# Melissa Eblen-Zayas

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## EDUCATION & ACADEMIC POSITIONS

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|---|---|
| Carleton College, Northfield, MN | |
| Professor of Physics | 09/2018 - present |
| Director, Perlman Center for Learning & Teaching | |
| and Humphrey Doermann Professor of Liberal Learning | 07/2016 - 06/2020 |
| Department Chair, Physics & Astronomy | 07/2012 - 06/2016 |
| Associate Professor of Physics | 09/2011 - 08/2018 |
| Assistant Professor of Physics | 09/2005 - 08/2011 |
| Ph.D. Physics, University of Minnesota, Minneapolis, MN | 2005 |
| B.A. *magna cum laude*, Smith College, Northampton, MA | 1999 |

## SUMMARY OF TEACHING

**Experience and interests**

- Teaching core courses throughout the introductory and intermediate physics curriculum and advanced courses in Electronics, Solid State Physics, and Contemporary Experimental Physics.
- Developed new courses in materials science (in Physics & Astronomy), materials and the environment (in Environmental Studies), and significantly redesigned the advanced lab course in physics to include a student-driven independent project component.

**Selected teaching and curricular development accomplishments**

- Invited chapter for advanced laboratory textbook: M. Eblen-Zayas, "Development and supervision of independent projects," In *Experimental Physics: Principles and Practice for the Laboratory*, edited by Walter Smith, CRC Press, pg 293-302 (2020).
- Proposed, designed, developed, and taught the hybrid Carleton Undergraduate Bridge Experience (CUBE) beginning in 2016 to provide incoming first-year students the opportunity to review quantitative skills, explore their application to many disciplines, and create an early connection with the Carleton community. Taught CUBE from 2016-2019.
    - M. Eblen-Zayas, L. Winton, "Building a Social and Academic Online Bridge to Quantitatively Rich College Coursework", *Numeracy* 15, Iss. 1: Article 3. doi:10.5038/1936-4660.15.1.1408 (2022).
    - M. Eblen-Zayas & Janet S. Russell, "Making an online bridge program high touch," *Journal of College Student Development* 60, 104, doi: 10.1353/csd.2019.0006 (2019).
- Incorporated academic civic engagement projects in courses to provide students with applied problem solving experiences.
    - LEAP Session: M. Eblen-Zayas, D. Gross, & D. Walser-Kuntz, "Civic Engagement Models to Foster Integrative Science Education," AAC&U Transforming STEM Education Conference (2015).
    - Contributed poster: M. Eblen-Zayas & M. Larson, "Making meaningful curricular connections to campus operations and community initiatives," AASHE Conference (2015).
    - Minnesota Campus Compact Presidents' Civic Engagement Steward Award (2015) – for advancing their campus' civic mission by forming strong partnerships, supporting others' civic engagement, and working to institutionalize a culture and practice of engagement.

## SUMMARY OF SCHOLARSHIP

**Interests**

- Scholarship of teaching and learning (SoTL) and pedagogy, with a focus on quantitative skills in introductory courses and the physics advanced laboratory curriculum.
- Experimental condensed matter physics research on the electronic and magnetic properties of correlated electron materials.

**Selected scholarly accomplishments**

- Conceptualized and led a multi-campus development and educational research pilot project that created a framework for developing online modules focused on quantitative skills (QS) and their applications, and assessed faculty use of and student engagement with modules (2016-2017). This led to an externally-funded research project aimed at improving understanding of best practices for the use of online modules to support students' QS development.
    - NSF Division of Education IUSE: Online modules for quantitative skill building: Exploring adaption and adoption across a consortium, PI: Melissa Eblen-Zayas, Co-PIs: Sundi Richard (Davidson College), Laura Muller & Jonathan Leamon (Williams College), $290,940 (2019 - 2023)
    - With three co-PIs, facilitated conversations & workshops with over 75 social science and science faculty at three institutions to develop prototype online modules to support student QS review and practice (2019-2020); to be tested by faculty in 2020-2021. Collaborating with SERC to assess factors that influence faculty engagement and choices.
    - M. Eblen-Zayas, E. Altermatt, L. J. Muller, J. Leamon, S. Richard, "Supporting student quantitative skills across introductory STEM courses: faculty approaches and perceived needs", *2020 Physics Education Research Conference Proceedings*, edited by S. Wolf, M. B. Bennett, and B. W. Frank, 137-142 (2020).
- Implemented changes in the advanced lab course aimed at providing more robust scaffolding of student-directed experimental projects, and studied effects of those curricular modifications.
    - M. Eblen-Zayas and R. C. Terrien, "Lessons learned from five years of student self-directed experimental projects in the advanced lab," *2018 Conference on Laboratory Instruction Beyond the First Year of College Proceedings*, edited by M. Eblen-Zayas, E. Behringer, M. Dark McNeese, E. Geneston, doi:10.1119/bfy.2018.pr.003 (2018).
    - M. Eblen-Zayas, "The impact of metacognitive activities on student attitudes towards experimental physics," *2016 PERC Proceedings*, edited by D. L. Jones, L. Ding, and A. Traxler, 104, doi:10.1119/perc.2016.pr.021 (2016).
    - M. Eblen-Zayas, "Comparing electronic and traditional lab notebooks in the advanced lab," *2015 Conference on Laboratory Instruction Beyond the First Year of College Proceedings*, edited by M. Eblen-Zayas, E. Behringer, and J. Kozminski, doi:10.1119/bfy.2015.pr.007 (2015).
    - Invited talk: "An evolving approach to assessment in upper-level labs," AAPT Summer Meeting, Provo, UT (2019).
    - Invited talk: "Experimental design in curricular labs", Conference on Laboratory Instruction Beyond the First Year of College (BFY III Conference), Baltimore, MD (2018).
    - Invited talk: "Redesigning an advanced lab course to promote experimental design," APS March Meeting, New Orleans, LA (2017).

- Studied the correlated electron material, $EuO_{1-x}$, including whether the material exhibits phase inhomogeneity and the relationship between the properties of $EuO_{1-x}$ and manganites.
    - NSF Major Research Instrumentation: Acquisition of an x-ray diffractometer for powder and thin film materials characterization, PI: Melissa Eblen-Zayas, Co-PIs: Cam Davidson & Steve Drew (Carleton College), $305,000 (2010 - 2013)
    - NSF Division of Materials Research RUI: EuO Thin Films as a Laboratory for Exploring Metal-Insulator Transitions and Colossal Magnetoresistance, PI: Melissa Eblen-Zayas, $144,590 (2008-2012)
    - Invited talks at: College of St Scholastica (2017), Williams College (2017), Kent State University (2014), Macalester College (2009), University of Minnesota (2009).
    - Contributed poster: B. Goodge, L. Hellwig, M. Eblen-Zayas, "Transport and magnetoresistance response of $EuO_{1-x}$ films fabricated by two different methods," APS March Meeting, Denver, CO, (2014).
    - Contributed poster: M. Eblen-Zayas, T. Brenner, B. Colwell, C. Carter, B. Schuster, S. Schlotter, "Impact of substrate heating during growth on transport and magnetization response of Eu-rich EuO thin films," *11th Joint MMM/Intermag Conference Digest*, 1170 (2010).

## SELECTED PROFESSIONAL SERVICE

**Selected service to American Association of Physics Teachers (AAPT), American Physical Society (APS)**

- Elected APS/AAPT Member-at-large, APS Forum on Education Executive Committee 2021-2023
- Committee for the *American Journal of Physics* Five-Year Review (2019)
- Minnesota AAPT chapter: President (2016-2018), Vice President (2014-2016), Treasurer (2006-2014)
- Reviewer for the report by the APS & AAPT Joint Task Force on Undergraduate Physics Programs, *Phys21: Preparing Physics Students for 21st Century Careers* (2016)
- AAPT Committee on Laboratories (2013-2016)
- Co-author on AAPT report: J. Kozminski, N. Beverley, D. Deardorff, R. Dietz, M. Eblen-Zayas, R. Hobbs, H. Lewandowski, S. Lindaas, A. Reagan, R. Tagg, J. Williams, B. Zwickl, *AAPT Recommendations for the Undergraduate Physics Laboratory Curriculum* (2014)

**Science consultant, Sherman Fairchild Foundation** (2017-present)

Advise on the science equipment programs and summer stipend programs run by the Foundation, including pre-grant visits to schools being considered for funding and mid-grant visits to schools that have received funding.

## SELECTED INSTITUTIONAL SERVICE AT CARLETON COLLEGE

- Community, Equity, Diversity, and Inclusion Leadership Board (2021 - present)
- STEM Board, formerly Science and Math Steering Committee (2006-2016, 2021 - present)
- Future Learning Technology Group (2013-2017)
- Faculty Personnel Committee (2014-2016)
- Science Facilities Planning Group (2014-2016)
- Facilities Master Planning – Science and Math Facilities Subcommittee (2013-2014)
- Summer Science Fellows Coordinator (2011-2014)
- Budget Committee (2010-2012)