

# Joshua D. Thomas

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## EDUCATION

- Ph. D. Physics**, University of Toledo August 2012  
Dissertation Title: “Spectroscopic Analysis and Modeling of the Red Rectangle”  
Advisors: Dr. Jon E. Bjorkman and Dr. Adolf N. Witt
- M. S. Physics**, University of Toledo December 2006  
Thesis Title: “Fluorescence Spectroscopy of Gas-phase Polycyclic Aromatic Hydrocarbons”  
Advisor: Dr. Adolf N. Witt
- B. S. Physics**, Concentration in Astrophysics, University of Toledo May 2004  
Magna Cum Laude, Departmental Honors, Outstanding Physics and Astronomy Student  
Thesis Title: “Gravitational Microlensing of Stars with Circumstellar Envelopes”  
Advisor: Dr. Jon E. Bjorkman

## POSITIONS HELD

- Alfred University, Alfred, NY, USA**  
Assistant Professor Aug. 2023 – Present  
Director of Stull Observatory Aug. 2023 – Present
- Clarkson University, Potsdam, NY, USA**  
Associate Professor July 2021 – June 2023  
Observatory Director Aug. 2013 – June 2023  
Courtesy Appointment, STEM Education Institute July 31, 2017 – June 2023  
Assistant Professor Aug. 2013 – June 2021  
Visiting Assistant Professor Aug. 2012 – May 2013
- Public Outreach Scientist**  
Adirondack Public Observatory, Tupper Lake, NY, USA May 23, 2017 – Jul. 29, 2017  
Adirondack Public Observatory, Tupper Lake, NY, USA May 28, 2014 – Aug. 8, 2014
- Teaching/Graduate Assistant**  
University of Toledo, Toledo, OH, USA Aug. 2004 – Aug. 2012

## RESEARCH INTERESTS

Observational Astronomy, Spectroscopy, Photometry, Numerical Simulation, Laboratory Astrophysics, Image Analysis

## PUBLICATIONS

The following publications are hyperlinked to the copies online. My name is in **red**, undergraduate names are in **blue**, and graduate students are in **green**. The DOI's are hyper-linked to the papers. My ORCID: 0000-0001-8145-7050

REFEREED  
PUBLICATIONS

1. “The orbital kinematics of  $\eta$  Carinae over three periastra with a possible detection of the elusive secondary’s motion”, Emily Strawn, Noel D Richardson, Anthony F J Moffat, Nour Ibrahim, Alexis Lane, Connor Pickett, André-Nicolas Chené, Michael F Corcoran, Augusto Damineli, Theodore R Gull, D John Hillier, Patrick Morris, Herbert Pablo, **Joshua D. Thomas**, Ian R Stevens, Mairan Teodoro, Gerd Weigelt, *Monthly Notices of the Royal Astronomical Society*, Volume 519, Issue 4, January 2023, <https://doi.org/10.1093/mnras/stad018>
2. “Humeral Bone Strength and Flight in Eumaniraptoran Dinosaurs”, Scott A. Lee, and **Joshua D. Thomas**, *The Electrochemical Society, ECS Transactions*, 104 (12) 3-18 (2021); DOI: <https://iopscience.iop.org/article/10.1149/10412.0003ecst>
3. “Recent Outbursts and Properties of HD 6226”, Noel D. Richardson, Olivier Thizy, Jon E. Bjorkman, Alex Carciofi, Amanda C. Rubio, **Joshua D. Thomas**, Karen S. Bjorkman, Jonathan Labadie-Bartz, Matheus Genaro, John P. Wisniewski, Luqian Wang, Douglas R. Gies, S. Drew Chojnowski, Andrea Daly, **Thompson Edwards**, **Carlie Fowler**, Allison D. Gullingsrud, Nolan Habel, David J. James, **Emily Kehoe**, Heidi Kuchta, Alexis Lane, Anatoly Miroshnichenko, Ashish Mishra, Herbert Pablo, Maurice Peploski, Joshua Pepper, Joseph E. Rodriguez, Robert J. Siverd, Keivan G. Stassun, Daniel J. Stevens, Jessica L. Trucks, James Windsor, **Mackenna Wood**, Étienne Bertrand, Jean-Jacques Broussat, Erik Bryssinck, Christian Buil, Stéphane Charbonnel, Arnold de Bruin, Joe Daglen, Valerie Desnoux, James Dull, Olivier Garde, Keith Graham, Kevin Gurney, Alun Halsey, Patrik Fosanelli, Joan Guarro Fló, Franck Houpert, Foster James, Christian Kreider, Robin Leadbeater, Tim Lester, Dong Li, Alain Maetz, Albert Stiewing, Peter Somogyi, Jean-Noël Terry, Stéphane Ubaud, and UlrichWaldschlaeger, *Monthly Notices of the Royal Astronomical Society*, Volume 508, Issue 2, December 2021, Pages 2002–2018; <https://doi.org/10.1093/mnras/stab2759>
4. “The orbit and stellar masses of the archetype colliding-wind binary WR 140”, **Joshua D. Thomas**, Noel D. Richardson, J. J. Eldridge, Gail H. Schaefer, John D. Monnier, Hugues Sana, Anthony F. J. Moffat, Peredur Williams, Michael F. Corcoran, Ian R. Stevens, Gerd Weigelt, Farrah D. Zainol, Narsireddy Anugu, Jean-Baptiste Le Bouquin, Theo ten Brummelaar, Fran Campos, **Andrew Couperus**, Claire L. Davies, Jacob Ennis, Thomas Eversberg, Oliver Garde, Tyler Gardner, Joan Guarro Fló, Stefan Kraus, Aaron Labdon, Cyprien Lanthermann, Robin Leadbeater, T. Lester, **Courtney Maki**, **Brendan McBride**, J. Ribeiro, Benjamin Setterholm, Berthold Stober, **Mackenna Wood**, Uwe Zurmöhl, *Monthly Notices of the Royal Astronomical Society*, Volume 504, Issue 4, July 2021, Pages 5221–5230; DOI: <https://doi.org/10.1093/mnras/stab1181>
5. “Cornhole Predict the Perfect Pitch: A Hands on Projectile Motion Experience Comparing Models and Data”, Michael Ramsdell, Ben Galluzzo, **Joshua Thomas**, Kathleen Kavanagh, **Corey Ryder**, Darlene Bissonette, Jen Knack, *Science Scope*, May/June 2021 (Volume 44, Issue 5); <https://www.nsta.org/science-scope/science-scope-mayjune-2021/cornhole-predicts-perfect-pitch>
6. “Conservation of Energy Yields the Incubation Time and Embryonic Metabolism in Birds and Tyrannosaur Dinosaurs from the Geometry of the Egg”, Scott A. Lee, **Joshua D. Thomas**, and Richard E. Irving, *The Physics Teacher* 59, 548 (2021); DOI: <https://doi.org/10.1119/5.0018956>
7. “The Mass of Hatchling Tyrannosaur and Sauropod Dinosaurs”, **Joshua D. Thomas**, Scott A. Lee, Max Cooley, and Richard E. Irving, *The Physics Teacher*, 58, 392, 2020; DOI: <https://doi.org/10.1119/10.0001834>
8. “Building a STEM Mentoring Program in an Economically Disadvantaged Rural Community”, Seema Rivera, Jennifer M. Knack, Kathleen Kavanagh, **Joshua Thomas**, Mary Margaret Small, Michael Ramsdell, *Journal of Educational Research and Practice*, Volume 9, Issue 1, Pages 413–422, 2019; DOI: [10.5590/JERAP.2019.09.1.29](https://doi.org/10.5590/JERAP.2019.09.1.29)
9. “Spectroscopy, MOST photometry, and interferometry of MWC 314: is it an LBV or an interacting binary?”, Richardson, Noel D.; Moffat, Anthony F. J.; Maltais-Tariant, Raphaël; Pablo,

Herbert; Gies, Douglas R.; Saio, Hideyuki; St-Louis, Nicole; Schaefer, Gail; Miroshnichenko, Anatoly S.; Farrington, Chris; Aldoretta, Emily J.; Artigau, Étienne; Boyajian, Tabettha S.; Gordon, Kathryn; Jones, Jeremy; Matson, Rachel; McAlister, Harold A.; O'Brien, David; Raghavan, Deepak; Ramiaramanantsoa, Tahina; Ridgway, Stephen T.; Scott, Nic; Sturmman, Judit; Sturmman, Laszlo; Brummelaar, Theo ten; **Thomas, Joshua D.**; Turner, Nils; Vargas, Norm; Zharikov, Sergey; Matthews, Jaymie; Cameron, Chris; Guenther, David; Kuschnig, Rainer; Rowe, Jason; Rucinski, Slavek; Sasselov, Dimitar; Weiss, Werner, *Monthly Notices of the Royal Astronomical Society*, Volume 455, Issue 1, p.244–257, November 2, 2015; DOI: [10.1093/mnras/stv2291](https://doi.org/10.1093/mnras/stv2291)

10. “Forelimbs of Tyrannosaurus rex: a pathetic vestigial organ or an integral part of a fearsome predator?”, Scott A. Lee and **Joshua D. Thomas**, *Phys. Teach.* 52, 521 (2014); AAPT DOI: <https://doi.org/10.1119/1.4902192>
11. “Geometry and velocity structure of HD 44179’s bipolar jet”, **Joshua D. Thomas**, Adolf N. Witt, Jason P. Aufdenberg, J. E. Bjorkman, Julie A. Dahlstrom, L. M. Hobbs and Donald G. York, *Monthly Notices of the Royal Astronomical Society*, Volume 430, Issue 2, p.1230-1237, 2013; DOI: <https://doi.org/10.1093/mnras/sts693>
12. “The nature of the Na I D-lines in the Red Rectangle”, color redJoshua D. Thomas, Adolf N. Witt, Jason P. Aufdenberg, J. E. Bjorkman, Julie A. Dahlstrom, S. R. Federman, L. M. Hobbs, Uma P. Vijh and Donald G. York, *Monthly Notices of the Royal Astronomical Society*, Volume 417, Issue 4, pp. 2860–2873, 2011; DOI: [10.1111/j.1365-2966.2011.19447.x](https://doi.org/10.1111/j.1365-2966.2011.19447.x)
13. “Performance enhancement study of an electrostatic Faraday cup detector”, **Thomas, J. D.**, Hodges, G. S., Seely, D. G., Moroz, N. A., & Kvale, T. J. *Nuclear Instruments and Methods in Physics Research A*, Volume 536, Issue 1-2, pp. 11–25, 2005; DOI: <https://doi.org/10.1016/j.nima.2004.07.211>

#### CONFERENCE PUBLICATIONS

1. “MWC 314: binary results from optical interferometry compared with spectroscopy and photometry”, Richardson, Noel D.; Moffat, Anthony F. J.; Maltais-Tariant, Raphael; Pablo, Herbert; Gies, Douglas R.; St-Louis, Nicole; Schaefer, Gail; Miroshnichenko, Anatoly S.; Farrington, Chris; Aldoretta, Emily J.; Artigau, Etienne; Boyajian, Tabettha; Gordon, Katie; Goldfinger, P. J.; Jones, Jeremy; Matson, Rachel; McAlister, Harold A.; O'Brien, David; Raghavan, Deepak; Ramiaramanantsoa, Tahina; Ridgway, Stephen T.; Scott, Nic; Sturmman, Judit; Sturmman, Laszlo; ten Brummelaar, Theo; **Thomas, Joshua D.**; Turner, Nils; Vargas, Norm; Zharikov, Sergey, *Proceedings of the SPIE*, Volume 9146, id. 91460G 12 pp. (2014) DOI: [10.1117/12.2055364](https://doi.org/10.1117/12.2055364)
2. “Production, Characterization, and Measurement of H(D) Beams on the ORNL Merged-Beams Experiment”, **Thomas, J. D.**, Kvale, T. J., Strasser, S. M. Z., Seely, D. G., & Havener, C. C. *American Institute of Physics Conference Series*, Volume 1099, pp. 154–158, 2009 DOI: [10.1063/1.3120002](https://doi.org/10.1063/1.3120002)
3. “Isotope Effects in Low Energy Ion-Atom Collisions”, Havener, C. C., Seely, D. G., **Thomas, J. D.**, & Kvale, T. J. *American Institute of Physics Conference Series*, Volume 1099, pp. 150–153, 2009 DOI: <https://doi.org/10.1063/1.3120001>
4. “Fluorescence Spectroscopy of Gas-phase Polycyclic Aromatic Hydrocarbons”, **Thomas, J. D.**, Witt A. N. *Proceedings of the NASA Laboratory Astrophysics Workshop 2006*, pp. 264–268, 2006 Bibcode: 2006nla.conf..264T

#### OTHER PUBLICATIONS

1. “Updated Orbit and Observations of Spectroscopic Binary HD 2019”, **Carlie Fowler**, **John Pluff III**, and **Joshua D. Thomas**, *Research Notes of the AAS*, Vol. 6, Number 10, pg. xx, October 13 2022 DOI: [10.3847/2515-5172/ac99e1](https://doi.org/10.3847/2515-5172/ac99e1)

2. “An Updated Ephemeris for the Single-lined Orbit of the Supergiant  $\mu$  Sagittarii”, Rachel A. Johnson, Noel D. Richardson, Anthony F. J. Moffat, **Joshua D. Thomas**, Terry Bohlsen, Paulo Cacella, Bernard Heathcote, Paul Luckas, Julian West, **Andrew Couperus**, Nicholas A. Dulaney, **Emily Fabian**, **Carlie Fowler**, Jennifer J. Greco<sup>1</sup>, Allison D. Gullingsrud, Nolan Habel, Kevin K. Hardegree-Ullman, Heidi Kuchta, Scott Legeza, **Courtney Maki**, **Brendan McBride**, Ashish Mishra, Wayne Oswald, **Maurice Peplowski**, Jessica Trucks, James Windsor, and **Mackenna Wood**, Research Notes of the AAS, Volume 2, Number 3, pg. 138, 2018, DOI: 10.3847/2515-5172/aad6ed
3. “A New Outburst in the Be star HD 6226 with upcoming HST observations”, Richardson, Noel D., Chojnowski, S. Drew, **Thomas, Joshua D.**, Wisniewski, John P., Bjorkman, Jon E., Bjorkman, Karen S., Trucks, Jessica, Habel, Nolan, Astronomer’s Telegram, No. 11367, Feb. 2018, Astronomer’s Telegram 11367
4. “Recollecting on the experience of Totality”, Joshua Thomas, Adirondack Stargazer, Adirondack Public Observatory, September 2017
5. Updated 8 test bank chapters, and wrote about 20 new questions per chapter, for an introductory astronomy text book. May 2015
6. Created 350-400 questions for the ORION adaptive learning system (Wiley PLUS on-line homework system) on electromagnetic waves, May 2014
7. “Winter Skies”, Joshua Thomas, Adirondack Stargazer, November 2013

RESEARCH  
EXPERIENCE

**Clarkson University, Potsdam, NY, USA**

- Spectroscopy of Binary Stars June 2016–June 2023
  - Spectroscopic monitoring and support observations for collaborators of Be stars, P Cygni Stars, and Wolfe-Rayet Stars.
  - One focus has been the star WR 140, which has a periastron passage in December 2016.
  - An out-bursting Be Star (HD 6226) has been monitored during Fall 2017 through Fall 2018.
- Photometry of Binary Stars June 2015–June 2023
  - The current focus is the 1-day binary LS4948, and WR 140.
  - Searching for Be Star candidates.
- Photometry of Nebulae June 2017 – June 2023
  - Survey of the night sky to search for and measure Extended Red Emission (ERE).
  - Find candidate stars to investigate connection between Diffuse Interstellar Bands and ERE.
- Red Rectangle 2012–June 2023
  - Studying the polarization of the Red Rectangle to look for periodic changes in polarization, with hopes of learning more about the return of material to the interstellar medium.
  - Determine the mass-loss rate in the outflow.

**University of Toledo, Toledo, OH, USA**

- Observational Spectroscopy and Radiative Transfer Simulation 2009–2012
  - Advisor: Dr. Adolf N. Witt and Dr. Jon E. Bjorkman
- Accelerator-based Atomic Physics 2007–2009
  - I collaborated with Dr. Charles C. Havener at Oak Ridge National Lab, Physics Division.
  - Advisor: Dr. Thomas J. Kvale
- Young Stellar Objects 2006–2007
  - Advisor: Dr. Thomas Megeath

- Laboratory Astrophysics 2004–2006
  - Advisor: Dr. Adolf N. Witt
- Scattered Light Simulation of Eta Carinae Summer 2004
  - Advisor: Dr. Jon E. Bjorkman
- Gravitational Microlensing, undergraduate thesis research 2003–2004
  - Funded by the Ohio Space Grant Junior and Senior Scholarships.
  - Advisor: Dr. Jon E. Bjorkman
- Accelerator-based Atomic Physics 2001-2004
  - Funded by the National Science Foundation Research Experience for Undergraduates.
  - Advisor: Dr. Thomas J. Kvale
- Member of the Ritter 1-meter observing team 2001–2004
  - Operated the 1-m telescope and échelle spectrograph in order to collect stellar spectra.
  - Logged approximately 30 solo observing nights.
  - Director of the Observatory: Dr. Nancy D. Morrison

**Triangle University Nuclear Laboratory, Duke University, Durham, NC, USA**

- Nuclear Physics Summer 2002
  - Modified a silicon strip detector and data acquisition system for use at the Duke Free Electron Laser Laboratory to study photodisintegration of Carbon nuclei.
  - Funded by the National Science Foundation Research Experience for Undergraduates.
  - Advisor: Dr. John Kelly

CODE PROJECTS

- Computer code designed for distribution.
- **PySplot**: A GUI tool for analysing and measuring spectra. Written to facilitate undergraduate research, and making quick plots, measurements, and comparisons of various optical spectra.
  - **Volume and Surface Area**: GUI designed to estimate the volume and surface area of a spheroid from a 2D-picture. Originally developed for the publication: “The Mass of Hatchling Tyrannosaur and Sauropod Dinosaurs”

EXTERNAL FUNDING

- NASA Space Grant: Faculty Fellowship**, Clarkson University Dec 2021
- Total Amount: **\$ 30,000**
  - Funding to study the extended red emission in nebulae, for support of JWST.
  - Funds for equipment upgrades, and summer research stipends for 2 undergraduate students.

**IMPETUS**, Clarkson University 1-July-2015–Nov 2021

- Total Grant Money to date: **\$ 1,597,500.00**
- Money Allocated to me to date: **\$ 107,032.50**
- 5% Co-PI for the Clarkson IMPETUS program, a New York state department of education funded k-12 STEM outreach program.
- Help plan and run monthly campus visits.
- Run activities for the summer roller coaster camp.
- Web-master and administrator for a custom instance of the learning management system, Moodle, which we use to coordinate with the 12 schools in our program.

INTERNAL  
FUNDING,  
CLARKSON**Observatory**

2015

- **\$25,000** matching grant from Provost Chuck Thorpe.
- Used to replace a failed mount.
- Replace 20-year old broken cameras.
- Purchase a spectrometer, and support equipment for student projects.

**Pre-frosh research program**

Summer 2020

- **\$2,000** to support student research.

**Reflection in Engineering**

2016

- PH131 and PH132 participated in study.
- **\$1,200**
- Purchased HD webcam, FLIR cam, and PASCO spectrometer for classroom use.

AWARDED  
OBSERVING TIME**GEMINI**, Clarkson University

Summer 2017

- PI on a GEMINI poor-weather proposal, along with collaborators at The University of Toledo.
- Infrared spectra of Be Stars, along with optical spectra support from Clarkson, and spectropolarimetry from Toledo.

## COLLOQUIA

1. “Small Observatories: Spectroscopy of Stars”, Clarkson University, Nov 15 2019
2. “The Structure of the Bipolar Jet in the Red Rectangle”, University of Montreal, March 14, 2013
3. “The Red Rectangle”, Clarkson University, David A. Walsh ‘67 College of Arts and Sciences Seminar Series, December 5, 2012
4. “Geometry and Velocity Structure of the Bipolar Jet in the Red Rectangle”, Clarkson University Physics Department, January 18, 2013

CONFERENCE  
PRESENTATIONS

1. “WR140 Update for next periastron passage”, Josh Thomas, ASNY, Siena College, Loudonville, NY, Nov. 18 2023
2. “The Colliding Winds of WR140 Revealed Through Collaboration with Amateur Astronomers”, Josh Thomas, ASNY 50th Anniversary Meeting, American Museum of Science, NYC, July 11 2018
3. “The Structure of the Bipolar Jet in the Red Rectangle”, Josh Thomas, NY Astronomical Society Meeting, RPI, Nov. 8 2014 (invited)
4. “The Red Rectangle: Recent Research on the Inner Workings of its Dust Engine”, Thomas, J. D., Witt, A. N., Aufdenberg, J. P., Bjorkman, J. E., Dahlstrom, J. A., Hobbs, L. M., Vijh, U. P., York, D. G., Wittfest, University of Toledo, Invited Session Speaker, 2010
5. “Determination of the Secondary Emission Coefficient  $\gamma$  in Electron Capture Cross Section Measurements in Low-Energy, Multiply-Charged Ion Atom Collisions”, Thomas, J. D., Kvale, T. J., Strasser, S. M. Z., Seely, D. G., & Havener, C. C. 2009, American Institute of Physics Conference Series, 1099, pp. 154, Conference on the Application of Accelerators in Research and Industry, Oral Presentation, 2008

6. “Fluorescence Spectroscopy of Gas-phase Polycyclic Aromatic Hydrocarbons”, Thomas, J. D. & Witt, A. N., NASA Laboratory Astrophysics Workshop, University of Nevada Las Vegas, Poster, 2006
7. “Fluorescence Spectroscopy of Gas-phase Polycyclic Aromatic Hydrocarbons”, Thomas, J. D. & Witt, A. N., Sigma Xi Research Symposium, University of Toledo Chapter, Oral Presentation, 2006
8. “Fluorescence Spectroscopy of Gas-phase Polycyclic Aromatic Hydrocarbons”, Thomas, J. D. & Witt, A. N., Sigma Xi Research Symposium, University of Toledo Chapter, Oral Presentation, 2005
9. “Gravitational Microlensing of Stars with Circumstellar Envelopes”, Thomas, J. D. & Bjorkman, J. E., Ohio Space Grant Consortium, Ohio Aerospace Institute, Cleveland, Ohio, Oral Presentation, 2004
10. “Gravitational Microlensing of Stars with Circumstellar Envelopes”, Thomas, J. D. & Bjorkman, J. E., Sigma Xi Research Symposium, University of Toledo Chapter, Oral Presentation, 2004
11. “Performance Enhancement Study of an Electrostatic Faraday Cup Detector”, Thomas, J. D. & Kvale, T. J., Sigma Xi Research Symposium, University of Toledo Chapter, Poster, 2004
12. “Gravitational Microlensing of Stars with Circumstellar Envelopes”, Thomas, J. D. & Bjorkman, J. E., Ohio Space Grant Consortium, Ohio Aerospace Institute, Cleveland, Ohio, Poster, 2003
13. “Design Improvements in Data Collection Faraday Cup Detector”, Thomas, J. D. & Kvale, T. J., Sigma Xi Research Symposium, University of Toledo Chapter, Oral Presentation, 2002

TEACHING  
EXPERIENCE

**Clarkson University, Potsdam, NY, USA**

- Instructor for Physics 157, Elementary Astronomy Aug. 2012–June 2023  
Spring Semesters 2015–June 2023
  - This course is aimed at non-physics majors.
  - I created this course and got it added to the course offerings at Clarkson.
  - The course has approximately 40 students each semester
- Instructor for Physics 230, Physics 3: Waves Fall Semesters 2018, 2020
  - This course is aimed at physics majors covering topics skipped over in Physics 1 and 2.
  - The course has approximately 10 students each time.
  - I incorporated python programming challenges into this course.
- Instructor for Physics 457, Introductory Astrophysics Spring 2012, Fall Semesters: 2015, 2017, 2019, 2021
  - I taught this elective astrophysics course for junior/senior level students in physics or closely related fields to from 10 - 20 students each offering.
  - The second, and third, time offering the course it was cross-listed at the 500 level and I had 3, and then 4, graduate students, respectively.
  - This course includes an observing project. For the Fall 2015 project, students made photometric observations, measured their data and compared with data in online databases. For Fall 2017 I have switched to a spectroscopic project in which I hope to get students to classify their star and compare temperatures derived from their spectra to a photometric classification of their star.
  - In 2019 the course project involved measuring the mass of Jupiter, and a photometric study of a star. Student’s collected and analysed real data.
- Instructor for Physics 131, Physics I Fall Semesters 2012–June 2023
  - I taught 1 of 3 sections of calculus based lecture.
  - Each semester had approximately 100 students in my lecture section.

- I managed the learning management system (Moodle) for all 3 lecture sections, as well as online homework system.

• Instructor for Physics 131, Team Design Lab Fall Semesters 2012–June 2023

- I taught 2 of 3 sections of an advanced laboratory that accompanies the Physics 131 course.
- For fall 2020 I wrote all new labs to be taught in-person/on-line.
- Each semester I had a total of approximately 50 students.
- I guided students through a simulated research experience.

• Instructor for Physics 132, Physics II Spring Semesters 2013–June 2023

- I taught 1 of 3 sections of calculus based lecture.
- Each semester had approximately 100 students in my lecture section.
- I managed the learning management system (Moodle) for all 3 lecture sections.

• Instructor for Physics 132, Team Design Lab Spring Semesters 2013–June 2023

- I taught 2 of 3 sections of an advanced laboratory that accompanies the Physics 132 course.
- Each semester I had a total of approximately 50 students.
- I guided students through a simulated research experience.

**University of Toledo, Toledo, OH, USA** 2006–2012

- Instructor for Astronomy 1010, Survey of Astronomy 2006, 2012
  - 1 section of lecture for non-science majors in 2012 (50 students).
  - 1 six-week summer section in 2006 (25 students).

• Instructor for Physics 2010, Technical Physics I Fall 2008

- I taught 1 section of an algebra-based class for engineering technology majors (60 students).

• Instructor for Physics 2130, Physics I Spring 2008

- I taught 1 section calculus-based physics (30 students).
- Designed in-class group problem solving activities.

TEACHING  
EXPERIENCE,  
TEACHING  
ASSISTANT

**University of Toledo, Toledo, OH, USA** 2004–2012

- Head Teaching Assistant Summer 2011, Summer 2012
- Laboratory Instructor for Astronomy 2050 2009–2011
- Recitation Instructor for Physics 2080 and 2140 2007–2011
- Laboratory Instructor for Physics 2010, 2020, 2070, 2080, 2130, and 2140 2004–2011

UNIVERSITY  
SERVICE

**Clarkson University, Potsdam, NY, USA** Fall 2013 – Present

- Advised student on degree requirements and course selection. About 7 per year.
- Attended convocation and commencement each year.
- Physics Club/Society of Physics Students/Sigma Pi Sigma Advisor
- Attended open house, and parent’s events each year.
- Chair of the Department Display and Poster Committee 2013-Present
- Member Curriculum Committee Fall 2019 – Present
- Kyle Connelly Ph. D., External committee member.  
Advisor: Dr. Kathleen Kavanagh July 2020 – Aug. 2021



- Matthew Southall, Ph. D. committee member.  
Advisor: Dr. Jan Scrimgeour Oct. 2021 – Aug. 2022.
- Physics Cafe, physics inspired social hour for undergraduate, graduate, and faculty.  
Co-founded with Dhara Trivedi Fall 2020, Fall 2021
- Built STEM Ed Institute QUESTS webpage Jan. 2021
- Took students to NY Astronomical Society Meetings:
  - SUNY Albany, Carlie Fowler presented. Mar. 16, 2019
  - Skidmore, Carlie Fowler, and Emily Kehoe presented. Oct. 5, 2019
  - Union Mackenna Wood, and Courtney Maki presented. Nov. 10, 2017
  - Sienna Andrew Couperus presented. Nov. 12, 2016
  - SUNY Oswego Peter Valliancourt presented. Nov. 8, 2014
- Took students to: Nobel Laureate at Global Foundries Malta, NY.,  
Ben Roulston, and Spencer Griswold April 14, 2016

GRADUATE  
PROJECTS  
ADVISED

- Clarkson University, Potsdam, NY, USA** 2021–Present
1. “Searching for Extended Red Emission in Nebulae, and searching for the carrier of the Diffuse Interstellar Bands”, Carlie Fowler June 2021 – June 2023

UNDERGRADUATE  
PROJECTS  
ADVISED

- Clarkson University, Potsdam, NY, USA** 2014–Present
1. “Arduino Dome Automation”, Anthony Caraballo. Spring 2022 – June 2023
  2. “Determining the Orbit of Binary Star System HD112014”, John Pluff III. Summer 2021 – June 2023
  3. “Python automated wavelength calibration LHIRES 3”, Mikaela Morris. May 2020 – June 2023
  4. “Spectroscopic Orbit of Binary Stars”, Emily Kehoe, Honors Thesis. Fall 2020 – Spring 2022
  5. “Spectra Normalization, software testing, and procedure writing”,  
Thompson Edwards. Sept 2019 – Spring 2021
  6. “Searching for Extended Red Emission in Nebulae”,  
Carlie Fowler, Honors Thesis. May 2018 – May 2021
  7. “Measuring asymmetric line profiles in Wolf-Rayet Stars”, Toni Panzera, Denver University Fall 2020 – Fall 2021
  8. “Slip ring power design for dome shutter motor”, Cono Sammarco. Spring 2020
  9. “All Sky Camera”, Taylor Ormansen (5 week project). June – Aug. 2019
  10. “Measure Jupiter mass for PH457 class project. Automated telescope focuser.  
Spectra normalization. Arduino weather station.”, Emily Kehoe. Spring 2019 – Summer 2020
  11. “Custom Horizon for Stellarium”, Meggan Barlow. May – July 2019
  12. “Arduino Automated Telescope Cover”, Maurice Peploski. May – June 2019
  13. “Python GUI interface for web-controlled power strip”, Connor Firth. Oct 2019 – Spring 2020
  14. “Python GUI for creating long-exposure images, for use with the “all sky camera””,  
Richard Potter. Oct. 2019 – Spring 2020

15. "RR Lyr light curves and distance measurement", James Wait. Sept. 2019 – Spring 2020
16. "Exploring the Use of a PASCO wireless spectrometer with a Telescope", Emily Fabian, Honors Thesis. Fall 2017 – Dec. 2018
17. "Producing Colored Images of Astronomical Objects", Taylor Murch. June – July 2018
18. "Arduino Based Automation for the LHIRES 3 spectrograph", Maurice Peploski. Spring 2018 – Summer 2018
19. "LHIRES 3 spectrograph wavelength calibration data collection 600 gr/mm grating", Emily Kehoe. Spring 2018
20. "LHIRES 3 spectrograph wavelength calibration data collection 1200 gr/mm grating", Cono Sammarco. Fall 2018 – Spring 2018
21. "Spectroscopic data analysis of Mu Sgr", Joseph Maier (1 semester). Fall 2017
22. "Don't be blinded by the Sun, PASCO Spectrometer for classroom projects". Fall 2017
23. "Spectroscopy of Be Stars", Courtney Maki. Summer 2017 – Spring 2018
24. "Making Lemonade out of LEMON, Adapting an Automated Photometry Program", Mackenna Wood, Honors Thesis. Spring 2016 – Spring 2018
25. "LS4948: A Study of Variable Stars", Carlie Fowler (5 week project). Summer 2017
26. "Photometric Search for Be Star Candidates in M16, and Dome Automation", Brendan McBride (10 week project). Summer 2017
27. "Spectroscopic monitoring of WR 140 and other binary stars", Andrew Couperus. Fall 2016 – Fall 2017
28. "Installing and testing the LHIRES III spectrograph, and telescope mount at Reynolds Observatory", Andrew Couperus and Courtney Maki. Summer 2016
29. "Arduino-based GPS for computer time synchronization", Jacob Hohl (1 semester project). Spring 2016
30. "Arduino-based Received Signal Strength Intensity distance Measurement", Jonathan Brassard (10 week project). Summer 2016
31. "Spectroscopic measurements of the binary star R81", Benjamin Roulson, Honors Thesis . Summer 2015 – Spring 2016
32. "Photometric measurements of the 1-day binary LS4948", Shoshana Chipman (5 week project). Summer 2015
33. "Photometric measurements of MWC 953", Emily Fabian (10 week project). Summer 2015
34. "Hartmann mask for Reynolds Observatory", Jonathan Brassard (5 week project). Summer 2014
35. "Flat field box for a CCD camera", Benjamin Roulston (10 week project). Summer 2014
36. "Modelling the velocity distribution of a galaxy cluster", Peter Valliancourt. 2014 – 2015
37. "Dome automation, and asteroid hunting", Mike Gough (1 semester project). Spring 2013

TEACHING  
DEVELOPMENT

- Reframing Infrastructure for Success Everywhere (RISE), A Quality Matters based course design workshop. June 2020
- 22<sup>nd</sup> Annual Teaching Effectiveness Conference, SUNY Canton Nov. 2, 2013.
- Course Design Workshop, Dominic Voge, Princeton’s McGraw Center for Teaching and Learning. Clarkson University April 13, 2013
- 21<sup>st</sup> Annual Teaching Effectiveness Conference, Clarkson University Nov. 3, 2012.

LEADERSHIP

- Adirondack Sky Center and Observatory June 2019 – Present
  - Board Member
  - Building and Education Committees
  
- Astronomical Society of New York** 2015–Present
  - Chair, Paper Prize Committee** Astronomical Society of New York 2020–Present
  - Paper Prize Committee** Astronomical Society of New York 2017–Present
  - Alfred Institutional Representative** Astronomical Society of New York 2023–present
  - Clarkson Institutional Representative** Astronomical Society of New York 2015–2023
  
- Society of Physics Students**, University of Toledo 2001–2006
  - President**, our chapter was awarded an outstanding chapter award. 2003–2004
  - Outreach Coordinator**, organized outreach activities. 2001–2003
  - Web-master**, designed and managed a new web page. 2001–2006
  - Organized a meeting of students and faculty to discuss the curriculum. This led to the creation of the course “Mathematical Methods in Physics” first offered spring of 2003, which has become a requirement for the B.S. in Physics. Fall 2002
  - As president I organized the SPS Zone-7 meeting, which was attended by undergraduate students from Michigan and Ohio. 2004

TECHNICAL SKILLS

- Operating systems:**  
Usage and administration: Linux/Unix, Mac, Windows, and OpenVMS.
- Mark-up languages and Web design:**  
L<sup>A</sup>T<sub>E</sub>X, HTML, CSS, Wordpress.
- Programming languages:**  
Proficient in: Python, FORTRAN, bash scripts. Familiar with IDL, MatLab, and LabView.
- General Software:**  
Microsoft Office, Google Office, Google Forms, Open/Libre Office, Gnumeric spreadsheet, and Origin.
- Graphics Software:**  
GIMP, ImageMagick, Inkscape, Blender, and FreeCAD.
- Astronomy Software:**  
IRAF, PyRAF, astropy, SAOImage DS9, MaximDL, Stellarium, TheSkyX, ASCOM, PHD Guiding, and AstroimageJ
- Education:**  
Moodle, Pearson Mastering, Zoom, Echo360, PASCO Capstone, IOLab, WileyPLUS, Turning Technologies Response, TopHat, Blackboard, Wacom.
- Video Analysis:**  
Tracker video analysis, and Video Physics by Vernier.

**3D Printing:**

Some basic experience with Makerbot, and 3D stl file generation.

PROFESSIONAL MEMBERSHIPS	American Astronomical Society	2019–Present
	American Association of Physics Teachers	2013–Present
	Society of Physics Students	2001–2012
	Sigma Pi Sigma, Physics Honor Society	Inducted 2004
	Sigma Xi	2004–2009
HONORS AND AWARDS	<b>University of Toledo, Toledo, OH, USA</b>	2000–2011
	Astronomy Bag Lunch Seminar, Best graduate student presentation.	Fall 2011
	Ed Foster Graduate Scholarship.	2011
	Sigma Xi Research Symposium, First Place in Poster Division.	2004
	Sigma Xi Research Symposium, Honorable Mention in Oral Presentation.	2004
	Ohio Space Grant Consortium, Senior Space Grant.	2003–2004
	Ohio Space Grant Consortium, Junior Space Grant.	2002–2003
C.V. Wolfe Scholarship in the Natural Sciences.	2001–2002	
PUBLIC OUTREACH	<b>Peakskill Highschool</b>	
	• Presentation for Peakskill Meteorite 30th anniversary.	Sept. 15 2022 – June 2023
	• Inaugural speaker for invited talk series.	TBD
	• Virtual Presentation “Spectroscopy of Stars”	Jan. 29 2021
	<b>Thousand Islands Land Trust (TILT)</b>	2019 – 2021
	• Stars and S’mores	
	• Lunar observing with telescope, pointing out constellations, and a hike!	
	• February 20, 2019; February 15, 2020	
	<b>Adirondack Sky Center and Observatory</b> Tupper Lake, NY, USA	2014 – Present
	• Invited Public Presentations	2012–2022
• “Stars from Birth to Death”, Cygnus Series Virtual Lecture	Aug. 2 2021	
• “Blue Sunsets and Other Scattered Lights”, Cygnus Series Virtual Lecture	Oct. 2 2020	
• “Spectroscopy of Stars: Riddle in the Rainbow”, Cygnus Series Virtual Lecture	Aug. 14 2020	
• “The Great American Solar Eclipse” and Solar Observing, Indian Lake Library	July 18 2017	
• “Searching for the Unseen, The Hunt for Exoplanets”, The Wild Center, Tupper Lake NY	July 7, 2017	
• “Dawn, Rosetta and Philae”, The Wild Center, Tupper Lake NY	June 24, 2015	
• “The Comets Are Coming, The Comets Are Coming”, The Wild Center, Tupper Lake NY	December 28, 2012	
• Outreach Scientist	May 23, 2017 – Jul. 29, 2017	
• Taught 8 basic astronomy classes to children each week was a different topic.		
• Created and Presented a pre-observing Presentation.		
• Gave twice weekly Presentations on the Science on a Sphere to the general public at the Wild Center in Tupper Lake.		
• Operated a telescope for public observing at the observatory every Friday.		
• Created advertising content, Presentations, and provided IT tech support.		
• Outreach Scientist	May 28, 2014 – Aug. 8, 2014	
• Gave twice weekly presentations on the Science on a Sphere to the general public at the Wild Center in Tupper Lake.		

- Operated a telescope for public observing at the observatory every Friday.
- Created part of the program of activities for the local celebration of “International Sun-day” held on the summer Solstice.
- Created advertising content, Presentations, and provided IT tech support.

**Morristown Library** Morristown NY

- Scale Models and the Solar system July 18, 2019
  - Presented to about 30 4-5 grade students from Morristown elementary.
  - Students learned about scale models, and took a brief tour of the solar system before making their own pocket solar system.

**Malone High School**, at SUNY Potsdam

2013 – 2019

- Astronomy Night
  - Present to about 30 high school students and parents.
  - Operated the SPITZ analog planetarium located at the State University of NY Potsdam, and introduced the students to a vast variety of topics in astronomy.
  - Weather permitting star gazing with the telescopes at Clarkson’s Reynolds Observatory.
  - Oct. 10, 2013; Oct. 10, 2014; Oct. 7, 2015; Oct. 20, 2016; Oct. 19, 2017; Oct. 18, 2018; Oct. 24, 2019

**Great Camp Sagamore**, Raquette Lake, NY, USA

2015 – 2017

- Presentation to general audience and star gazing.
  - “Spectroscopy, Taste The Rainbow” September 23, 2017
  - “The Skies of Fall” September 22, 2017
  - “Spectroscopy, Taste The Rainbow” September 24, 2016
  - “What’s up? The night sky” September 23, 2016
- Presentation and stargazing for NY State Master Teachers workshop
  - “Stargazing and Telescopes” June 29, 2016
- Staff Training Workshop
  - Instructed the staff on how to use a Dobsonian mounted telescope. June 25, 2015

**SOAR Life Long Learning**, Potsdam, NY, USA

May 2, 2016

- A demonstration-filled lecture to senior citizens on starlight.
- Spectroscopy, and how light interacts with material. The astrophysics of astronomical images were related back to the blue sky and sunset.

**Massena Nature Center**, Massena NY, USA

Feb. 2, 2017

- Presented on the night sky, constellations, and the scale of the Earth-Moon system.

**Madison Elementary School**, Massena NY, USA

Oct. 15, 2014 and Apr. 20, 2016

- Astronomy Night, presented to about 150 6th graders, in 3 groups.
- At the 2016 event: I talked about the phases of the moon, with a demonstration. I also demonstrated an infra-red camera and tied that in with current space missions!
- At the 2014 event: I shared some personal experiences and talked about exploding stars!

**Museum With Out Walls**

North Country Children’s Museum, Potsdam, NY, USA

2014 – 2016

- December 10, 2016: Astronomy Workshop, The solar system and constellations
- November 21, 2015: Astronomy Workshop, The solar system and constellations
- October 2, 2015: Scrap Heap Challenge–Rube Goldberg Machine
- September 29, 2014: Scrap Heap Challenge–Rube Goldberg Machine

**Clarkson University, Potsdam, NY, USA**

- Science Cafe 2013
  - Two public lectures on astronomy “Starlight: Revealing the Universe”, part of the “Science Cafe” series in Canton & Potsdam NY, February 26 & 27, 2013 (About 40 people attended the talk on the 26th, and about 30 people attended the talk on the 27th.)
- Science Olympiad 2013 – 2016
  - I administered and judged the astronomy portion of the competition for high school students.
  - Feb. 2 2013, Feb. 1 2014, Jan. 31 2015, Feb. 4 2016
- North Country Science and Engineering Festival Oct. 10 2012
  - I volunteered during a public outreach event held on campus for 5<sup>th</sup> – 12<sup>th</sup> grade, sponsored by IMPETUS a NY state STEM program for minorities and economically disadvantaged students.
  - I assisted the Physics Club with a demonstration of non-Newtonian fluids.
- Astronomy Night Fall 2012
  - I assisted the undergraduate Physics Club with a star party held on campus with several telescopes on Cheel lawn.
- Public Observing at Reynolds Observatory Fall 2012 – Present
  - Solar observing for 5<sup>th</sup> and 6<sup>th</sup> graders (about 15 students) on August 15, 2013.
  - Public Observing on October 11, 2013 for approximately 10 local residents.
  - Between 2013 and 2016 the observatory equipment was being repaired, replaced, and upgraded.
  - Observing for community members July 25, 2016.
  - Occasional observing for honors program.
  - Annual visit by Malone High School 2013–2019
  - Summer open house, July 22, 2022 (about 20 people attended)

**University of Toledo, Toledo, OH, USA**

- Venus Transit June 5, 2012
  - I volunteered during a public outreach event held on campus, pointing out sunspots, Venus, and solar flares.
  - I operated an 8-inch reflector with a projection screen, training a student to track the Sun.
  - I set up and operated a small solar telescope with an H $\alpha$ -filter.

**Society of Physics Students, U. Toledo**

- National Rube Goldberg Machine Competition 2002–2008  
2005, 2006
  - I participated in the construction of two Rube Goldberg machines. I participated in the local competition against engineers, winning both years. The machines went on to win honorable mention in 2005 and second place on 2006 at the National Rube Goldberg Competition.
  - I took part in a public outreach event, which included a segment on the local news to promote science and engineering at the University of Toledo, as well as having the second machine exhibited at the Imagination Station (formerly COSI Toledo).
- Elementary School Star Parties 2004–2005
  - I operated a small telescope and pointed out constellations to middle school children.
  - At Lail Elementary and St. Pius X Academy, Toledo OH, USA.
- Ritter Planetarium 2003–2008
  - On several occasions I gave public tours of the 1-meter telescope facilities.
  - I operated the 1-m telescope for public observing.
  - I assisted in updating several of the planetarium’s display cases.
- Toledo Astronomical Association Boy Scout Star Parties 2003–2005

- I operated an 8-inch telescope and pointed out the constellations for night sky viewing by the boy scouts and their families.
- The event was held at the Pioneer Scout Reservation in north west Ohio.
- Various Physics Demonstrations 2002–2006
  - Defiance College Science Fair (first two years).
  - Northwest Ohio Science Fair, held at the University of Toledo.
  - COSI Toledo, Science Museum in Toledo.

## REFERENCES

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