

# CAROLINE ANNA ROBERTS

## CURRICULUM VITAE

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### WORK

**Laboratory Instructor, Georgia State University**, Atlanta, GA, *Fall 2014-Spring 2017*

- Lab instructor of record for introductory Solar System and Stellar and Galactic astronomy courses responsible for all aspects of the lab class
- Labs taught: 16

**Instructor, Johns Hopkins Center for Talented Youth (CTY)**, Santa Cruz, CA, *July 2018-August 2018*

- As an Introduction to Astronomy Instructor for 7<sup>th</sup>-10<sup>th</sup> grade students in a 3-week, 7-hour per day course at the University of California Santa Cruz CTY location, planned and taught lessons, graded assignments, helped run night observation sessions, and spearheaded a field trip to the Lick observatory

**Hard Labor Creek Observatory Graduate Student Fellow, Georgia State University**, Atlanta, GA, *Spring 2017-Fall 2018*

- Coordinated monthly open houses and outreach to the public
- Compiled a more comprehensive checklist and complete procedure for open houses
- Updated the manual for the 20-inch telescope
- Created a document of information for volunteers to refer to in the event of cloudy open houses
- Facilitated the completion of observatory tasks and communication

**Graduate Researcher, Georgia State University**, Atlanta, GA, *Fall 2014-present*

- Active galactic nuclei (AGN) research under the guidance of Dr. Misty Bentz

### EDUCATION

**Georgia State University**, Atlanta, GA; *M.S.: diploma received May 2017, PhD: expected graduation August 2019*

- M.S. Physics with a concentration in Astronomy
- PhD Astronomy

**Sewanee: The University of the South**, Sewanee, TN; *Diploma received May 2014 cum laude*

- B.S. Physics
- Chancellors' Merit Scholarship (2/3 tuition)
- Relevant Coursework: two semesters of entry-level Physics, two semesters of Electromagnetism (including electronics), Mechanics, Quantum Mechanics, Optics, Thermodynamics, Advanced Laboratory, two semesters of Modern Physics, Junior and Senior Research Seminar, Solar System Astronomy, Readings in Cosmology, Calculus including Multidimensional Calculus, Differential Equations, Linear Algebra, two semesters of General Chemistry, Intro to Modeling and Programming (Java)

**Miss Porter's School**, Farmington, CT; *Diploma received June 2010 cum laude (Top 20% of graduating class)*

- Alice Hamilton Award for Excellence in Science, Spring 2010

### RESEARCH EXPERIENCE

**Graduate Student Research**, Atlanta, GA, *Fall 2014-present*

- Longslit and IFU spectroscopy, photometry of AGN; advisor: Dr. Misty Bentz
- Observed 15 nights at Apache Point Observatory and 15 nights at Hard Labor Creek Observatory

**Senior Physics Seminar on Astronomical Polarimetry**, Sewanee, TN, *Spring 2014*

- Learned how polarimetry works within the field of astronomy, and the nature of types of polarization in the universe
- Constructed a polarimeter and tested its performance on a telescope at Sewanee's Cordell-Lorenz Observatory
- Furthered familiarity with the workings of Cordell-Lorenz Observatory, 5 nights of observation
- Presented a 50-minute presentation recapping research on April 9, 2014

- Continued research and created a poster on the topic which was presented to the department

**Undergraduate Research Assistant, Georgia State University, Atlanta, GA, Summer 2013**

- Produced V- and B-band light curves spanning a previous observation period of six months for active galactic nuclei NGC 7469 using IRAF's differential photometry method under the guidance of Dr. Misty Bentz
- Compared these curves to those obtained by the image subtraction program ISIS
- Gained experience independently navigating software guidebooks and online resources
- Relayed summer research details to faculty and peers in a Sewanee Physics talk

**Junior Physics Seminar on Visual Binary Star Systems, Sewanee, TN, Spring 2013**

- Learned the technique of binary star observation by measurement of separation and position angle of binary stars
- Determined the minimum resolution of the Cordell-Lorenz Observatory's 0.3-m telescope/camera systems
- Gained knowledge of how to use the Cordell-Lorenz Observatory's telescopes, 5 night of observation
- Presented a 50-minute presentation recapping research on April 3, 2013
- Presented a poster on the topic at Scholarship Sewanee on April 26, 2013

**National Science Foundation Research Experience for Undergraduates Intern, The University of Wyoming, Laramie, WY, Summer 2012**

- Began a reverberation mapping campaign with other REU interns under the guidance of Drs. Michael Brotherton, Daniel Dale, and Chip Kobulnicky
- Collected CCD images and spectra of active galactic nuclei on approximately 14 nights with the University of Wyoming's 2.3 and 0.6-m telescopes (4 nights and 10 nights)
- Reduced the spectra and images and performed photometry and spectroscopy using the IRAF software on UNIX computers
- Challenged the team to reduce data error by modeling consistent, disciplined observation and reduction habits
- Relayed summer research details to faculty and peers in a Sewanee Physics talk

**National Science Foundation Research Experience for Undergraduates Intern, The Southeastern Association for Research in Astronomy (SARA) and Valdosta State University, Valdosta, GA, Summer 2011**

- Studied active galactic nuclei (AGN) using photometry under the guidance of Dr. Kenneth Rumstay
- Aided the reverberation mapping campaign STARE (Georgia State University, Dr. Misty Bentz)
- Observed the program AGN with SARA's 0.9-m telescope (6 nights)
- Performed reduction and photometry on four years' worth of CCD image data with the software package MIRA; Python (Matplotlib) and AASTeX (similar to LaTeX) were also used during the summer
- Focused on making data accurate by double-checking images and questioning inconsistencies
- Published the scientific paper "A Ten-Year Photometric Study of Selected Active Galaxies," Roberts, C. A. & Rumstay, K. S. 2012, JSARA, 6, 47-58
- Relayed summer research details to faculty and peers in a Sewanee Physics talk

**TECHNOLOGY, LAB, AND OTHER SKILLS**

Proficient ability in telescope operation, IDL, Python, IRAF as used for image and spectra reduction, photometry, and spectroscopy, ISIS image subtraction, SuperMango plotting, LaTeX, Microsoft Office, and Mac, Windows, UNIX, and LINUX operating systems; novice ability in Mathematica, Java, MATLAB, Arduino (C), CSS, and HTML; proficient in French

**PRESENTATIONS**

**Fourth Year Review Research Presentation**

PowerPoint: *AGN Properties from Stellar Dynamical Modeling and RM*

**Atlanta, GA**

April 24, 2018

**The 231<sup>st</sup> Meeting of the American Astronomical Society**

PowerPoint: *Stellar Dynamical Modeling of AGN for Comparison with RM*

**Washington, DC**

January 12, 2018

**AGN STORM Conference**

PowerPoint: *Comparison of Stellar Dynamical Modeling and RM for AGN*

**Atlanta, GA**

August 18, 2017

**AGN Winds Conference**

Poster: *Stellar Dynamical Modeling of AGN for Comparison with RM*

**Atlanta, GA**

June 26-29, 2018

<b>The 229<sup>th</sup> Meeting of the American Astronomical Society</b> PowerPoint: <i>Reverberation Mapping Results for NGC 4151</i>	<b>Grapevine, TX</b> January 7, 2017
<b>GSU STEM Conference, Women in Physics</b> PowerPoint: <i>Reverberation Mapping Results for NGC 4151</i>	<b>Atlanta, GA</b> November 18, 2016
<b>Second Year Qualifier Examination Research Presentation</b> PowerPoint: <i>Reverberation Mapping of NGC 4151</i>	<b>Atlanta, GA</b> March 24, 2016
<b>Renfroe Middle School Science Showcase</b> PowerPoint: <i>Measuring the Mass of Black Holes in the Centers of Galaxies</i>	<b>Decatur, GA</b> February 12, 2016
<b>Georgia State Astronomy Department Seminar: The Time Domain</b> PowerPoint: <i>Gamma Ray Bursts</i>	<b>Atlanta, GA</b> September 25, 2015
<b>Renfroe Middle School Science Showcase</b> PowerPoint: <i>Measuring the Mass of Black Holes in the Centers of Galaxies</i>	<b>Decatur, GA</b> February 13, 2014
<b>Georgia State Astronomy Department Seminar: Degenerate Matter</b> PowerPoint: <i>Neutron Stars</i>	<b>Atlanta, GA</b> October 31, 2014
<b>Sewanee Senior Seminar 50-minute research presentation</b> PowerPoint: <i>Polarization in the Universe</i>	<b>Sewanee, TN</b> April 9, 2014
<b>The 223<sup>rd</sup> Meeting of the American Astronomical Society</b> Poster: <i>Photometric Monitoring of the Active Galactic Nucleus in NGC7469</i> C. A. Roberts, M. C. Bentz	<b>Washington, DC</b> January, 2014
<b>Sewanee Physics Seminars: 6 Minute Seminar Proposals</b> PowerPoint: <i>Polarization in the Universe</i> A Senior Seminar proposal	<b>Sewanee, TN</b> October 16, 2013
<b>Sewanee Physics Seminars: Summer Research Talks</b> Poster: <i>Magnitude Light Curves of Galaxy NGC 7469</i>	<b>Sewanee, TN</b> September 4, 2013
<b>Scholarship Sewanee</b> Poster: <i>Visual Binary Star Systems</i>	<b>Sewanee, TN</b> April 26, 2013
<b>Sewanee Junior Seminar 50-minute research presentation</b> PowerPoint: <i>Visual Binary Star Systems</i>	<b>Sewanee, TN</b> April 3, 2013
<b>The 221<sup>st</sup> Meeting of the American Astronomical Society</b> Poster: <i>Reverberation Mapping of Radio-Loud Active Galactic Nuclei</i> M. Mason, N. Erickson, C. A. Roberts, M. Johnson-Groh, D. Starceвич, S. Niles Nissam, A. Bhattacharjee, M. S. Brotherton, D. A. Dale, H. A. Kobulnicky	<b>Long Beach, CA</b> January 9, 2013
<b>Sewanee Physics Seminars: Seminar Proposals</b> PowerPoint: <i>Binary Stars</i> A Junior Seminar proposal	<b>Sewanee, TN</b> Fall, 2012
<b>Sewanee Physics Seminars: Summer Research Talks</b> PowerPoint: <i>Reverberation Mapping</i>	<b>Sewanee, TN</b> Fall, 2012
<b>The 219<sup>th</sup> Meeting of the American Astronomical Society</b> Poster: <i>A Ten-Year Photometric Study of Selected Active Galaxies</i>	<b>Austin, TX</b> January 9, 2012

C. A. Roberts, K. S. Rumstay

**Sewanee Physics Seminars: Summer Research Talks**

PowerPoint: *A Ten-Year Photometric Study of Selected Active Galaxies*

A summer research presentation

**Sewanee, TN**

October 10, 2011

**PUBLICATIONS & AWARDS**

**Pattern, powered by The Weather Channel**, Rutledge, GA, *August 12, 2018*

- **Interviewee**, shared information with Pattern's viewers about the Perseid Meteor Shower that evening

<https://twitter.com/Pattern/status/1028802986766688257>

**Be4STEMinc**, Atlanta, GA, *December 12, 2017*

- **Interviewee**, talked with organizer Diana Palma about graduate student research to encourage youth to succeed in STEM

<https://www.youtube.com/watch?v=azKZ904KGWg>

**The Astrophysical Journal**

"A Low-mass Black Hole in the Nearby Seyfert Galaxy UGC 06728"

Bentz, M. C., Batiste, M., Seals, J., Garcia, K. Kuzio de Naray, R., Peters, W. Anderson, M., Jones, J., Lester, K., Machuca, C., Parks, J. R., Gnilk, C. L. P., Revalski, M., Roberts, C. A., Saylor, D., Sevrinsky, R. A., & Turner, C. 2016, *ApJ*, 831, 2

<http://adsabs.harvard.edu/abs/2016ApJ...831....2B>

**Society of Physics Student Perspectives on Physics Meetings**

"Astronomy Goes to Washington"

- Wrote an essay about the 223<sup>rd</sup> American Astronomical Society Meeting to earn a \$200 Society of Physics Students Travel Award

<http://www.spsnational.org/meetings/reports/2014/AAS-Roberts.pdf>

**The Journal of the Southeastern Association for Research in Astronomy**

"A Ten-Year Photometric Study of Selected Active Galaxies"

Roberts, C. A. & Rumstay, K. S. 2012, *JSARA*, 6, 47-58

<http://jsara.org/JSARA-V06/ms0608-Roberts+Rumstay.pdf>

**The Minor Planet Electronic Circulars**

Comet ephemeris data obtained in a Sewanee Solar System Astronomy class lab was published in The Minor Planet Electronic Circulars, which is put out by the Minor Planet Center and the Smithsonian Astrophysical Observatory.

- September 16<sup>th</sup>, 2011: Comet Van Ness (213P) b
- September 29<sup>th</sup>, 2011: Comet Garradd (C/2009 P1)
- October 1<sup>st</sup>, 2011: 2011 SN117
- October 8<sup>th</sup>, 2011: Comet Novichonok-Gerke (P/2011 R3)
- November 1<sup>st</sup>, 2011: Comet Garradd (C/2009 P1)

**ASSOCIATION MEMBERSHIPS**

**American Astronomical Society**, *Summer 2011-present*

- Sustainability Committee Member, *Summer 2018-present*
- Attended and presented a 5-minute talk at the 231<sup>st</sup> Meeting in Washington, DC, *Stellar Dynamical Modeling of AGN for Comparison with Reverberation Mapping*, Roberts, C. A., Bentz, M. C., Batiste, M., Valluri, M., Vasiliev, E., *January 2018*
- Chambliss Undergraduate Poster Award Judge, 231<sup>st</sup> Meeting in Washington, DC, *January 2018*
- Attended and presented a 5-minute talk at the 229<sup>th</sup> Meeting in Grapevine, TX, *Reverberation Mapping Results for NGC 4151*, Roberts, C. A., Bentz, M. C., Batiste, M., *January 2017*
- Chambliss Undergraduate Poster Award Judge, 229<sup>th</sup> Meeting in Grapevine, TX, *January 2017*

- Attended and presented a poster at the 223<sup>rd</sup> Meeting in Washington, DC, *Photometric Monitoring of the Active Galactic Nucleus in NGC 7469*, C. A. Roberts, M. C. Bentz, *January 2014*
- Attended and presented a poster at the 221<sup>st</sup> Meeting in Long Beach, CA, *Reverberation Mapping of Radio-Loud Active Galactic Nuclei*, M. Mason, N. Erickson, C. A. Roberts, M. Johnson-Groh, D. Starcevich, S. Niles Nissam, A. Bhattacharjee, M. S. Brotherton, D. A. Dale, H. A. Kobulnicky, *January 2013*
- Attended and presented a poster at the 219<sup>th</sup> Meeting in Austin, TX, *A Ten-Year Photometric Study of Selected Active Galaxies*, C. A. Roberts, K. Rumstay, *January 2012*

**Sigma Pi Sigma**, Physics honor society, *Spring 2012-present*

**Omicron Delta Kappa**, national leadership honor society, *inducted November 4, 2013*

**Order of Omega**, Greek leadership honor society, *inducted November 1, 2013*

**Who's Who Among College and University Students 2014**, one of 50 students selected from the Sewanee class of 2014

**Girl Scouts of America: Lifetime Member**, Greater Atlanta Council, *1998-present*

- **Girl Scout Gold Award Recipient**, consisting of a service project of planning and hosting a fun run, The Dunwoody Dash, for Girl Scouts and Boy Scouts at Brook Run Park in Dunwoody, Georgia, *August 15, 2009*
- **Volunteer**, Astronomy Workshops for Girl Scouts at Georgia State University, Dr. Misty Bentz and Girl Scouts of Greater Atlanta, 6 events on the GSU campus or at Hard Labor Creek Observatory, *Fall 2014-present*

## ACTIVITIES & OTHER EXPERIENCE

**Hard Labor Creek Observatory**, Rutledge, GA, *Fall 2014-present*

- **Graduate student volunteer**, operated handheld telescopes on the observatory lawn at public open house nights and answered guest questions, Event lead for 5 events, 12 events total
- **Presenter**, gave talks for events happening at the park: The Georgia Buddhist Summer Camp and The Perseid Meteor Shower Star Party

**Astronomy Peer Advising Leaders (AstroPAL)**, Atlanta, GA, *Fall 2014-present*

- **Liason**, ran mentor training, assisted with all PAL programming, met to check in with each mentee
- **PAL**, participated with founder Dr. Nicole Cabrera Salazar as a student mentee for two years and then a student mentor to Aparna Venkatara (Spring 2017) and Eliot Vrijmoet (Fall 2016-Spring 2018)

**Extragalactic Group Journal Club**, Atlanta, GA, *Summer 2013 and Fall 2014-present*

- **Club organizer and reviver**, Spring 2017-Summer 2018
- **Club member**, read and discussed research papers every other week, served as presenter at least once per semester

**Grad Student Parental Leave Policy Committee of the GSU Graduate Student Alliance**, Atlanta, GA, *Fall 2017-Summer 2018*

- Member, assisted chair Danielle Carmody with research and for a proposal to GSU regarding support of graduate students who are parents, helped with student surveys and interviews

**Women in STEM, GSU Chapter**, Atlanta, GA, *Fall 2016-present*

- **Club member**, attending planning meetings, coffee hours with guest lecturers, workshops, and conferences

**GSU Astronomy Nights**, Atlanta, GA, *October 23, 2015 (an official satellite event of White House Astronomy Night, Pinckneyville Park), and November 10, 2016 (Grant Park)*

- **Event volunteer**, helped organizer Daniel Horenstein by operating a telescope on the lawn for the public and helping with setup and cleanup

**Urban Life Observatory**, Atlanta, GA, *Fall 2014-present*

- **Lab TA volunteer**, bringing astronomy to the astronomy students of Georgia State University with handheld telescopes, 8 events total

**Georgia Science Olympiad Middle School Regional Competition**, Atlanta, GA, *February 14, 2015*

- **Volunteer**, helped to design, hold, and judge the Solar System event

**International Astronomical Union Symposium 314**, Atlanta, GA, *May 2015*

- **Conference volunteer**, manned reception desk and helped in astronomy outreach with local middle school youth

**oSTEM, Georgia State Chapter**, Atlanta, GA, *Fall 2014-Spring 2016*

- **Club member**, attending meetings and presentations to engage in conversations about the importance of being out as an LGBTQIA\* person in Science, Technology, Mathematics, and Engineering

**Georgia State University Astronomy Club**, Atlanta, GA, *Fall 2014-Spring 2016*

- **Club member**, attending meetings to promote astronomy at Georgia State

**Real Youth**, Atlanta, GA, *Fall 2015-Spring 2016*

- **Volunteer tutor**, assisting youth visiting a LGBTQIA\* resource center with homework and studying as well as general support

**Laboratory Experience at The University of North Texas, Denton, TX, April 12<sup>th</sup>-14<sup>th</sup>, 2013**

- Performed Rutherford scattering experiments with a 1.5 MeV proton beam

**Sewanee Cross Country, Sewanee, TN, Fall 2010-Spring 2014**

- Finished 5k and 6k races consistently in the team's top eight
- Named to the SCAC's 2010 All-Sportsmanship team for women's cross country
- Aided Sewanee's women's 6<sup>th</sup> place finish at the 2014 NCAA Division III South/Southeast Regional Championship

**Sewanee Track and Field, Sewanee, TN, Springs 2011, 2012 and 2014**

- Current Sewanee school record holder in the 3000-m Steeplechase (12:29:31), competed in the 1500-m
- Sewanee Tiger of the Week Spring 2014

**Gay Straight Alliance, The University of the South, Sewanee, TN, Spring 2011-Spring 2014**

- **President, Spring 2013-Spring 2014:** Independently planned and organized two Sewanee Safe Space Program training sessions, helped plan community events, lead all meetings and discussions
- **Co-President, Fall 2012:** Led all meetings; planned events such as movie screenings, cook-outs, art gallery events, and discussion panels; fostered communication with the greater Sewanee LGBTQIA\* and ally community which includes faculty, staff, community members, and School of Theology students
- **Secretary, Spring 2011-Spring 2012:** Recorded meeting minutes with consistent detail and helped the active president with tasks such as reaching out to other clubs and registering and advertising for events

**Gamma Tau Upsilon Sorority, Sewanee, TN, Spring 2011-Spring 2014**

- **Historian, Spring 2013-Spring 2014:** Maintained scrapbooks and created a composite of the sorority
- **Vice-President, Historian, and Greeks Go Green Chair, Spring 2012-Spring 2013:** Led a revision of the sorority's bylaws, revised the crisis management plan, assisted the president in executing the events, meetings, and fundraisers of a sorority of more than thirty members and affiliates, fostered the growth of the sorority by reaching out to potential members, modeled a disciplined attitude toward getting tasks done; created a sorority website, composite, scrapbook, and alumni newsletter; managed the sorority's recycling
- **Secretary and Social Chair, Spring 2011-Spring 2012:** Recorded meeting minutes with consistent detail, planned formals and social events for more than thirty people

**Folks at Home, Sewanee, TN, Spring 2013-Spring 2014**

- **Volunteer,** attending weekly home visits with local elder Sewanee resident

**Cordell-Lorenz Observatory, Sewanee, TN, Fall 2010-Spring 2010**

- **Observatory assistant,** manipulating and organizing data regarding comet and satellite observation

**Fernbank Science Center Observatory, Atlanta, GA, summers and breaks 2009-2010**

- **Observatory assistant,** helped at public observation nights operating small telescopes, providing information, and answering questions