

## Benjamin E. Levy, Ph.D.

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### CONTACT INFORMATION

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### EDUCATION

**Ph.D. in Physics** **2022**  
*The University of North Carolina at Chapel Hill, Chapel Hill, NC*

- Dissertation title: “Toward Magnetomotive Ultrasound Elastometry of Thrombosis”
- Dissertation advisor: Amy L. Oldenburg

**B.A. in Physics with honors** **2015**  
*Carleton College, Northfield, MN*

### TEACHING EXPERIENCE

**DAVIDSON COLLEGE, DAVIDSON, NC** **2022 - Present**  
🏆 *Received the Exceptional Teaching Award for Visiting Faculty, May 2023*

#### PHY 330, CLASSICAL MECHANICS

- Emphasize both analytical and computational skill sets to broaden the range of tractable problems and make classical mechanics more relevant to students
- Provide numerous opportunities for group problem solving and applications-based activities involving current physics research (more details [here](#))
- Implement reflection essays designed to help students appreciate and engage with the physics community’s important work in diversity, equity, and inclusion
- End the term with an exciting three-week-long final research project in which student groups build physical and computational models of medieval trebuchets, perform optimization experiments, and present their results to the department

#### PHY 225, GENERAL PHYSICS II: STUDIO

- Teach via the “studio” format which promotes an inclusive learning environment via interactive combined laboratory and recitation sections in place of lectures and stand-alone laboratories
- Design numerous medical imaging-related course components specifically relevant to this life sciences focused audience
- Developed a technique for fostering intra-group trust and camaraderie through motivating, meaningful laboratory journal assignments designed to reinforce daily material

#### PHY 125, GENERAL PHYSICS WITH CALCULUS I: STUDIO

- Teach via the “studio” format which promotes an inclusive learning environment via interactive combined laboratory and recitation sections in place of lectures
- Developed and implemented new laboratory experiments and activities to highlight biophysics topics

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL, CHAPEL HILL, NC 2015 - 2022  
☞ Received the Tanner Award for Excellence in Undergraduate Teaching, April 2021

INSTRUCTOR: PHYS 281L, EXPERIMENTAL TECHNIQUES IN PHYSICS

- Seven term lead instructor for sophomore-level modern physics laboratory course
- Developed in-person, remote-control, and at-home laboratory experiments including an X-ray Compton scattering apparatus, and an interferometer that students build at home (more details [here](#))
- Wrote a new full-term uncertainty analysis curriculum and led accompanying lectures employing active learning techniques
- Created communication-focused assignments for expert, peer, and general audiences
- Implemented a reflection essay series to help students actively engage with issues of diversity, equity, and inclusion in the physics community
- Trained two first-time co-instructors and managed three teaching assistants

INSTRUCTOR: PHYS 114, GENERAL PHYSICS I

- Instructor of record for introductory mechanics course for life science majors
- Led lectures and “studios” (interactive, combined laboratory/recitation sections)
- Developed course materials, demos, and exam questions based on my research
- Supervised my graduate teaching assistant

GRADUATE TEACHING ASSISTANT

- Courses taught:
  - PHYS 118, Mechanics and Relativity (Fall 2015, Spring 2016, Spring 2017)
  - PHYS 119, Electromagnetism and Quanta (Fall 2017, Spring 2018)
- Led “studios” (interactive, combined laboratory/recitation sections)
- Developed course materials such as laboratory report assignments and mini-lectures

HONORS AND  
AWARDS

**Exceptional Teaching Award for Visiting Faculty** **May 2023**  
*Davidson College, Davidson, NC*

- This award recognizes visiting faculty for “exceptional teaching, demonstrated by an exceptional commitment to their students and their discipline, ability to create and foster a lively and engaging classroom environment, and a tendency to inspire students and serve as a model for their colleagues.”

**Tanner Award for Excellence in Undergraduate Teaching** **April 2021**  
*The University of North Carolina at Chapel Hill, Chapel Hill, NC*

- Highest university-wide teaching honor for graduate students at UNC

**Outstanding Graduate Teaching Assistant Award (2×)** **May 2016, May 2020**  
*UNC-Chapel Hill, Dept. of Physics and Astronomy, Chapel Hill, NC*

**Hamilton Award for Summer Research Funding (2×)** **April 2019, Feb. 2020**  
*UNC-Chapel Hill, Dept. of Physics and Astronomy, Chapel Hill, NC*

**Best Graduate Paper Award** **Nov. 2019**  
*North Carolina Section of the American Association of Physics Teachers*

**“Distinction” for Senior Thesis Presentation** **June 2015**  
*Carleton College, Northfield, MN*

ADVISING AND  
MENTORING  
EXPERIENCE

**Research Students Mentored**

**2023 - Present**

*Davidson College, Davidson, NC*

- Honors Thesis Students
  - Juan Camilo Pérez Góngora, (physics, mathematics, '25)
- Summer Research Students
  - Jacquelline Nyakunu, (physics, pre-med, '26)
  - Griffin Whalen, (physics, '25)
  - Christopher Piatnichouk, (physics, pre-med, '26)
- Independent Research Students (During Academic Term)
  - Benjamin Gear, (chemistry, pre-med, '26)
  - Henry Russell, (physics, '26)
  - Niels van Duijnhoven, (physics, '25)
  - Chenlu Qin, (chemistry, mathematics, '23)

**Research Advisor for High School Students**

**2021**

*North Carolina School of Science and Mathematics, Durham, NC*

- Advised two high school students in cosmic muon and ultrasound research projects
- Coordinated oral presentations and activities for summer research program

**Graduate Teaching Assistant Mentor**

**2021 - 2022**

*The University of North Carolina at Chapel Hill, Chapel Hill, NC*

- Led the transition of *Experimental Techniques* course to a new instructor in preparation for my graduation
- Mentored successor graduate student in lecturing, grading, and administrative tasks

**Undergraduate Teaching Assistant Advisor**

**2020**

*The University of North Carolina at Chapel Hill, Chapel Hill, NC*

- Advised student as she assisted in development of a remote laboratory experiment for my *Experimental Techniques* course

PUBLICATIONS

*\*Indicates student co-author*

J. Nyakunu\*, C. T. Piatnichouk\*, H. C. Russell\*, N. J. van Duijnhoven\*, and B. E. Levy. "A Finite Element Analysis Model for Magnetomotive Ultrasound Elastometry Magnet Design with Experimental Validation." Under peer review. Preprint [arXiv:2408.07737](https://arxiv.org/abs/2408.07737) [physics.med-ph] (2024).

B. E. Levy, A. N. Kuchera, S. N. Cudo, and M. Belloni. "A Hands-On Activity for Introducing Gauss's Law." Accepted and awaiting publication at *The Physics Teacher* (2024).

B. E. Levy and A. L. Oldenburg. "Elastometry of Clot Phantoms via Magnetomotive Ultrasound Based Resonant Acoustic Spectroscopy." *Physics in Medicine and Biology*, 67, 155010 (2022).

B. E. Levy and A. L. Oldenburg. "Single Magnetic Particle Motion in Magnetomotive Ultrasound: An Analytical Model and Experimental Validation." *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, 68(8), 2635-2644 (2021).

D. Thapa, B. E. Levy, D. L. Marks, and A. L. Oldenburg. "Inversion of Displacement Fields to Quantify the Magnetic Particle Distribution in Homogeneous Elastic Media from Magnetomotive Ultrasound." *Physics in Medicine and Biology*, 64(12), 125019 (2019).

B. E. Levy, M. M. Hossain, J. M. Sierchio, D. Thapa, C. M. Gallippi, and A. L. Oldenburg. “[Effect of Model Thrombus Volume and Elastic Modulus on Magnetomotive Ultrasound Signal under Pulsatile Flow.](#)” *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, 65(8), 1380-1388 (2018).

M. M. Hossain, B. E. Levy, D. Thapa, A. L. Oldenburg, and C. M. Gallippi. “[Blind Source Separation Based Motion Detector for Imaging Super-Paramagnetic Iron Oxide \(SPIO\) Particles in Magnetomotive Ultrasound Imaging.](#)” *IEEE Transactions on Medical Imaging*, 37(10), 2356-2366 (2018).

PRESENTATIONS  
AND POSTERS **Invited**

- B. E. Levy. “Toward Measuring the Stiffness of Blood Clots Using Magnetomotive Ultrasound.” *University of South Carolina, Department of Physics and Astronomy Colloquium* (April, 2024).

**Contributed**

\*Indicates student co-author

- B. E. Levy and C. Piatnichouk\*. “Simulations of Resonating Blood Clots for a Classical Mechanics Course: Insights from the Classroom.” *North Carolina Section of the American Association of Physics Teachers, Spring Meeting* (2024).
- B. E. Levy, C. Qin\*, C. Piatnichouk\*, J. C. Pérez Góngora\*, and G. Whalen\*. “Finite Element Simulations of Resonating Blood Clots for a Classical Mechanics Course.” *American Association of Physics Teachers Summer Meeting* (2023).
- B. E. Levy, M. Sankaran\*, S. Brogan, R. V. F. Janssens, and D. L. Deardorff. “[Less is More: At-Home Interferometry in an Undergraduate Laboratory Course.](#)” *American Association of Physics Teachers Summer Meeting* (2021).
- J. Weinberg-Wolf, D. L. Deardorff, and B. E. Levy. “Meeting Laboratory Learning Objectives in a Remote Instruction Environment.” *American Physical Society April Meeting* (2021).
- B. E. Levy and A. L. Oldenburg. “Toward Contrast-Enhanced Imaging and Elastography of Thrombosis Models via Magnetomotive Ultrasound.” *UNC Blood Research Center Seminar Series* (2020).
- B. E. Levy. “Active Learning Approach for Teaching the Guide to the Expression of Uncertainty in Measurement (GUM).” *North Carolina Section of the American Association of Physics Teachers, Fall Meeting* (2019). *Received Best Graduate Paper Award.*
- B. E. Levy, D. Thapa, and A. L. Oldenburg. “Toward an Analytical Model of Magnetomotive Ultrasound (MMUS) Signal Generation.” *IEEE International Ultrasonics Symposium* (2019).
- B. E. Levy, M. M. Hossain, C. M. Gallippi, and A. L. Oldenburg. “Magnetomotive Ultrasound Imaging Under Pulsatile Flow using Super-Paramagnetic Iron Oxide as a Contrast Agent.” *Frontiers in Biomagnetic Particles* (2017).

**External Talks and Posters by Students Mentored**

\*Indicates student co-author

- H. Russell\*, N. van Duijnhoven\*, and B. E. Levy. “Finite Element Analysis for Magnetomotive Ultrasound Magnet Optimization.” *North Carolina Section of the American Association of Physics Teachers, Spring Meeting* (2024).
- C. Piatnichouk\*, B. Grear\*, and B. E. Levy. “Analytical and Experimental Validation of Finite Element Magnet Simulations for a New Medical Imaging Modality.” *North Carolina Section of the American Association of Physics Teachers, Spring Meet-*

ing (2024).

- G. Whalen\*, J. C. Pérez Góngora\*, C. Piatnichouk\*, C. Qin\*, and B. E. Levy. “Validation of Computational Blood Clot Elastometry Model Through Design and Testing of Magnetomotive Ultrasound Tissue-Mimicking Phantoms.” *American Physical Society March Meeting* (2024).
- J. C. Pérez Góngora\*, G. Whalen\*, C. Piatnichouk\*, C. Qin\*, and B. E. Levy. “Design and Validation of Computational Blood Clot Elastometry Model for Use with Magnetomotive Ultrasound.” *Southeastern Section of the APS Annual Meeting* (2023).
- C. Piatnichouk\*, C. Qin\*, J. C. Pérez Góngora\*, G. Whalen\*, and B. E. Levy. “Blood Clots in a Classical Mechanics Course: Simulating Driven, Damped Oscillators Using Finite Element Analysis.” *Southeastern Section of the APS Annual Meeting* (2023).

#### Internal Posters by Students Mentored

- J. Nyakunu. “Increasing Magnetomotive Ultrasound Force using Permanent Magnets: a Finite Element Analysis Study.” *Davidson College Fall Research Symposium* (2024)
- C. Piatnichouk and B. Gear. “Analytical and Experimental Validation of Finite Element Magnet Simulations for a New Medical Imaging Modality.” *Davidson College Verna Miller Case Research and Creative Works Symposium* (2024).
- H. Russell and N. van Duijnhoven. “Finite Element Analysis for Magnetomotive Ultrasound Magnet Optimization.” *Davidson College Verna Miller Case Research and Creative Works Symposium* (2024).
- G. Whalen. “Validation of Computational Blood Clot Elastometry Model Through Design and Testing of Magnetomotive Ultrasound Tissue-Mimicking Phantoms.” *Davidson College Fall Research Symposium* (2023).
- J. C. Pérez Góngora. “Design of Computational Blood Clot Elastometry Model Using Finite Element Analysis for Use With Magnetomotive Ultrasound.” *Davidson College Fall Research Symposium* (2023).
- C. Piatnichouk. “Blood Clots in a Classical Mechanics Course: Simulating Driven, Damped Oscillators Using Finite Element Analysis.” *Davidson College Fall Research Symposium* (2023).
- C. Qin. “COMSOL Multiphysics-Assisted Pedagogical Demonstrations of Resonance: Spring, Wineglass/Glass Sheet, and Model Blood Clot.” *Davidson College Verna Miller Case Research and Creative Works Symposium* (2023).

#### DEI-FOCUSED SEMINARS & CERTIFICATIONS

- **Safe Zone:** allyship training to support members of the LGBTQIA+ community
- **Haven:** allyship training to support those affected by sexual and interpersonal violence and/or stalking
- **Mental Health First Aider:** training for response strategies when someone is developing a mental health problem or experiencing a mental health crisis
- **Birds of a Feather:** dynamics of academic collaborations across identity differences
- **Confidence and Empowerment:** discussion of students’ classroom experiences that foster or hinder confidence
- **Creating and Sustaining Belonging:** teaching practices to build a classroom that welcomes all students
- **Dimensions of Diversity:** discussion of identities and intersectionalities that can be overlooked in common DEI discourse

SERVICE

**University Teaching Award Selection Committee Member** **2021 - 2022**

*The University of North Carolina at Chapel Hill, Chapel Hill, NC*

- Evaluated student and professor nominations for the *J. Carlyle Sitterson Award for Teaching First-Year Students*
- Conducted interviews with students to gain additional perspectives on nominees
- Collaborated with committee members in order to produce a short list of candidates

**Graduate Studies and Affairs Committee Member** **2017 - 2018**

*UNC-Chapel Hill, Dept. of Physics and Astronomy, Chapel Hill, NC*

- Worked to modernize the graduate curriculum including PhD requirements, core courses, and elective offerings
- Coordinated studies of graduate population and collected quality feedback in order to accurately represent graduate student interests and needs

**Graduate Student Pre-Candidacy Mentoring Team Leader** **2016 - 2017**

*UNC-Chapel Hill, Dept. of Physics and Astronomy, Chapel Hill, NC*

- Coordinated, and worked as part of a team of senior graduate students who provided mentoring sessions for first-year graduate students in the department
- Guided students through the process of passing the doctoral written exam by working through past problems, and sharing study strategies

**Prospective Graduate Student Visiting Days Coordinator** **2016 - 2017**

*UNC-Chapel Hill, Dept. of Physics and Astronomy, Chapel Hill, NC*

- Collaborated with two fellow graduate students and a faculty member to coordinate logistics, meetings, meals, and other activities for students admitted to the physics & astronomy department
- Worked directly with admitted students to ensure their visiting days schedule was appropriately tailored to their interests