

JOSHUA S. J. REDING, PhD

SCIENCE POLICY & ADVOCACY • OPTICAL ASTRONOMY • INTERNATIONAL SPACE DIPLOMACY
SPECTRUM MANAGEMENT • EDUCATION, OUTREACH, & WORKFORCE DEVELOPMENT

EDUCATION

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL (UNC-CH) Chapel Hill, NC
Doctor of Philosophy (PhD) Oct 2022

Advisor: Dr. J. Christopher Clemens

Dissertation: *The Menagerie of "Failed" Type Ia Supernovae*

Master of Science (MS) May 2020

Thesis: *An Isolated White Dwarf with 317 s Rotation and Magnetic Emission*

Graduate Certificate in Innovation, Leadership, and Management Apr 2022

COLGATE UNIVERSITY Hamilton, NY

Bachelor of Arts (AB) May 2015

Double major in Astronomy-Physics (Advisor: Dr. Thomas J. Balonek) and Philosophy (Advisor: Dr. Ulrich Meyer)

Semester abroad: University of St. Andrews, Scotland, UK Spring 2013

WORK EXPERIENCE

NATIONAL SCIENCE FOUNDATION Alexandria, VA

Electromagnetic Spectrum Management, Division of Astronomical Sciences (MPS/AST)

AAAS Science & Technology Policy Fellow Sep 2023 – Present

- Advance protections for ground-based astronomy by initiating programs and funding opportunities to study present and future impacts of satellite constellations on science and society; coordinating collaborative efforts between academic, government, industry, and other parties; and participating in national and international discussions including at the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) and International Telecommunication Union (ITU).
- Coordinate mutually agreeable operations between academic/federal research facilities and satellite constellation companies by meeting with industry representatives, composing formal Coordination Agreements and ensuring ongoing compliance, creating a website of guidelines and resources for satellite operators, and delivering informational talks in public fora including the National Academies of Sciences, Engineering, and Medicine (NASEM).
- Lead NSF's team developing the National Spectrum Workforce Plan as tasked in the 2023 National Spectrum Strategy. Promote job creation and technology development in spectrum engineering and management through NSF's Spectrum Innovation Initiative (SII) by organizing workshops on spectrum career pathways and technology priorities, establishing partnerships between academic and industry entities, and identifying and facilitating cross-agency collaboration on projects and initiatives.

NORTH CAROLINA DEPARTMENT OF COMMERCE Raleigh, NC

Office of Science, Technology & Innovation (OSTI)

North Carolina STEM Policy Fellow Aug 2022 – Jul 2023

- Advocated for and supported initiatives to promote Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grant recipients within North Carolina, including the One North Carolina Small Business Program and the Defense Innovation Network.
- Composed communications pieces for dissemination amongst the general public and the North Carolina General Assembly
- Supported the North Carolina Board of Science, Technology & Innovation by formalizing strategic priorities and providing research and content for plans of operation, reports, surveys, etc.; provided analyses of Board actions to members and OSTI.
- Assisted with policies promoting offshore wind energy, including meeting with project consultants, conducting background research on supply chain and infrastructure development opportunities, and contributing to a successful NSF Regional Innovation Engines Type I proposal to make the Carolinas the offshore wind hub of the mid-Atlantic.

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL Chapel Hill, NC

Research Assistant Jul 2016 – Aug 2023

- Performed time-series spectroscopic and photometric analysis on unusual white dwarf systems as potential type Ia supernova progenitors, remnants, or failed systems. Fit synthetic stellar models to observational data with modeling software TLUSTY.
- Conducted astronomical observations using the 4.1-m Southern Astrophysical Research (SOAR) Telescope at Cerro Pachón, Chile, and Panchromatic Optical Monitoring and Polarimetry Telescopes (PROMPT) at Cerro Tololo, Chile.
 - Designed and commissioned fabrication of a deconstructible primary optics tube for the Goodman Spectrograph, commissioned Acktar Magic Black™ anti-reflective coating of tube interior, and installed on-site at SOAR.
 - Designed and commissioned fabrication of housing and mounting system for a polarimeter on the PROMPT system.

Teaching Assistant, Private Tutor Jul 2016 – May 2021

- Head TA for ASTR 101L Introduction to Astronomy Laboratory: Our Place in Space; TA for ASTR 519/719 Observational Astronomy, PHYS 231 Physical Computing, PHYS 118 Introductory Calculus-Based Mechanics and Relativity, PHYS 115 General Physics II: For Students of Life Sciences; Private Tutor for ASTR 101: Introduction to Astronomy
 - Administrator on Skynet Robotic Telescope Network
 - Designed and prototyped small devices for student projects using laser cutters and 3D printers.

COLGATE UNIVERSITY

Undergraduate Research Assistant
 Undergraduate Teaching Assistant, Private Tutor
 Case-Geyer Library Circulation Desk Worker

Hamilton, NY
 Jun 2013 – Aug 2015
 Aug 2013 – May 2015
 Aug 2011 – May 2015

ORGANIZATIONAL LEADERSHIP, SERVICE, & OUTREACH

AMERICAN ASTRONOMICAL SOCIETY (AAS)

Committee for the Protection of Astronomy and the Space Environment (COMPASSE)

Electromagnetic Interference (EMI) Subcommittee Vice Chair 2024 – 2027

ASTRONOMY ON TAP IN THE TRIANGLE

Organizer, Master of Ceremonies

Fullsteam Brewery, Durham, NC

2018 – 2021

- Organized and hosted event solo through 2019, then formed, trained, and managed inter-institutional organizing committee
- Integrated with North Carolina Science Festival, and connected local PBS reporters with organizing committee

THE SCIENTIFIC RESEARCH AND EDUCATION NETWORK (SciREN) TRIANGLE

Budget Coordinator

Raleigh, NC

2019 – 2021

UNC-CH PHYSICS & ASTRONOMY GRADUATE STUDENT ASSOCIATION

Treasurer

Chapel Hill, NC

2019 – 2020

Vice President

2018 – 2019

Outreach and New Student Recruitment Committees

2017 – 2021

ASTRONOMY DAYS

UNC-CH Team Coordinator

North Carolina Museum of Natural Sciences, Raleigh, NC

2017 – 2022

EDUCATIONAL RESEARCH IN RADIO ASTRONOMY (ERIRA)

Undergraduate Research Advisor

Green Bank, WV

Aug 2017

COLGATE UNIVERSITY SOCIETY OF PHYSICS STUDENTS

President

Hamilton, NY

2014 – 2015

PROFESSIONAL DEVELOPMENT

NASA ASTROPHYSICS MISSION DESIGN SCHOOL

Spring 2023

- “MAUVE” Telescope Mechanical & Configuration Systems Lead, Type Ia Supernova Science Objective Co-Lead

SIGMA XI SCIENCE POLICY BOOT CAMP

Jul 2022

- Science Policy Hack-A-Thon 2nd Place (\$1000 prize)

PENN STATE SUMMER SCHOOL IN STATISTICS FOR ASTRONOMERS XVII

Jun 2022

UNC-CH GRADUATE CERTIFICATE IN INNOVATION, LEADERSHIP, AND MANAGEMENT

2021 – 2022

COMSCICON TRIANGLE

Spring 2022

AAS CONGRESSIONAL VISIT DAYS

Spring 2021

- Advocated for legislation addressing space debris to the offices of Rep. David Price and Sens. Richard Burr and Thom Tillis

DUNLAP INSTITUTE ASTRONOMICAL INSTRUMENTATION SUMMER SCHOOL

Summer 2019

ADDITIONAL

Professional Organizations: International Astronomical Union Centre for the Protection of Dark and Quiet Skies from Satellite Constellation Interference (IAU CPS; 2023 – Present), American Association for the Advancement of Sciences (AAAS; 2023 – Present), DarkSky (2022 – Present), National Science Policy Network (NSPN; 2022 – Present), Sigma Xi Scientific Research Honor Society (2018 – Present), American Astronomical Society (AAS; 2015 – Present)

Technical Skills: Proficient in Python, Windows and UNIX environments, LaTeX, Microsoft Office programs; Advanced in IDL, MATLAB, SolidWorks; Competent with Tableau, Adobe Illustrator, Adobe Photoshop

Awards: AAAS Science & Technology Policy Fellowship (2023), NC STEM Policy Fellowship (2022), NC Space Grant Graduate Research Fellowship (2020), NSF Graduate Research Fellowship Honorable Mention (2018), Colgate University Lila and Curtiss '25 Frank Scholarship (2015)

SCIENTIFIC PUBLICATIONS

DIRECTLY MEASURING WHITE DWARF ROTATION WITH HIGH-RESOLUTION SPECTROSCOPY

2024, *The Astrophysical Journal*, in preparation

Joshua S. Reding, J. C. Clemens, J. J. Hermes, B. T. Gänsicke

TWO NEW WHITE DWARFS WITH VARIABLE MAGNETIC BALMER EMISSION LINES

2023, *Monthly Notices of the Royal Astronomical Society*, 522(1), 693

Joshua S. Reding, J. J. Hermes, J. C. Clemens, R. J. Hegedus, B. C. Kaiser

AN ISOLATED WHITE DWARF WITH 317 S ROTATION AND MAGNETIC EMISSION

2020, *The Astrophysical Journal*, 894(1), 19

Joshua S. Reding, J. J. Hermes, Z. P. Vanderbosch, E. Denny, B. C. Kaiser, C. B. Mace, B. H. Dunlap, J. C. Clemens

MAUVE: AN ULTRAVIOLET ASTROPHYSICS PROBE MISSION CONCEPT

2024, *Journal of Astronomical Telescopes, Instruments, and Systems*, near submission

A TEST OF SPECTROSCOPIC AGE ESTIMATES OF WHITE DWARFS USING WIDE WD+WD BINARIES

2024, *The Astrophysical Journal*, submitted

DISCOVERY OF 74 NEW BRIGHT ZZ CETI STARS IN THE FIRST THREE YEARS OF TESS

2022, *Monthly Notices of the Royal Astronomical Society*, 511(2), 1574

VELOCITY-IMAGING THE RAPIDLY PRECESSING PLANETARY DISC AROUND THE WHITE DWARF HE 1349-2305 USING DOPPLER TOMOGRAPHY

2021, *Monthly Notices of the Royal Astronomical Society*, 508(4), 5657

LOOKING INTO THE CRADLE OF THE GRAVE: J22564-5910, A YOUNG POST-MERGER HOT SUBDWARF?

2021, *Astronomy & Astrophysics*, 655, A43

I SPY TRANSIENTS AND PULSATIONS: EMPIRICAL VARIABILITY IN WHITE DWARFS USING GAIA AND THE ZWICKY TRANSIENT FACILITY

2021, *The Astrophysical Journal*, 912(2), 125

LITHIUM POLLUTION OF A WHITE DWARF RECORDS THE ACCRETION OF AN EXTRASOLAR PLANETESIMAL

2021, *Science*, 371(6525), 168

FIVE NEW POST-MAIN-SEQUENCE DEBRIS DISKS WITH GASEOUS EMISSION

2020, *The Astrophysical Journal*, 905(1), 5

PARTLY BURNT RUNAWAY STELLAR REMNANTS FROM PECULIAR THERMONUCLEAR SUPERNOVAE

2019, *Monthly Notices of the Royal Astronomical Society*, 489(2), 1489

PHOTOMETRIC AND SPECTROSCOPIC PROPERTIES OF TYPE IA SUPERNOVA 2018oh WITH EARLY EXCESS EMISSION FROM THE KEPLER 2 OBSERVATIONS

2019, *The Astrophysical Journal*, 870(1), 12

A 15.7-MIN AM CVN BINARY DISCOVERED IN K2

2018, *Monthly Notices of the Royal Astronomical Society*, 477(4), 5646

PRESENTATIONS, PROCEEDINGS, & POSTERS

SATELLITE CONSTELLATIONS IN NATIONAL AND INTERNATIONAL POLICY

Invited talk, AAS Congressional Visit Days 2024, April 2024

AAS COMPASSE DARK & QUIET SKIES 2023/2024 UPDATES

Invited talk, NASEM Committee on Astronomy and Astrophysics, March 2024

INNOVATION OPPORTUNITIES IN ENGINEERING IN NORTH CAROLINA AND BEYOND

Invited talk, Tau Beta Pi Engineering Honor Society Research Triangle Chapter, April 2023

AN ENIGMATIC CLASS OF ISOLATED WHITE DWARFS WITH MAGNETIC EMISSION

Featured talk and poster, *Magnetism and Accretion*, Cape Town, South Africa, January 2023

MEASURING THE UNIVERSE WITH EXPLODING STARS

Invited talk, Charlotte Amateur Astronomers' Club, February 2022

DIRECTLY MEASURING WHITE DWARF ROTATION WITH HIGH-RESOLUTION SPECTROSCOPY

Featured talk, *North Carolina Space Symposium*, April 2021

THE MENAGERIE OF "FAILED" TYPE IA SUPERNOVAE

Invited talk, *Symposium on Horizons in Astronomy and Physics Education (SHAPE)*, March 2021

IT'S ALIVE! ELECTRIC GENERATORS IN SPACE

Featured talk, *Astronomy on Tap in the Triangle*, October 2020

WHITE DWARF PLANETS AS UNIPOLAR GENERATORS

Poster, *236th Meeting of the American Astronomical Society*, June 2020

THE CONFLUENCE OF HARDWARE FAILURES THAT LED TO THE DISCOVERY OF THE MOST RAPIDLY ROTATING WHITE DWARF

Featured talk, *Kepler SciCon V*, Glendale, CA, March 2019

MEASURING THE UNIVERSE WITH STARS THAT EXPLODE

Featured talk, *Astronomy on Tap in the Triangle*, October 2018

AN EXPLORATION OF SPOTTED WHITE DWARFS FROM K2

Featured talk and proceedings, *21st European Workshop on White Dwarfs*, Austin, TX, July 2018

A METHOD TO SELECT VARIABLE WHITE DWARFS FROM *Gaia* DR2

Poster (co-author), *21st European Workshop on White Dwarfs*, Austin, TX, July 2018

THE OPTICAL VARIABILITY OF THE BLAZAR 3C 454.3 OVER THREE DECADES FROM THE COLGATE UNIVERSITY FOGGY BOTTOM OBSERVATORY

Poster (co-author), *229th Meeting of the American Astronomical Society*, Grapevine, TX, January 2017

THE 2013-2015 OPTICAL OUTBURST AND HISTORIC LIGHT CURVE OF THE BLAZAR 3C 454.3

Poster (co-author), *227th Meeting of the American Astronomical Society*, Kissimmee, FL, January 2016

THE STANDARD CANDLE: DISTANCE DETERMINATION OF TYPE IA SUPERNOVA 1991M IN IC 1151

Featured talk and proceedings, *Colgate University Class of 2015 PHYS 410 Senior Research Symposium*, Hamilton, NY, December 2014

AN EXPLORATION OF SUPERNOVA LIGHT CURVE PRODUCTION METHODS: APPLICATION TO SN 1991M IN IC 1151

Featured talk and proceedings, *2014 Keck Northeast Astronomy Consortium Undergraduate Research Symposium*, Swarthmore College, November 2014

THE EFFECT OF HIGH-ENERGY PHOTONS ON PLANET-FORMING DISKS IN THE ORION NEBULA

Featured talk and proceedings, *2013 Keck Northeast Astronomy Consortium Undergraduate Research Symposium*, Vassar College, October 2013

SUCCESSFUL GRANT & EXTERNAL TELESCOPE PROPOSALS

NSF ENGINES DEVELOPMENT AWARD

2023 – 2025

- Consortium proposal: *Advancing Clean Energy Technologies in the Piedmont Region to Generate Innovative New Economic Systems*
- PI: UNC Charlotte; Co-Is: East Carolina University, Clemson University, South Carolina Research Authority, E4 Carolinas, **North Carolina Department of Commerce**; Other senior personnel: NC State University, Elizabeth City State University, Fayetteville State University; Miscellaneous other organizations and personnel with pledges support
- Award amount: \$1,000,000
- Contributed research on offshore wind potential and generated maps with Tableau and GIS data for inclusion in proposal

NSF ASTRONOMY AND ASTROPHYSICS RESEARCH GRANT

2021 – 2024

- Group proposal: *White Dwarf Stars Under the Influence of Planets* (Award #2108311)
- PI: J. C. Clemens; Co-Is: **Joshua S. Reding**, B. C. Kaiser, R. J. Hegedus, J. Frederick, E. Dennihy
- Award Amount: \$530,312

NORTH CAROLINA SPACE GRANT

2020 – 2021

- Personal proposal: *The Menagerie of “Failed” Type Ia Supernovae*
- Award amount: \$10,000

MCDONALD OBSERVATORY OBSERVING TIME REQUEST

2018

- Group proposal: *High-Speed Follow-Up of White Dwarfs Observed with K2*
- PI: **Joshua S. Reding**; Co-Is: J. J. Hermes, D. E. Winget, Z. P. Vanderbosch, B. C. Kaiser, A. Vasquez Soto, J. C. Clemens
- 10 nights awarded using the 2.1-m Otto Struve Telescope in 2017–2018 Trimester 3

NATIONAL OPTICAL ASTRONOMY OBSERVATORY OBSERVING TIME REQUEST

2018

- Group proposal: *Resolving Reflection Nebulae Around Post-AGB Objects in the LMC*
- PI: G. C. Sloan; Co-Is: K. E. Kraemer, B. H. Dunlap, **Joshua S. Reding**
- 1 night awarded using SOAR Adaptive Module (SAM) in 2018A Semester

EUROPEAN SOUTHERN OBSERVATORY OBSERVING TIME REQUEST

2017 – 2018

- Group proposal: *Measuring Rotation in the Most Massive White Dwarfs*
- PI: B. T. Gänsicke; Co-Is: **Joshua S. Reding**, J. J. Hermes
- 5.5 hours awarded using VLT/UVES in Observing Period 101A