycee d'Etat Makokou Gabon
1987-1989	High school Chemistry – Lycee d'Etat Makokou Gabon
1986-1987	Electronics Lab – University of Washington