Zoe Boekelheide

Curriculum Vitae
February 2022

Department of Physics
Lafayette College
Easton, PA

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Positions held

- Associate Professor
  Department of Physics
  Lafayette College
  Easton, PA
  2021-present
- Assistant Professor
  Department of Physics
  Lafayette College
  Easton, PA
  2013-2021
- Postdoctoral Research Associate
  Magnetic Materials Group
  Material Measurement Laboratory
  National Institute of Standards and Technology (NIST)
  Gaithersburg, MD
  2012-2013

Education

- Ph.D. in Physics with a Designated Emphasis in Nanoscale Science and Engineering
  - Dissertation title: "Effects of nanoscale structure on the magnetism and transport properties of Cr and Cr-Al alloys"
  - Advisor: Frances Hellman

  University of California - Berkeley
  2011
- M.A. in Physics
  University of California - Berkeley
  2007
- B.S. in Physics with High Distinction
  Harvey Mudd College
  2004

Teaching Experience

- Courses taught as Instructor of Record: I was primarily responsible for the course syllabus, structure, and content.
  - First-year Seminar 117: Demonstrating Science
    Lafayette College: *Fall 2018, Fall 2019, Fall 2020, Fall 2021*
  - Physics 130: Spacetime, Relativity, and Contemporary Physics
    Lafayette College: *Fall 2014 (co-taught), Fall 2015, Fall 2016*
  - Physics 131: Physics I: Mechanics

Lafayette College: *Spring 2014, Fall 2014, Spring 2016, Spring 2017, Spring 2019, Spring 2021*

- Physics 151: Accelerated Physics I: Mechanics
  Lafayette College: *Fall 2013*
- Physics 152: Accelerated Physics II: Electricity, Magnetism, and Optics
  Lafayette College: *Fall 2016 (with lab), Fall 2018 (with lab), Fall 2019 (with lab), Fall 2020 (with lab), Fall 2021 (with lab)*
- Physics 327: Advanced Classical Mechanics
  Lafayette College: *Spring 2019, Spring 2020, Spring 2021*
- Physics 338: Advanced Physics Laboratory
  Lafayette College: *Spring 2020, Spring 2022*
- Physics 342: Electromagnetic Fields
  Lafayette College: *Fall 2013, Fall 2015*

- Courses taught as a Lab or Section Instructor: I was not primarily responsible for the course syllabus, structure, and content.
  - Physics 112L: General Physics II: Electricity, Magnetism, and Optics Lab
    Lafayette College: *Spring 2020*
  - Physics 131L: Physics I: Mechanics Lab
    Lafayette College: *Fall 2014, Spring 2015, Spring 2017, Spring 2019, Spring 2021, Spring 2022*
  - Physics 133L: Physics II: Electricity, Magnetism, and Waves Lab
    Lafayette College: *Spring 2016*
  - Physics 151L: Accelerated Physics I: Mechanics Lab
    Lafayette College: *Spring 2022*
  - Physics 7B: Physics II: Thermo, Electric., and Magn. Discussion/Lab
    University of California - Berkeley: *Fall 2004, Spring 2005, Summer 2010*

Research students supervised

- Vanessa Dela Paz Maca, Independent Study, Lafayette College *2022*
- Henry Steinthal, EXCEL Scholar, Lafayette College *2022*; Independent Study, Lafayette College *2022*
- Kailey Krausz, EXCEL Scholar, Lafayette College *2021*
- Sena Yevenyo, EXCEL Scholar, Lafayette College *2019-present*
- Emily Barnes-Taub, EXCEL Scholar, Lafayette College *2019-2020*
- Jackson Miller, EXCEL Scholar, Lafayette College *2017-2018*; Honors Thesis, Lafayette College *2018-2019*
- Zainab Hussein, EXCEL Scholar, Lafayette College *2014-2017*
- Shannon Hartzell, EXCEL Scholar, Lafayette College *2014-2016*
- Waseh Ahmad, EXCEL Scholar, Lafayette College *2015-2016*
- Irina Koltsova, Montgomery College Intern Program, NIST *2013*
- Aidin Fathalizadeh, supervised senior research project, UC-Berkeley *2006-2007*
- I served as second reader or outside reader on the following Lafayette Honors Theses:
  - Adina Shrestha (Biology, *2022*)
  - Deniz Ozbay (Math, *2022*)
  - Tyler Armstrong (Chemical Engineering, *2022*)
  - Harry Chernak (Mechanical Engineering, *2022*)
  - Joelle Rabin-Court (Biology, *2021*)
  - Inaki Minondo (Math, *2021*)
  - Elene Karangozishvili (Math, *2021*)
  - Matt Tascione (Geology, *2021*)
  - Gracie Gibbons (Biology, *2020*)

- Mallory Kane (Physics, *2020*)
- Catherine Bartholet (Physics, *2020*)
- Xinwen Zhang (Mechanical Engineering, *2019*)
- Alyssa Devin (Mechanical Engineering, *2019*)
- Ryan Cerbone (Chemistry, *2017*)
- Enia Xhakaj (Physics, *2017*)
- Ross Chumsky (Physics, *2016*)
- Tom Day (Physics, *2016*)
- Hao Lu (Physics, *2016*)
- Ian Crawley (Physics, *2015*)
- Tyler Fruneaux (Chemical Engineering, *2014*)

Professional Service

- Member of the scientific program committee for the following conferences:
  - Magnetism and Magnetic Materials, virtual conference (*2020*)
  - Magnetism and Magnetic Materials, Las Vegas, NV (*2019*)
- Reviewer for the following journals:
  - AIP Advances
  - Applied Physics Letters
  - Journal of Applied Physics
  - Journal of Alloys and Compounds
  - Journal of Physics: Condensed Matter
  - IEEE Magnetics Letters
  - IEEE Transactions on Magnetics
  - Nanotechnology
  - Scientific Reports
  - Transactions on NanoBioscience
- Reviewer for the following organizations:
  - Magnetism and Magnetic Materials (MMM) Conference GMAG Student Awards (*2014-2016*)
  - Australian Nuclear Science and Technology Organisation (ANSTO) Bragg Institute beamtime proposals (*2010-2017*)
- Session chair for the following conference sessions:
  - Session: Biomedical and Non-Biomedical Applications II, International Conference on Magnetism (ICM), San Francisco CA (*2018*)
  - Session: Magnetocaloric Materials V, International Conference on Magnetism (ICM), San Francisco CA (*2018*)
  - Session: Nanoparticles and Nanowires (not in arrays) I, Magnetism and Magnetic Materials (MMM) Conference, Pittsburg PA (*2017*)
  - Session: Magnetic Fluids and Nanoparticles Applications, Magnetism and Magnetic Materials (MMM) Conference, New Orleans LA (*2016*)
  - Session: Magnetic Fluids and Applications I, Magnetism and Magnetic Materials (MMM)/Intermag Joint Conference, Chicago IL (*2013*)
- Co-facilitator for group:
  - American Association of Physics Teachers (AAPT) Faculty Online Learning Community (FOLC) (*2016-2017*)

Institutional Service

- Curriculum and Educational Policy Committee, Lafayette College (*2018-2021*)
- Mathematics Department Visiting Assistant Professor Search Committee, Lafayette College (*2019*)
- Chemistry Department Visiting Assistant Professor Search Committee, Lafayette College (*2019*)
- Information Technology and Library Committee, Lafayette College (*2017*)
- Mechanical Engineering Department Tenure-Track Faculty Search Committee, Lafayette College (*2016-2017*)
- Physics Department Tenure-Track Faculty Search Committee, Lafayette College (*2015-2016*)
- Physics Department Library Liaison, Lafayette College (*2014-2018*)
- Physics Department: Organize weekly Physics Tea (academic year) and weekly Lunch Presentations (summer), Lafayette College (*2014-2016*)

Outreach and Diversity

- Incorporated community engagement projects into two courses: First-year seminar 117 (Demonstrating Science) and Physics 338 (Advanced Physics Laboratory) (*2018-present*)
- Co-leader for Women in the Sciences (WITS) mentoring group, Lafayette College (*2015-present*)
- Leader of Physics workshop for Summer Program for Academic Leadership (SPAL), Lafayette College (*2014-2019*).
- Adventure in Science program for middle schoolers, NIST (*2012-2013*)
- Lab tour guide for GetSET summer program for underrepresented high school girls, UC-Berkeley (*2005-2010*)
- Assist with Society for Women in the Physical Sciences (SWPS) events, UC-Berkeley (*2005-2009*)

Awards

- Thomas Roy and Lura Forrest Jones Lecture Award, Lafayette College (*2021*)
- NRC postdoctoral research fellowship (*2012-2013*)
- APS GMAG Student Dissertation award (*2011*)
- IEEE-Oakland East Bay section Magnetic Multilayers conference - student award (*2010*)
- NSF Graduate Fellowship Award - honorable mention (*2004*)
- Alfred B. Focke Award for Outstanding Work in Experimental Physics, Harvey Mudd College (*2004*)
- Harvey S. Mudd Merit Scholarship (*2000-2004*)
- National Merit Scholarship (*2000-2004*)

External grants received

- National Science Foundation
  - Collaborative proposal with James Dearworth (PI), Tamara Carley (co-PI), and myself (co-PI)
  - Award for $563,976
  - Project title: MRI: Acquisition of a Carl Zeiss EVO SEM (Scanning Electron Microscope) at Lafayette College

Internal grants received

- Teaching with Technology Grant
  - Submitted proposal for $1,487 (awarded)
  - Project title: Tablet for making videos to support physics problem-solving

Peer-Reviewed Publications

* = Undergraduate student co-author

12. Z. Boekelheide, S. Hunagund, Z. A. Hussein*, Jackson T. Miller*, A. A. El-Gendy, and R. L. Hadimani, "Particle size-dependent magnetic hyperthermia in gadolinium silicide micro- and nano-particles from

calorimetry and AC magnetometry", *Journal of Magnetism and Magnetic Materials* **519**, 167441 (2021)

11. Z. Boekelheide, Jackson T. Miller*, C. Grüttner, and C. L. Dennis, "The effects of intraparticle structure and interparticle interactions on the magnetic hysteresis loop of magnetic nanoparticles", *Journal of Applied Physics* **126**, 043903 (2019)

10. Z. Boekelheide, Z. A. Hussein*, S. M. Harstad, A. A. El-Gendy, and R. L. Hadimani, "Gd_5Si_4 micro- and nano-particles for self-regulated magnetic hyperthermia", *IEEE Transactions on Magnetics*, **53**, 5400204 (2017)

9. Z. Boekelheide, Z. A. Hussein*, and S. Hartzell*. "Electronic measurements in an alternating magnetic field (AMF) for studying magnetic nanoparticle hyperthermia: Minimizing eddy current heating", *IEEE Transactions on Magnetics* **52**, 5400304 (2016)

8. Z. Boekelheide and C. L. Dennis, "Artifacts in magnetic measurements of fluid samples", *AIP Advances* **6**, 085201 (2016)

7. Z. Boekelheide and F. Hellman, "Cr(110) texture induced by epitaxy on Al_2O_3(0001) substrates: Preferential grain growth in the <001> direction", *Applied Physics Letters*, **102**, 141601 (2013)

6. Z. Boekelheide, D. A. Stewart, and F. Hellman, "Chemical ordering in Cr_3Al and relation to semiconducting behavior", *Physical Review B*, **86**, 085120 (2012)

5. Z. Boekelheide, T. Saerbeck, A. P. J. Stampfl, R. A. Robinson, D. A. Stewart, and F. Hellman, "Antiferromagnetism in Cr_3Al and relation to semiconducting behavior", *Physical Review B*, **85**, 094413 (2012)

4. Z. Boekelheide, A. X. Gray, C. Papp, B. Balke, D. A. Stewart, S. Ueda, K. Kobayashi, F. Hellman, and C. S. Fadley, "Band gap and electronic structure of an epitaxial, semiconducting $Cr_{0.80}Al_{0.20}$ thin film", *Physical Review Letters*, **105**, 236404 (2010)

3. Z. Boekelheide, David W. Cooke, E. Helgren and F. Hellman, "Resonant impurity scattering and electron-phonon scattering in the electrical resistivity of Cr thin films", *Physical Review B*, **80**, 134426 (2009)

2. David W. Cooke, Z. Boekelheide, D.R. Queen and F. Hellman, "The role of the spin-density wave and disorder in the density of states of sputtered Cr films", *Journal of Applied Physics*, **105**, 07C314 (2009)

1. Z. Boekelheide, E. Helgren and F. Hellman, "Spin-density wave in polycrystalline Cr films from infrared reflectivity", *Physical Review B*, **76**, 224429 (2007)

Book chapters

* = Undergraduate student co-author

1. "Gd-based magnetic nanoparticles for biomedical applications", S. Harstad, S. Hunagund, Z. Boekelheide, Z. A. Hussein*, A. A. El-Gendy, and R. L. Hadimani, chapter in Magnetic Nanostructured Materials: From Lab to Fab, edited by A. A. El-Gendy, J. M. Barandiaran, and R. L. Hadimani, Elsevier, Cambridge MA (2018)

Invited Presentations

8. "Why I love magnets and you should too", Lafayette College (Jones Faculty Lecture), Easton PA, April 14, 2022

7. "Magnetic reversal in nanoparticles: Mechanisms, measurement, and biological applications", Dickinson College, Carlisle PA, March 21, 2019

6. "Magnetic reversal in nanoparticles: Mechanisms, measurement, and biological applications", West Virginia University, Morgantown WV, September 18, 2018

5. "Gd_5Si_4 micro- and nano-particles for self-regulating magnetic hyperthermia", Villanova Physics Colloquium, Villanova PA, December 1, 2017

4. "Measuring magnetic nanoparticles", Lafayette College Physics Colloquium, Easton PA, December 11, 2012

3. "Explaining the semiconducting behavior in antiferromagnetic Cr_3Al", NIST Magnetic Materials Group, Gaithersburg MD, May 20, 2011

2. "Explaining the semiconducting behavior in Cr3Al", UC-Berkeley Materials Research Society Graduate Student Seminar Series, Berkeley CA, April 5, 2011

1. "Effects of Nanoscale Structure on the Magnetism and Transport Properties of Chromium and Chromium-Aluminum Alloys", APS March Meeting, Dallas TX, March 21, 2011

Contributed Presentations

21. "Particle size-dependent magnetic hyperthermia in gadolinium silicide micro- and nano-particles from calorimetry and AC magnetometry", talk, APS March Meeting, March 15, 2021, virtual conference.

20. "Dynamic hysteresis loops and specific loss power of iron oxide nanoflowers", talk, APS March Meeting, March 4-8, 2019, Boston MA.

19. "Dynamic hysteresis loops and specific loss power of iron oxide nanoflowers in the nonlinear regime", poster, MMM/Intermag Joint Conference, January 14-18, 2019, Washington, DC.

18. "Gadolinium silicide micro- and nanoparticles for self-regulating magnetic hyperthermia: effects of particle size", poster, International Conference on Magnetism, July 16-20, 2018 San Francisco, CA.

17. "Gd_5Si_4 micro- and nano-particles for self-regulated magnetic hyperthermia", talk, Intermag, April 27, 2017, Dublin, Ireland.

16. "The effects of intraparticle and interparticle interactions on the magnetic hysteresis loop of frozen suspensions of bionized nanoferrite (BNF) particles", talk, Americal Physical Society (APS) March Meeting, March 14, 2017, New Orleans LA.

15. "Shape of the hysteresis loop of frozen suspensions of bionized nano-ferrite (BNF) particles in water", talk, International Conference on Fine Particle Magnetism (ICFPM), June 17, 2016, Gaithersburg MD.

14. "Electronic measurements in an alternating magnetic field (AMF) for studying magnetic nanoparticle hyperthermia", talk, American Physical Society (APS) March Meeting, Baltimore MD, March 18, 2016

13. "Electronic measurements in an alternating magnetic field (AMF) for studying magnetic nanoparticle hyperthermia: Minimizing eddy current heating", poster, Magnetism and Magnetic Materials (MMM)/Intermag Joint Conference, San Diego CA, January 12, 2016

12. "Anisotropy and shape of hysteresis loop of frozen suspensions of iron oxide nanoparticles in water", talk, American Physical Society (APS) March Meeting, Denver CO, March 6, 2014

11. "Artifacts in magnetic measurements of fluid samples", poster, Magnetism and Magnetic Materials (MMM), Denver CO, November 7, 2013

10. "Magnetic moment measurements of fluid samples", talk, American Physical Society (APS) March Meeting, Baltimore MD, March 21, 2013

9. "Magnetic characterization of amine-functionalized iron oxide nanoparticles", talk, Magnetism and Magnetic Materials (MMM)/Intermag Joint Conference, Chicago IL, January 18, 2013

8. "The role of structural ordering in the semiconducting behavior of Cr_3Al", talk, American Physical Society (APS) March Meeting, Dallas TX, March 23, 2011

7. "Band gap, antiferromagnetism, and structural ordering in semiconducting $Cr_{1-x}Al_x$", poster, International Symposium on Metallic Multilayers (MML), Berkeley CA, September 24, 2010

6. "Semiconducting behavior in $Cr_{1-x}Al_x$ thin films", talk, International Conference on Advanced Materials (ICAM), Rio de Janeiro Brazil, September 22, 2009

5. "Semiconducting behavior in $Cr_{1-x}Al_x$ thin films", poster, Workshop to Foster US-Brazilian Research Collaborations, Rio de Janeiro Brazil, September 18, 2009

4. "Semiconducting behavior in $Cr_{1-x}Al_x$ thin films", talk, American Physical Society (APS) March Meeting, Pittsburgh PA, March 17, 2009

3. "Spin-density wave in polycrystalline Cr films from infrared reflectivity", talk, American Physical Society (APS) March Meeting, New Orleans LA, March 13, 2008

2. "Electrical Resistance of Sputtered Chromium Thin Films", talk, American Physical Society (APS) March Meeting, Baltimore MD, March 14, 2006

1. "Resistance of Ta/PtMn/Ta Thin Films", poster, American Physical Society (APS) March Meeting, Montreal QC, March 23, 2004