# Chris Nolting – Curriculum Vitae

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***Contact Information***

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***Education***

**Ph.D in Astrophysics** – July 2020
University of Minnesota - Twin Cities – Advisor: Tom Jones
*Cluster Weather Vanes: Radio Galaxies as Probes of Cluster Dynamics*

**B.S. in Astrophysics**
**B.S. in Physics** – 2014
University of Minnesota - Twin Cities – Advisor: Liliya L. R. Williams
*Fitting DARKexp predictions to dark matter halo profiles from simulation*
Summa Cum Laude with High Distinction, Deans List

***Teaching Experience***

"+1" courses and lab sections are scheduled for spring 2026

## Gustavus Adolphus College

**Visiting Assistant Professor (2023–present)**

Courses taught:

- Phy 102: Astronomy, Cosmology, & Astrophysics — **1 semester**
- Phy 120/122: General Physics I: Mechanics (mixed algebra/calc-based audience) — **1 semester**
- Phy 170: General Physics II (algebra-based) — **1 semester**
- Phy 205: Mechanical Universe (Mechanics /w engineering focus) — **1 semester**
- Phy 250: Applied Math for Sci. & Engineering — **1 semester**
- Phy 220: Integrated Phys. & Applied Math I — **1 semester**
- Phy 230: Integrated Phys. & Applied Math II — **+1**
- Phy 380: Thermal & Statistical Physics — **2 semesters**

Labs taught:

- Phy 121: General Physics I Lab — **2 sections**
- Phy 171: General Physics II Lab — **4 sections +1**
- Phy 201: Phys. for Sci. & Engineering I Lab — **1 section**
- Phy 211: Phys. for Sci. & Engineering II Lab — **2 sections +1**
- Phy 206: Mechanical Universe Lab — **1 section**

## College of Charleston

**Astronomy Research & Teaching Fellow (2020–2022)**

Courses/labs taught:

- Ast 129: Introduction to Astronomy I — **1 semester**
- Ast 129L: Introduction to Astronomy I Lab — **1 section**
- Ast 130: Introduction to Astronomy II — **1 semester**
- Ast 130L: Introduction to Astronomy II Lab — **1 section**

***Teaching Experience (cont.)***

## University of Minnesota - Twin Cities

**Graduate Instructor (2019)**

**Graduate Teaching Assistant (2014–2015)**

**Undergraduate Teaching Assistant (2013–2014)**

Courses taught:

- Ast 1001: Introduction to Astronomy **1 summer**
- Ast 1001: Introduction to Astronomy Lab **6 sections**

Courses Taken:

- GRAD 8101: Teaching in Higher Education
- GRAD 8200: Practicum for Future Faculty
  – Received Preparing Future Faculty Certification

## Hamline University

**Guest Lecturer (2018)**

Lectures taught:

- Astrophysics for Physicists (J-Term 2018)
  "Magnetohydrodynamics"
- Phys 1160: Algebra based Physics II (Spring 2018)
  "Interference and Diffraction"
- Phys 1120: Astronomy (Spring 2018)
  "Galaxies and Cosmology"

***Student Mentorship (Research)***

Key:
HS: High School
UG: Undergraduate

**Christopher Gutuza – Gustavus – UG (2024-present)**
Hybrid Morphology Radio galaxies. Talk at Gustavus Research Expo

**Jaden Knutson – Gustavus – UG (2024-present)**
3D printing of simulated Radio Galaxies, poster at Gustavus Expo

**Christopher Lesoine – CofC – UG (2021 - 2022)**
AGN jet backflow models. Presented to department journal club.

**Tri Nguyen – CofC – UG (2021 - 2022)**
AGN jet precession modeling. Coauthor on ApJ paper.

**Jay Ball – CofC – HS, then UG (2021 - 2022)**
AGN jet precession modeling. Coauthor on ApJ paper.

**Chika Onubogu – UMN – UG (2019 - 2020)**
2 REU sessions, Magnetic fields in bent jets. 2 REU poster sessions

**Nardin Azar – UMN – UG (2017)**
Mentored on UG senior thesis. Presented her work at CUWiP.

***Teaching Interests***

- Introductory Astronomy
- Introductory Physics
- Mathematical Methods
- Computational Methods
- Physics and Astronomy Labs
- Fluid Mechanics
- High Energy Astrophysics

***Research Experience***

## Los Alamos National Lab

Postdoctoral Researcher (July 2022 - August 2023)

– Supervisor: **Hui Li**

Implementing cosmic ray electron transport methods into Magnetohydrodynaic (MHD) simulation codes and applying them to astrophysical environments. Simulations of magnetically driven jets on large scales.

## College of Charleston

Astronomy Research and Teaching Fellow (Aug 2020 – June 2022)

– Supervisor: **P. Chris Fragile**

Performed MHD simulations of AGN jets in a variety of contexts: Studying Minkowski's Object by simulating jet–cloud interactions, studying precessing jets, and testing a jet backflow model for 'x-shaped' sources.

## University of Minnesota - Twin Cities

Wombat User Group (June 2015 – present)

Contributed to the continued development of the Wombat multiphysics astrophysical MHD code.

Graduate Research Assistant (June 2018 – July 2020)

NSF Graduate Research Fellow (June 2015 – June 2018)

– Advisor: **Tom Jones**

Performed MHD simulations of radio galaxy jets in dynamic Intracluster Media, and code development integrating N-body particle dynamics with the Eulerian MHD code, implementing a hydro shock detection routine, and stabilizing the WENO solver with HLLE fluxes.

Undergradate Research Assistant (May 2013 – May 2014)

– Advisor: **Liliya L. R. Williams**

Tested DARKexp models for the energy and density distributions of dark matter halos against Millennium-II N-body simulation data

***Research Grants***

Fuller Physics Summer Research Award- Summer 2024 & Summer 2025

– $3400, $3900 - Gustavus Adolphus College

Grants for funding UG C. Gutuza's summer research projects.

Los Alamos Institutional Computing - December 2022

– 2 Million Node Hours - Chicoma/Rome

SSM Student Research Award Funding - April 2022

– $5500 - College of Charleston

Grant for funding undergraduate C. Lesoine's summer research project

***Research Grants (cont.)***

NSF XSEDE Startup Allocation - July 2021
– 1600 Node Hours - Stampede2
Ran scaling tests for the Wombat MHD code

NSF Graduate Research Fellowship - March 2015
– $138,000 total funding for 3 years research
Performed my PhD research detailed above. Radio Galaxy Jet–Galaxy Cluster Dynamics

***Research Interests***

- Active Galactic Nuclei Jets
- Galaxy Cluster Dynamics and Formation
- Magnetohydrodynamics
- Cosmological & N-body Simulation
- High Performance Computing

***Outreach***

**SCSC Science & Nature Conference** (Fall 2023, 2024, 2025)
Ran the Phun Physics Circus and presented physics demonstrations to multiple classes of students grades 3-6, along with undergraduate volunteers.

**Science on Saturday** (Spring 2024)
Another physics demonstration day for young students

**Los Alamos High School** (October 2022, March 2023)
Presented to local Astronomy class on aspects of astronomy followed by questions.

**Pajarito Environmental Education Center** (October 2022)
Public presentation in planetarium, followed by telescope viewing.

**Astronomy On Tap** (Dec 2021, Nov 2022, Feb, Apr, & June 2023)
Public presentations at local restaurants, with astronomy trivia and telescope viewings. Organizer for the Albuquerque chapter.

**Universe in the Park** (2014–2019)
Public presentations and telescope viewings at state parks every weekend of the summer.

**Astronomy Public Night** (2013–2015)
Public presentation followed by a viewing with the 10 inch refractor on the roof of the UMN physics building.

**Other Astronomy Outreach** (2014–present)
Public lectures, presentations at local schools, viewings of special events (eclipses, transits, meteor showers, etc), and tours.

**Society of Physics Students (SPS)** (2011–2014)
Helped staff and organize events showcasing physics demos and concepts to young students and encouraged them to pursue careers in science.

***Service***

**Academic Advisor** (2024-present)
Academic Advisor for 7 physics majors at Gustavus

**Reviewer** Reviewed papers for the journals *Galaxies*, *Astronomy & Astrophysics*

**Engineering Club Advisor** (2024-present)
Advisor to the Engineering Club, with a focus on high powered rocketry

**Society of Physics Students (SPS)** (2023-present)
Advisor to SPS at Gustavus, and working with them for outreach events.

***Honors***

Robert O. Pepin Fellowship (2019)

National Science Foundation - Graduate Research Fellow (2015)

Minnesota Institute for Astrophysics Outreach Award (2015, 2016)

Best Astronomy Teaching Assistant (2014)

Lavern & Ted Jones Astrophysics Scholarship (2013)

***Leadership***

**Universe in the Park** - Coordinator (Dec. 2014–September 2019)
Helped liase with park staff, organize outreach events, maintained outreach equipment and telescopes, and trained others in use and care of equipment.

**Society of Physics Students** - Secretary (Sept. 2012–May 2013)
- President (Sept. 2013–May 2014)

Helped to plan events, including large collaborations, charity fundraisers, and yearly trips to national laboratories. Acquired grants for outreach materials and increased the number of outreach events.

***Language Proficiencies***

Fortran, C++, Python, Julia, Perl, Bash, Matlab, Mathematica, LaTeX

***Skills***

Code parallelization with MPI and OpenMP
Astrophysical data analysis with SAOImage DS9, XPA, and AstroPy

***Professional Memberships***

American Astronomical Society (AAS)
High Energy Astrophysics Division (HEAD)

***References***

**Paul Saulnier** - Colleague, Gustavus Adolphus College
Email: psaul@gustavus.edu, phone: 507-933-6123

**P. Chris Fragile** - Postdoc Mentor & Collaborator, College of Charleston
Email: fragilep@cofc.edu, phone: 925-519-0722

**Lawrence Rudnick** - Collaborator, University of Minnesota
Email: larry@umn.edu, phone: 612-396-9645

Additional references available upon request.

***Publications***

1. Chong Ge; Ming Sun; Mpati Ramatsoku; **Chris Nolting**; Barbel S. Koribalski; The shocking features in the closest rich galaxy cluster Norma, ApJ (2025, in production)
2. **Nolting, Chris**; Ball, J.; Nguyen, T. M.; *Simulations of Precessing Jets and the Formation of X-shaped Radio Galaxies*, The Astrophysical Journal, Volume 948, Issue 1, id.25, 10 pp. (2023)
3. **Nolting, Chris**; Lacy, M.; Croft, S.; Fragile, P. C.; Linden, S. T.; Nyland, K.; Patil, P., *Observations and Simulations of Radio Emission and Magnetic Fields in Minkowski's Object*, The Astrophysical Journal, Volume 936, Issue 2, id.130, 12 pp. (2022)
4. Rudnick, L.; Bruggen, M.; Brunetti, G.; Cotton, W.; Forman, W.; Jones, T. W.; **Nolting, Chris**; Schellenberger, G.; Sebokolodi, L.; van Weeren, R., *Intracluster Magnetic Filaments and an Encounter with a Radio Jet*, The Astrophysical Journal, Volume 935, Issue 2, id.168, 24 pp. (2022)
5. **Nolting, Chris**; Jones, T. W.; O'Neill, Brian J.; Mendygral, P. J., *Simulated Interactions between Radio Galaxies and Cluster Shocks. II. Jet Axes Orthogonal to Shock Normals*, The Astrophysical Journal, Volume 885, Issue 1, article id. 80, 14 pp. (2019)
6. O'Neill, Brian J.; Jones, T. W.; **Nolting, Chris**; Mendygral, P. J., *A Fresh Look at Narrow-Angle Tail Radio Galaxy Dynamics, Evolution and Emissions* , The Astrophysical Journal, Volume 884, Issue 1, article id. 12, 21 pp. (2019)
7. O'Neill, Brian J.; Jones, T. W.; **Nolting, Chris**; Mendygral, P. J., *Shocked Narrow-Angle Tail Radio Galxies: Simulations and Emissions*, The Astrophysical Journal, Volume 887, Issue 1, article id. 26, 18 pp. (2019)
8. **Nolting, Chris**; Jones, T. W.; O'Neill, Brian J.; Mendygral, P. J., *Interactions Between Radio Galaxies and Cluster Shocks - 1: Jet Axes Aligned with Shock Normals* , The Astrophysical Journal, Volume 876, Issue 2, article id. 154, 16 pp. (2019)
9. Mendygral, P. J.; Radcliffe, N.; Kandalla, K.; Porter, D.; O'Neill, B. J.; **Nolting, C.**; Edmon, P.; Donnert, J. M. F.; Jones, T. W., *WOMBAT: A Scalable and High-performance Astrophysical Magnetohydrodynamics Code*, The Astrophysical Journal Supplement Series, Volume 228, Issue 2, article id. 23, 23 pp. (2017)
10. Tom Jones, **Chris Nolting**, Brian O'Neill, Peter Mendygral, *Using Collisions of AGN Outflows with ICM Shocks as Dynamical Probes*, Physics of Plasmas, Volume 24, Issue 4, id.041402
11. **Chris Nolting**, Liliya L. R. Williams, Michael Boylan-Kolchin, Jens Hjorth, *Testing DARKexp against energy and density distributions of Millennium-II halos* , Journal of Cosmology and Astroparticle Physics, Issue 09, article id. 042 (2016)

***Presentations and Talks***

1. Chris Gutuza; **Chris Nolting**, *Modeling the Bending of Active Galactic Nuclei Jets with MHD Simulations*, Talk, Gustavus Fall Research Symposium, Sept 2025
2. Jaden Knutson; **Chris Nolting**, *Computational Modelling of Radio Galaxy Nuclei*, Poster Presentation, Gustavus Fall Research Symposium, Sept 2025
3. **Chris Nolting**; *Precessing AGN Jets: Dynamics and Observational Signatures*, CfA Galaxy Group Seminar, Harvard Center for Astrophysics, November 2023
4. **Chris Nolting**; *Simulating Hercules A with a Magnetic Tower Jet*, Lunch Seminar, NRAO, Socorro, NM, July 2023
5. **Chris Nolting**; Jay Ball; Tri M. Nguyen, *Precessing Radio Galaxy Jets: Dynamics and Observable Properties*, Talk, 38th New Mexico Symposium, Socorro, NM, February 2023
6. **Chris Nolting**; Jay Ball; Tri M. Nguyen, *Simulations of Precessing Jets and the Formation of X-shaped Radio Galaxies*, Oral Session Talk, American Astronomical Society Meeting 241, January 2023
7. **Chris Nolting**; Mark Lacy; Steve Croft; P. Chris Fragile; Sean Linden; Kristina Nyland; and Pallavi Patil, *Observations and Simulations of Radio Emission and Magnetic Fields in Minkowski's Object*, iPoster Presentation, American Astronomical Society Meeting 240, June 2022
8. **Chris Nolting**, *Precessing Radio Galaxy Jets: Simulations and Observable Signatures*, Poster Presentation, Extragalactic jets on all scales - launching, propagation, termination, June 2021
9. **Chris Nolting**; Tom Jones; Chika Onubogu; Alex Reineck; Peter Mendygral, *Magnetic Field Configurations in Dynamic Radio Galaxy Environments*, Oral Session Talk, American Astronomical Society Meeting 237, January 2021
10. **Chris Nolting**; Tom Jones, *Shocked Radio Galaxies*, Invited talk, 10th Korean Astrophysics Workshop, Busan, Korea, July 2019
11. **Chris Nolting**; Tom Jones, *Shocked Radio Galaxy Jets: Clues to Cluster Weather*, Invited talk, Wombat User Group Meeting, Bologna, Italy, July 2018
12. **Chris Nolting**; Tom Jones, *Shocked Radio Galaxy Jets: Clues to Cluster Weather*, Snowcluster 2018 Conference Talk, March 2018
13. **Chris Nolting**, Tom Jones, Brian O'Neill, Peter Mendygral, *Shocked Radio Jets: Emerging Complex Structures*, Physics of the Instracluster Medium: Theory and Computation Workshop, Poster Presentation, August 2016
14. **Chris Nolting**, Tom Jones, *Radio Galaxy Dynamics: A Mpc long tail in Abell 2256*, Minnesota Supercomputing Institute Research Exhibition, Poster Presentation, April 2016