

CONTACT
INFORMATION

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RESEARCH
INTERESTS

Nonlinear Models, Data Visualization Techniques, Physics Education Research and Curriculum Development, and Laser Spectroscopy.

EDUCATION

The University of Texas, Austin, Texas USA

Ph.D., Physics (2018)
Dissertation title: *Grouping and comparing Texas high schools through machine learning and visualization techniques*
<http://doi.org/10.15781/T2CR5NW6C>

Michigan Technological University, Houghton, Michigan USA

B.Sc., Physics (2011)
Minors: Astrophysics, Mathematical Sciences

RESEARCH
EXPERIENCE

The University of Central Florida, Orlando, Florida USA

Primary Investigator: Dr. Zhongzhou Chen —zhongzhou.Chen@ucf.edu *Summer 2018 - Present*
Investigating the relationship between student behavior in online mastery learning programs and course outcomes.

The University of Texas, Austin, Texas USA

Advisor: Dr. Michael Marder —marder@chaos.utexas.edu *Fall 2012 - Summer 2018*
I studied how the standardized test scores of Texas students change over time, using various methods of student disaggregation. Over the course of this study, I developed multiple methods of sorting students into groups, for the purposes of finding exemplary schools in Texas, informing policy, and improving future student scores.

Advisor: Dr. George Shubeita —shubeita@chaos.utexas.edu *Spring - Fall 2012*
Examining microrheology in *Drosophila* embryos through *in vivo* measurements of the viscosity of cytoplasm in the embryos.

Michigan Technological University, Houghton, Michigan USA

Advisor: Dr. Jacek Borysow —jborysow@mtu.edu *Fall 2010 - Spring 2011*
Measured the spread of emission lines resulting from the stimulated emission of cesium atoms in a strong, nonuniform magnetic field (Paschen-Back effect), in an effort to use cesium as an atomic absorption filter.

Advisor: Dr. Brian Fick —fick@mtu.edu *Summer 2010*
Analyzed CCD camera data from the Pierre Auger Cosmic Ray Observatory (Pampa Amarilla, Argentina) in an attempt to derive the approximate cloud cover percentage at a specific time.

TEACHING
EXPERIENCE

Assistant Instructor

Fall 2014 - Spring 2018

Supervisor: Dr. Kenneth W. Gentle —k.gentle@mail.utexas.edu

I was the assistant instructor for introductory mechanics for Physics major laboratory classes. I taught lab classes, oversaw the development of new lab procedures, lead weekly lab meetings, and mentored graduate TAs, many of whom had never taught before.

Instructor

Spring 2016

Supervisor: Joanna Collins —joanna.collins@austin.utexas.edu

I planned, wrote curriculum (in-class experiments, lectures, homework, quizzes, and exams), and taught an integrated lab and lecture course in introductory mechanics.

Teaching Assistant

Fall 2011 - Spring 2014

Supervisor: Dr. Kenneth W. Gentle —k.gentle@mail.utexas.edu

Teaching assistant for introductory mechanics for Physics major laboratory classes. During this time I rewrote the lab manual to make it more accessible to students.

Teaching Assistant

Summer 2012

Supervisor: Dr. Nathan Erickson —nathanwerickson@austin.utexas.edu

Teaching assistant for introductory electromagnetics for pre-med students.

Teaching Assistant

Fall 2008 - Spring 2011

Supervisors: Michael Meyer —mrmeyer@mtu.edu and Dr. Bryan Suits —suits@mtu.edu

Teaching assistant for both major and non-major Physics laboratory classes. Laboratories ranged from introductory mechanics to advanced majors electronics laboratory.

PROFESSIONAL
EXPERIENCE

Treasurer and Cofounder

Fall 2015 - Present

MiDataLabs, Lansing, Michigan USA (www.midatalabs.org)

MiDataLabs helps nonprofit organizations analyze data, synthesize knowledge, and visualize information. Our mission is to advance public data literacy, encourage civic engagement, and promote informed decision-making.

Coordinator

Spring 2014 - Spring 2018

University of Texas Physics Education Group (wikis.utexas.edu/display/physed)

Faculty Contact: Dr. Michael Marder —marder@chaos.utexas.edu

I coordinated The University of Texas Physics Education Group. These weekly meetings consisted of presentations by invited speakers and students, roundtable discussions, luncheon meetings, and debates between invited debaters.

Educational Content Development

Summer 2016 - Spring 2017

University Extension, Austin, Texas USA (www.extension.utexas.edu)

Staff Contact: Matthew Boyer —mpboyer@austin.utexas.edu

I designed an online two course physics sequence, covering introductory mechanics, electromagnetism, wave mechanics, relativity, atomic and nuclear physics, and cosmology. The content is conceptual in nature and incorporates simulations (mostly PhET) in lieu of in-class experiments.

Internship

Summers 2008, 2009

Twistthink, llc., Holland, Michigan USA (www.twistthink.com)

Among lab tech responsibilities (such as equipment and product testing, soldering, and research), I completed two larger Summer projects:

- 2008 - Developed a system for communication through ultrasonic waves and specialized it to the forklift industry.
- 2009 - Designed a programmable Radio Frequency communication board which controls lights using IEEE 802.15.4 (Zigbee) in a parking garage based on temperature, light intensity incident on the board, and time of day.

PRESENTATIONS

July 2018 - *Understanding Standardized Test Scores Using Machine Learning and Longitudinal Analysis* - Presentation for AAPT summer meeting in Washington, D.C. describing the relationship between high school demographic information and test score performance in Texas high schools.

April 2018 - *Grouping and comparing Texas high schools through machine learning and visualization techniques* - Ph.D. defense presentation for the Center for Nonlinear Dynamics.

October 2017 - *Designing an online course*, a discussion of my experiences in developing a two-course physics sequence for an online university. Presented to the UT Physics Education Group.

September 2017 - *The Great American Eclipse*, a discussion of the August 2017 solar eclipse, the educational opportunities it presented, and some of the exciting research which was possible due to the countrywide transit. Presented to the UT Physics Education Group.

July 2017 - *Improving Texas School Comparison Groups via Modern Clustering Techniques*, presentation at AAPT summer meeting in Cincinnati detailing an application of machine learning to Texas high school comparison groups.

April 2017 - *Texas Education Data: A Journey in Three Acts*, a discussion of three separate and oddly related investigations of data related to Texas education and schools. Presented to the UT Center for Nonlinear Dynamics

November 2016 - *Reflections on Education*, a discussion of local and national education. Presented to the UT Physics Education Group.

April 2016 - *Science Education Through the Eyes of a Physicist*, a guided discussion of the article by Ted Schultz. Presented to the UT Physics Education Group.

April 2016 - *Test Scores, Visualizations, and Networks*, an overview of my investigation into the strange world of standardized test score analysis. Presented to the UT Center for Nonlinear Dynamics.

February 2016 - *How Do Physics and Math Education Relate As Disciplines?*, presentation to the UT Physics Education Group about the separate evolution of math and physics education.

October 2015 - *Why Do We Even Teach Physics Labs?*, presentation to UT-Austin's Physics Education Group on a justification for physics teaching labs.

July 2015 - *Longitudinal Flow of Student Test Scores at the Campus Level*, presentation at AAPT summer meeting at the University of Maryland

March 2015 - *Campus-Level Flow of Student Test Scores*, presentation to UT Center for Nonlinear Dynamics

November 2013 - *A Microscope for Texas*, Ph.D. Qualifying Presentation

April 2011 - *An Atomic Absorption Filter for Non-Dispersive Raman Spectroscopy*, presentation of undergraduate research to Michigan Technological University's physics department

October 2010 - *An Undergraduate Experiment Examining the Zeeman Effect in Cesium* (independent research), presented at the Society of Physics Students meeting at Eastern Michigan University

OUTREACH

Participated in Family Physics Night at Texas Lutheran University Spring 2012, Fall 2013, Fall 2014, Fall 2015, and Fall 2016.

Instructed portions of the nanotechnology class of Michigan Technological University's Summer Youth Programs (2011) under the supervision of Dr. John Jaszczak (jaszczak@mtu.edu).

Helped organize and direct Family Physics Night from 2007 through 2011 in the Keewenaw Peninsula of Michigan. Physics undergraduates spend one night a semester showing demonstrations and teaching local primary school students about interesting topics in Physics.

Participated (from 2008 to 2011) in the Physics display of the Western Upper Peninsula Science Fair held at Michigan Technological University's Memorial Union Building every Spring. The usual age of children attending this is kindergarten - 9th grade.

HONORS AND CERTIFICATIONS

Inclusive Classrooms Leadership Certification - March 2018

Clock Award recipient from the UT Austin Department of Services for Students with Disabilities - May 2013

Elected *Vice President*, Society of Physics Students (Michigan Tech Chapter) 2008 through 2011. During this time, we were recognized multiple times by the national SPS community, winning the Blake Lilly prize and being selected as a Distinguished SPS Chapter.

Michigan Technological University - Dean's list

COMPUTER SKILLS

Languages and Software: Advanced proficiency in Python, MATLAB, Mathematica, L^AT_EX, Microsoft Office Suite, Adobe Creative Suite, and Audacity. Intermediate proficiency in Java, C, Tableau, MySQL, SPICE, SAS, PHP, and R.

Operating Systems: Microsoft Windows, Linux, Mac