Jess William Vriesema

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EDUCATION

2020	**Ph.D.**	**Planetary Science**, University of Arizona (Tucson, AZ)
		Dissertation Advisors: Drs. Roger Yelle and Tommi Koskinen
		Dissertation Title: "Modeling Electrodynamics in Saturn's Upper Atmosphere"
2015	**M.Sc.**	**Planetary Science**, University of Arizona (Tucson, AZ)
2011	**M.Sc.**	**Physics**, University of Arizona (Tucson, AZ)
2009	**B.Sc.**	**Physics**, Calvin College (Grand Rapids, MI)
		Minor: Computer Science

EMPLOYMENT

2020–*present*   **Associate Lecturer**, Department of Physics + Astronomy, University of Wisconsin–Eau Claire, Eau Claire, WI, USA

2020   **Associate Lecturer**, Department of Computer Science, University of Wisconsin–Eau Claire, Eau Claire, WI, USA

2019   **Associate Lecturer**, Department of Mathematics, University of Wisconsin–Eau Claire, Eau Claire, WI, USA

PUBLICATIONS

Vriesema, J. W., Koskinen, T. T. and Yelle, R. (2019). Electrodynamics in Saturn's Thermosphere at Low and Middle Latitudes. *Icarus*. DOI: 10.1016/j.icarus.2019.113390.

Dykhuis, M. J., Molnar, L. A., Gates, C. J., Gonzales, J. A., Huffman, J. J., Maat, A. R., Maat, S. L., Marks, M. I., Massey-Plantinga, A. R., McReynolds, N. D., Schut, J. A., Stoep, J. P. Stutzman, A. J., Thomas, B. C., Vander Tuig, G. W., **Vriesema, J. W.** and Greenberg, R. (2015). Efficient spin sense determination of Flora-region asteroids via the epoch method. *Icarus*, 267, 174–203. DOI: 10.1016/j.icarus.2015.12.021.

Molnar, L. and **Vriesema, J.** (2006). *Minor Planet Observations*, *Minor Planet Circulars*, 56166, 1.

INVITED TALKS

2021 "The Role of Electrodynamics in Saturn's Upper Atmosphere", *UWEC Earth Science Seminar Series.* University of Wisconsin–Eau Claire, Eau Claire, Wisconsin. 12 March 2021.

2020 "What Electrodynamics Can Tell Us About Saturn's Upper Atmosphere", *Calvin Physics Seminar.* Calvin University, Grand Rapids, Michigan. *Given remotely.* 10 November 2020.

2020 "What Electrodynamics Can Tell Us About Saturn's Upper Atmosphere", *Ask a Scientist.* University of Wisconsin–Eau Claire, Eau Claire, Wisconsin. 12 March 2020. *Presentation cancelled 2 hrs prior due to COVID-19 emergency.*

2018 "Resistive Heating in Saturn's Upper Atmosphere...and the Difficulties in Calculating It". *SIAM Interdisciplinary Student Seminar.* University of Arizona, Tucson, Arizona. 13 April 2018.

HONORS, AWARDS AND FELLOWSHIPS

Total Awards: $151,150 USD

2016–2019	$120,000	NASA Earth and Space Science Fellowship
2011	$750	William Bickel Award for Enthusiasm in Laboratory and Pedagogy
2008	—	Winner of the 2008 Lower Michigan Mathematics Contest (with two teammates)
2006–2009	$10,500	Calvin Faculty Honors Scholarship
2006–2007	$1500	Michigan Merit Award
2005–2009	$10,000	Howard Hughes Medical Institute Scholarship
2005	$3900	Michigan Competitive Scholarship
2005–2006	$4500	Calvin Dean's Scholarship

TEACHING EXPERIENCE

Associate Lecturer, Department of Physics + Astronomy, University of Wisconsin–Eau Claire

General Physics I — Fall 2020–Fall 2021
Survey of Astronomy — Spring 2021

Duties: Prepared and delivered lectures 3–4x/week for 45–55 students, held office hours; developed original assignments, quizzes, in-class activities, demonstrations, lectures and exams; proctored and graded exams; managed online course content on Canvas. Instructor of record.

General Physics I Lab — Fall 2020–Fall 2021
General Physics II Lab — Spring 2021

Duties: Prepared and delivered lectures 1x/week for 7–9 students per section (6–8 sections per semester), held office hours; oversaw lab sessions; graded; managed online course content on Canvas. Instructor of record.

Associate Lecturer, Department of Computer Science, University of Wisconsin–Eau Claire

Introduction to C++ — Spring 2020
Computer Systems — Spring 2020

Duties: Prepared and delivered lectures 4–5x/week for 30–50 students, held office hours; developed assignments, labs, quizzes, in-class activities, lectures and exams; proctored and graded exams; managed online course content on Canvas. Instructor of record.

Associate Lecturer, Department of Mathematics, University of Wisconsin–Eau Claire

Elementary Statistics — Fall 2019

Duties: Prepared and delivered lectures 4x/week for two sections of 40 and 50 students (respectively), held office hours; developed assignments, lectures and quizzes, in-class activities and exams; proctored and graded exams; managed online course content on Canvas. Instructor of record.

Lecturing Teaching Assistant, Department of Physics, University of Arizona

Introductory Physics I — Spring 2010, Fall 2010, Fall 2011

Duties: Prepared and delivered lectures 3x/week for up to 150 students, held office hours, proctored and graded exams.

Teaching Assistant/Associate, LPL, University of Arizona

Planet Earth: Evolution of the Habitable World — Spring 2014, Spring 2017
Our Golden Age of Planetary Exploration — Spring 2016, Fall 2016
The Universe and Humanity: Origin and Destiny — Fall 2014, Spring 2015, Fall 2015

Duties: (Varied by instructor) Held office hours, graded homework and exams, organized teams of undergraduate preceptors, monitored online discussion forums, designed and maintained online course content on D2L (e.g. monitoring online discussion sections, uploading lectures and other content, creating/managing quizzes and gradebooks). Some courses involved running a Full Dome digital projection presentation in our planetarium.

Laboratory Teaching Assistant, Department of Physics, University of Arizona

Introductory Laboratory I — Summer 2010, Summer 2011
Introductory Laboratory II — Spring 2011
Introductory Mechanics — Fall 2009

Duties: (Varied by course) Prepared and taught lab sections, held office hours, monitored online course content via D2L (e.g. gradebooks) and graded homework, lab reports and exams.

RESEARCH EXPERIENCE

2014–2021   **Research Associate**, LPL, University of Arizona
Advisors: Drs. Roger Yelle and Tommi Koskinen
Description: Developed, ran, analyzed magnetohydrodynamic models of Saturn's thermosphere using MATLAB and Fortran 77/90, in part using the Saturn Thermosphere Ionosphere Model, a general circulation model of Saturn's upper atmosphere.

2011–2014   **Research Assistant**, LPL, University of Arizona
Advisor: Dr. Tami Rogers
Description: Developed, ran and visualized highly parallel 2D and 3D magnetohydrodynamic simulations of the solar interior using Fortran 77/90/95 on a NASA supercomputer. Analysis and some visualization performed on workstations using Fortran 77/90/95, MATLAB, gnuplot and VAPOR.

2013   **NASA Intern**, NASA's Goddard Space Flight Center
Advisor: Dr. Thomas Clune
Description: Assisted Drs. Thomas Clune and Weiyuan Jiang in developing a highly scalable, spectral framework in portable (ifort, nagfor, gfortran) Fortran 95/2003 for pseudospectral dynamo simulations at petascale on a NASA supercomputer.

2009, 2011   **Research Assistant**, Department of Physics, University of Arizona
Advisor: Dr. Doug Toussaint
Description: Developed serial and highly parallelized code for GPU analysis of lattice quantum chromodynamics calculations using C and CUDA.

2008   **Research Assistant**, Department of Computer Science, Calvin College
Advisors: Drs. Joel Adams and Keith Vander Linden
Description: Developed an extensible, object-oriented virtual reality engine and interface in C, C++ and Java for use in introductory computer science classes, developed demo applications, and gave tours for public outreach and potential students.

2006–2007   **Research Assistant**, Department of Physics and Astronomy, Calvin College
Advisor: Dr. Paul Harper
Description: Developed ultra coarse-grained, object-oriented simulations of lipid bilayer phase transitions in Java and C++. Explored parameter space using embarrassingly parallel simulations.

ADDITIONAL WORK EXPERIENCE

2012–2014   **Private Tutor** [self-employed]
Tutored undergraduate students in physics and calculus courses.

2007–2008   **Computer Lab Monitor**, Department of Computer Science, Calvin College
Helped computer science students in a computer lab with their homework for intro/intermediate computer science courses (primarily Java, C/C++).

2006–2009   **Physics Lab Assistant**, Department of Physics and Astronomy, Calvin College
Aided the instructor before and during lab sections, graded lab reports.

2005–2007   **Observatory Assistant**, Department of Physics and Astronomy, Calvin College
Opened/closed the on-campus telescopes, gave tours and did astrophotography. Also opened/monitored/closed a remote, robotic, optical telescope, programmed it to collect images in the evening and downloaded the data the next morning.

2005–2006   **Physics Grader**, Department of Physics and Astronomy, Calvin College
Graded physics homework sets.

SELECTED PRESENTATIONS

2021   **Vriesema, J. W.**, Koskinen, T., Yelle, R. and Müller-Wodarg, I. "Modelling Electrodynamics in Saturn's Upper Atmosphere", *Royal Astronomical Society Discussion Meeting: Comparative equatorial Thermosphere-Ionosphere-Magnetosphere Coupling*, online. Poster.

2019   **Vriesema, J. W.**, Koskinen, T. T., Yelle, R.V. and Müller-Wodarg, I. "Results from an Improved Model of Electrodynamics in Saturn's Upper Atmosphere", *EPSC-DPS Joint Meeting 2019*, Geneva, Switzerland. Oral presentation.

2018   **Vriesema, J. W.**, Koskinen, T. T. and Yelle, R. "Electrodynamics in Saturn's Thermosphere at Low Latitudes", *2018 Magnetospheres of Outer Planets Conference*, Boulder, Colorado. Oral presentation.

2018   **Vriesema, J. W.**, Koskinen, T. T. and Yelle, R.. "Electrodynamics in Saturn's Thermosphere", *Cassini Science Symposium 2018*, Boulder, Colorado. Poster.

2017   **Vriesema, J. W.**, Koskinen, T. T. and Yelle, R. "Resistive Heating and Ion Drag in Saturn's Thermosphere", *49th DPS Meeting*, Provo, Utah. Poster.

2017   **Vriesema, J. W.**, Koskinen, T. T. and Yelle, R. "Resistive Heating in Saturn's Thermosphere", *Lunar and Planetary Laboratory Conference*, Tucson, Arizona. Oral presentation.

2016   **Vriesema, J. W.**, Koskinen, T. and Yelle, R. "Resistive Heating in Saturn's Thermosphere", *48th DPS Meeting*, Pasadena, California. Poster.

2015   **Vriesema, J. W.** "Resistive Heating in Saturn's Ionosphere", *Lunar and Planetary Laboratory Conference 2015*, Tucson, Arizona. Oral presentation.

2014   **Vriesema, J. W.** and Rogers, T. "NASA@SC14: Simulating the Interior Rotation and Dynamics of Stars", *Supercomputing 2014*, New Orleans, Louisiana. Oral and poster presentations.

2014   **Vriesema, J. W.**. "Analysis of Solar Simulation Data Using Spectral Coherence", *Lunar and Planetary Laboratory Conference 2014*, Tucson, Arizona. Oral presentation.

2013   Jiang, W., Clune, T., **Vriesema, J.** and Gutmann, G. "*SpF*: Enabling Petascale Performance for Pseudospectral Dynamo Models", *AGU Fall Meeting 2013*, San Francisco, California. Poster.

2013   **Vriesema, J.**, Clune, T., and Gutmann, G. "Spectral Framework (SpF): A Scalable and Extensible Framework for Dynamo Simulation", *NASA Summer 2013 Intern Poster Session,* Greenbelt, Maryland. Poster.

2008   **Vriesema, J. W.**, Adams, J. and Vander Linden, K. "Exploring Virtual Reality and 3D Visualization", *Calvin College 2008 Science Division Summer Research Poster Fair*, Grand Rapids, Michigan. Poster.

2007   **Vriesema, J. W.**, Harper, P. "Ultra Coarse-Grained Computer Simulation of Lipid Bilayer Fusion in C++: Working Under Constant Pressure", *Calvin College 2007 Science Division Summer Research Poster Fair*, Grand Rapids, Michigan. Poster.

2006   **Vriesema, J. W.**, Harper, P. and VanderHill, J. "Towards Computer Simulation of Hydrated Lipid Bilayer Fusion", *Calvin College 2006 Science Division Summer Research Poster Fair*, Grand Rapids, Michigan. Poster.

PROFESSIONAL ACTIVITIES AND SERVICE

2016–2020   Member of the LPL Men's Auxiliary Group (male allies against sexism)

2015–2020   Technical Consultant for the LPL Grads (website development and LaTeX support)

2017   Organizing committee member for the *2017 Lunar and Planetary Laboratory Conference* in Tucson, AZ

2007–2009   Co-leader of the Society of Physics Students (an unofficial Calvin College chapter)

MEDIA COVERAGE

2018   "Ringed Dynamo", Episode 493 of the *Travelers in the Night* podcast by Dr. Al Brauer. Available at https://sites.google.com/site/travelersinthenight/programs-481-510#TOC-493-Ringed-Dynamo.

2014   "Simulating the Interior Rotation and Dynamics of Stars and Giant Planets", by NASA. References my 2014 presentation at SC14. Available at https://www.nas.nasa.gov/SC14/demos/demo28.html.

2009   "Light Solutions", by Lynn Rosendale. Describes a light pollution study and campaign from 2008 that I was involved in. Available at https://calvin.edu/news/archive/light-solutions.

PROFESSIONAL ASSOCIATIONS

2021–*present*   Chippewa Valley Astronomical Society

2014–*present*   American Astronomical Society (AAS) Junior Member

2014–*present*   Division for Planetary Sciences (DPS) Junior Member

2017–2020   American Association for the Advancement of Science (AAAS) Student Member

2005–2009   Society of Physics Students (SPS) (unofficial Calvin College chapter)

SELECTED VOLUNTEER EXPERIENCES

2017	Co-facilitator for inter-religious dialogue through the Voices of Discovery inter-group dialogue program
2015–2018	Website maintainer or co-maintainer for the University of Arizona chapter of the Graduate Christian Fellowship
2013–2018	Leadership team member for high school youth group
2010–*present***	Leadership team member for the University of Arizona chapter of the Graduate Christian Fellowship
2009	Math and science tutor with Job Corps
2004–2005	Calvinist Cadet Corps (boy scout) counselor
2000–2004	Calvinist Cadet Corps (boy scout) junior counselor

NOTEWORTHY AND/OR CREATIVE SIDE PROJECTS

Personal Adage: *"If a picture is worth a thousand words, then an animation is worth a thousand pictures, a simulation is worth a thousand animations, and a framework is worth a thousand simulations."*

2021	Developed a paper model in LaTeX/TikZ to demonstrate how solar motions vary with latitude and time of year. Details, video and downloadables for science outreach and education are available at https://www.lpl.arizona.edu/~vriesema/solar_motion.html.
2018	Developed code to convert topographic and/or bathymetric data for planetary bodies into wireframe models suitable for 3D printing. Details and interactive 3D model are available at https://www.lpl.arizona.edu/~vriesema/3d_printing.html.
2016	Developed a semi-cooperative board/card game around the premise of surviving on, and ultimately escaping from, a remote, uninhabited island.
2014–	Developed my personal website from scratch: https://www.lpl.arizona.edu/~vriesema.
2013	Applied the t-distributed Stochastic Neighbor Embedding (t-SNE) machine-learning algorithm in Python to an exoplanet database in order to investigate possible relationships and groupings of exoplanets.
2013	Wrote an applet in Java to visualize the propagation of 2D internal gravity waves.
2012	Adapted a numerical model of fluvial weathering from Martian literature to Titan. This MATLAB model allowed one to qualitatively compare predictions from this surface and subsurface erosion model to observed valley and drainage network morphologies.
2012	Updated and optimized a colleague's stochastic integration model, converting from Fortran 77 to C and adding GPU acceleration via CUDA, for a 7-fold speed increase.

2011   Developed a highly-optimized and highly visual Java applet to simulate and visualize 2D, N-body impact processes using hard-shell collisions. Models with tracer particles demonstrate that the model is consistent with the Maxwell Z-model for impact crater ejecta. Animations from the model are available at https://www.youtube.com/playlist?list=PL1F51F54259CD96B8.

2011   Developed an interactive and highly visual Java applet to simulate the behavior and topology of the classical XY lattice model of statistical mechanics using the metropolis algorithm. Description and download available at https://www.lpl.arizona.edu/~vriesema/xy_model.html.

2009   Wrote software to assist with creating wide-field astrophotographic mosaics. The least-squares algorithm calculated the brightness and offset scales for 294 monochrome images (a grid of 7×14 images in each of three colors) to help produce a single, color image of the Andromeda galaxy (M31, NGC 224). Final result and description available at https://calvin.edu/observatory/astrophotography/galaxies/the-andromeda-galaxy/index.html.

2006   Developed an object-oriented, ray-tracer in Java as my final project for my first-ever programming class. Description and code available at https://www.lpl.arizona.edu/~vriesema/raytracer.html.

2004   Programmed a simple model of the Moon orbiting Earth on my graphing calculator.

2004   Wrote an ELIZA-like psychotherapy program on my graphinc calculator.

2002   Initiated, designed and built a 4-bit binary adder using basic logic gates. This project featured push-buttons, LEDs and flipflop storage circuits on three breadboards. (My grandpa added resistors to my circuit design, provided parts, a power supply and much guidance.)