

Patrick M. Treuthardt, Ph.D.

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EDUCATION **University of Alabama**, Tuscaloosa, Alabama, U.S.A.
2007 Ph.D., Physics with Astronomy specialization
• Thesis: *The Kinematics and Dynamics of Three Resonance Ring Barred Spiral Galaxies*
(Supervisor: Professor Ronald J. Buta)
2000 M.S., Physics with Astronomy specialization
New Mexico Institute of Mining and Technology, Socorro, New Mexico, U.S.A.
1998 B.S., Physics with an option in Astrophysics
• Awarded with Honors

EXPERIENCE **North Carolina Museum of Natural Sciences**, Raleigh, North Carolina, U.S.A.
2013 – Present Assistant Head
Astronomy and Astrophysics Research Laboratory
University of Arkansas at Little Rock, Little Rock, Arkansas, U.S.A.
2010 – 2015 Part-time Lecturer
2012 – 2013 Visiting Research Associate
2010 – 2013 Affiliate Graduate Faculty
2009 – 2012 Postdoctoral Research Fellow
Secondary Affiliation: **Arkansas Center for Space and Planetary Sciences**,
University of Arkansas at Fayetteville
2009 – 2012 Mentor
North Carolina State University, Raleigh, North Carolina, U.S.A.
2014 Temporary Instructor
University of Oulu, Oulu, Finland
2008 Visiting Researcher
2007 Visiting Student
2003 Visiting Student
2002 Visiting Student
University of Alabama, Tuscaloosa, Alabama, U.S.A.
2008 Intern
1999 – 2007 Graduate Research Assistant
1998 – 2005 Graduate Teaching Assistant
Kitt Peak National Observatory, Tucson, Arizona, U.S.A.
2006 Visiting Observer
2004 Visiting Observer
Observatoire de Haute-Provence, St. Michel l'Observatoire, France
2004 Visiting Observer

- Please refer to the following pages for detailed work experience.

REFEREED
JOURNAL
PUBLICATIONS

- Mutlu Pakdil, B., Mangedarage, M., Seigar, M. S., & **Treuthardt, P.** *A photometric study of the peculiar and potentially double ringed, non-barred galaxy: PGC 1000714*, Monthly Notices of the Royal Astronomical Society, 466, 355-368 (2017).
- **In the top 5% of all research outputs ever tracked** by Altmetric.
 - International press coverage including: Astronomy Magazine, CBC News, CNN, CTV News, Daily Mail, Engadget, Fox News, Gizmodo, IFLScience.com, The Independent, International Business Times, International Business Times UK, MPR News, Sci-News.com, Science Daily, SciWorks Radio, Tech Times, WFAE 90.7, Space.com, Wired UK, etc.
- Sierra, A., Seigar, M. S., **Treuthardt, P.**, & Puerari, I., *Determination of Resonance Locations in Barred Spiral Galaxies Using Multiband Photometry*, Monthly Notices of the Royal Astronomical Society, 450, 1799-1811 (2015).
- Treuthardt, P.**, Seigar, M. S., Sierra, A. D., Al-Baidhany, I., Salo, H., Kenefick, D., Kenefick, J. & Lacy, C. H. S., *On the Link Between Central Black Holes, Bar Dynamics, and Dark Matter Halos in Spiral Galaxies*, Monthly Notices of the Royal Astronomical Society, 423, 3118-3133 (2012).
- Treuthardt, P.**, Salo, H., & Buta, R., *Dynamical Simulations of NGC 2523 and NGC 4245*, The Astronomical Journal, 137, 19-33 (2009).
- Treuthardt, P.**, Salo, H., Rautiainen, P., & Buta, R., *The Bar Pattern Speed of NGC 1433 Estimated Via Sticky-Particle Simulations*, The Astronomical Journal, 136, 300-311 (2008).
- Treuthardt, P.**, Buta, R., Salo, H., & Laurikainen, E., *The Kinematically Measured Pattern Speeds of NGC 2523 and NGC 4245*, The Astronomical Journal, 134, 1195-1205 (2007).
- Keel, W. C., Holberg, J. B., & **Treuthardt, P.**, *Far-Ultraviolet Spectroscopy of Star-Forming Regions in Nearby Galaxies: Stellar Populations and Abundance Indicators*, The Astronomical Journal, 128, 211-223 (2004).
- Buta, R., **Treuthardt, P. M.**, Byrd, G. G., & Crocker, D. A., *Circumnuclear Star Formation in the Early-Type Resonance Ring Barred Spiral Galaxy NGC 1326*, The Astronomical Journal, 120, 1289-1305 (2000).

BOOKS

Structure and Dynamics of Disk Galaxies. Proceedings of a Conference held 12-16 August 2013 at the Winthrop Rockefeller Institute, Petit Jean Mountain, Arkansas, USA. Edited by M. S. Seigar and **P. Treuthardt**. ASP Conference Proceedings, Vol. 480. San Francisco: Astronomical Society of the Pacific (2014).

RECENT
CONFERENCE
PRESENTATIONS

- Seigar, M., Mutlu-Pakdil, B., Mangedarage, M., & **Treuthardt, P.** *The Nonbarred Double-Ringed Galaxy, PGC 1000714*, American Astronomical Society Meeting 229, #145.19 (2017).
- Mutlu-Pakdil, B., Seigar, M., Davis, B., **Treuthardt, P.**, & Berrier, J. *Testing SMBH scaling relations using cosmological simulations and optical/near-IR imaging data*, American Astronomical Society Meeting 229, #107.01 (2017).
- Treuthardt, P.**, & Grouchy, R. *A Further Examination of Manifold Theory*, IAU General Assembly, Meeting #29, id.2257756 (2015).
- Treuthardt, P.**, Beauchemin, R., & De Los Reyes, M. *The Dust Lane Curvature in a Sample of Galactic Bars*, American Astronomical Society Meeting 223, #453.12 (2014).
- Al-Baidhany, I., Seigar, M., **Treuthardt, P. M.**, Sierra, A., Davis, B. N., Kenefick, D., Kenefick, J. D., & Lacy, C. H. *A Study of Supermassive Black Holes and the Properties of Their Host Galaxies*, American Astronomical Society Meeting 223, #453.09 (2014).
- Sierra, A., Seigar, M., **Treuthardt, P. M.**, & Puerari, I. *Determination of Resonance Locations in Spiral Galaxies using Multi-band Photometry*, American Astronomical Society Meeting 223, #309.02 (2014).

SELECTED
POPULAR
PUBLICATIONS

Treuthardt, P., *Topic of upcoming event: Searching for life beyond Earth*, The News & Observer, SciTech, (17 Jan 2016).

Treuthardt, P., *Inside NC Science: Ancient supernova shrouded in mystery*, The News & Observer, SciTech, (3 May 2015).

Treuthardt, P., *Black holes continue to fascinate masses*, The News & Observer, Health & Science Newsletter, (14 December 2014).

Treuthardt, P., *A Spiral Galaxy with a Twist*, NatureSearch Newsletter, Issue 3 (2013).

RESEARCH
EXPERIENCE

North Carolina Museum of Natural Sciences, Raleigh, North Carolina, U.S.A.

2013, January – Present

Assistant Head

–

Astronomy and Astrophysics Research Laboratory

- Currently investigating the viability of the manifold theory of spiral arm structure by comparing simulated and observed data.
- Currently investigating the skewness of galaxy bars through simulation modeling in conjunction with photometric and kinematic data.
- Currently investigating the curvature of dust lanes found in galaxy bars through photometric analysis of HST images.
- Leading an investigation of the spiral arm pitch angle of cloud bands in tropical cyclones as an indicator of cyclone strength.
- Collaborating in an investigation of the spiral arm pitch angle vs. supermassive black hole mass relationship in the Illustris simulation.

University of Arkansas at Little Rock, Little Rock, Arkansas, U.S.A.

2012, September – 2013, January

Visiting Research Associate

- Investigated the skewness of galaxy bars through simulation modeling in conjunction with photometric and kinematic data.

2009, April – 2012, August

Postdoctoral Research Fellow

–

(Supervisor: Associate Dean, Marc S. Seigar)

- Developed detailed numerical models of the gaseous and stellar components of an unusual barred spiral galaxy.
- Developed numerical models of the gaseous component of 40 barred spiral galaxies in order to compare observational and theoretical parameters.
- Collaborated in the development of a pipeline script to process and analyze digital multi-waveband images of galaxies.

University of Oulu, Oulu, Finland

2008, July – 2008, December

Visiting Researcher

–

(Supervisor: Professor Heikki Salo)

- Collaborated in the development of numerical models of the gaseous and stellar components of 23 barred spiral galaxies in order to compare observational and theoretical parameters.
- Responsible for presenting research results to the Astronomy Division of the Department of Physical Sciences.

2007, April – 2007, May

Visiting Student

- Collaborated in the development of numerical models of the gaseous and stellar components of 2 ringed barred spiral galaxies in order to compare observational and theoretical parameters.
- Collaborated in the development of custom IDL software for analysis of galaxy simulation results and comparison with observed morphology.
- Responsible for presenting research results to the Astronomy Division of the Department of Physical Sciences.

- 2003, June – 2003, August **Visiting Student**
- Collaborated in the development of numerical models of the gaseous and stellar components of ringed barred spiral galaxies in order to compare observational and theoretical parameters.
 - Developed custom IDL software for analysis of galaxy simulation results and comparison with observed morphology and kinematics.

- 2002, June – 2002, August **Visiting Student**
- Trained in the use of a proprietary Fortran numerical simulation program to model the gaseous and stellar components of spiral galaxies in order to compare observational and theoretical parameters.
 - Developed custom IDL software for analysis of galaxy simulation results and comparison with observed morphology and kinematics.

University of Alabama, Tuscaloosa, Alabama, U.S.A.

- 1999, May – 2007, December **Graduate Research Assistant**
- Processed and analyzed digital 1D stellar spectra.
 - Processed and analyzed digital near-infrared images of galaxies.
 - Used digital images and 2D spectra of galaxies, in conjunction with a sophisticated numerical simulation code, to compare observational and theoretical parameters.
 - Developed IDL software for analysis of images, spectra, and simulation models.
 - Analyzed digital images and spectra of nearby starburst galaxies to determine the source of escaping Lyman- α radiation.
 - Processed and analyzed digital images of galaxies to derive structural parameters for a statistical study.

Kitt Peak National Observatory, Tucson, Arizona, U.S.A.

- 2006, January **Visiting Observer**
- Granted 2 nights of observing time by NOAO and obtained long slit spectra of 2 galaxies using the Ritchey-Chretien Focus Spectrograph on the 4 meter telescope.

- 2004, April **Visiting Observer**
- Granted 3 nights of observing time by NOAO and obtained near-infrared images of 9 galaxies using the FLAMINGOS instrument on the 2.1 meter telescope.

Observatoire de Haute-Provence, St. Michel l'Observatoire, France

- 2004, May **Visiting Observer**
- Granted 4 nights of observing time by the Institut National des Sciences de l'Univers and obtained 2D spectra of 6 galaxies using a Fabry-Perot interferometer on the 1.93 meter telescope.

TEACHING
EXPERIENCE

North Carolina Museum of Natural Sciences, Raleigh, North Carolina, U.S.A.

- 2013, January – Present **Assistant Head**
– **Astronomy and Astrophysics Research Laboratory**
- Developed and presented lectures for undergraduate level astrobiology classes at Appalachian State University.
 - Currently supervising research projects with undergraduate interns.
 - Responsible for instructing, supervising, and coordinating laboratory volunteers.
 - Participate in weekly outreach events (i.e. public talks or solar observing sessions).

University of Arkansas at Little Rock, Little Rock, Arkansas, U.S.A.

- 2010, January – 2015, May **Part-Time Lecturer**
- Instructor for a classroom-based and online *Introduction to Astronomy* lecture.
 - Instructor for an online *Introduction to Astronomy* laboratory

2010, January – 2013, January **Affiliate Graduate Faculty**

- Member of Dissertation Examination Committees for two Astronomy graduate students.
- Substitute instructor for the graduate/senior-undergraduate level *Classical Mechanics* course.

2009, April – 2012, August **Mentor**

- Assisted with instructing, overseeing, and directing the dissertation research of two Astronomy graduate students.

North Carolina State University, Raleigh, North Carolina, U.S.A.

2014, August – 2014, December **Temporary Instructor**

- Developed and administered an upper level undergraduate astrophysics course titled *Stars and Galaxies*.

University of Alabama, Tuscaloosa, Alabama, U.S.A.

2008, January – 2008, May **Intern**

- Responsible for grading assignments and exams for the graduate/senior-undergraduate level *Theoretical Astrophysics* course.
- Responsible for grading assignment for the undergraduate level *Astronomy Beyond the Solar System* course.

1998, August – 2005, May **Graduate Teaching Assistant**

- Instructor for a classroom-based *Introduction to Astronomy* laboratory.

SELECTED
RECENT
OUTREACH
ACTIVITIES

2013 – present

- Solar observing sessions **Host**
Nature Research Center, North Carolina Museum of Natural Sciences
- *Meet the Scientist* **Speaker**
SECU Daily Planet Theater, North Carolina Museum of Natural Sciences

2016

- *History of Astronomy* **Lecturer**
Oscher Lifelong Learning Institute, Raleigh, North Carolina
- *Science Cafe: Star Trek: The Golden Anniversary* **Panelist**
The Daily Planet Cafe, Raleigh, North Carolina
- *Ask a Scientist: How do black holes make ripples in space?* **Interviewee**
The News & Observer, Raleigh, North Carolina
- *Science Cafe: The Sun: Common and Uncommon Events* **Speaker**
The Daily Planet Cafe, Raleigh, North Carolina
- *Galaxies* **Speaker**
The Lab, Museum of Life and Science, Durham, North Carolina
- *Cocktails and Cosmonauts* **Presenter**
Museum of Life and Science, Durham, North Carolina
- Graduate Student Seminar **Speaker**
University of North Carolina - Chapel Hill
- *Science in the Movies: Space on the Silver Screen* **Panelist**
North Carolina State University
- *The Science of The Martian* **Panelist**
North Carolina Museum of Natural Sciences
- *Exploring Galaxies and the Universe* **Lecturer**
Oscher Lifelong Learning Institute, Raleigh, North Carolina

2015

- *Neutrino Day* **Speaker**
North Carolina Museum of Natural Sciences
- WRAL-TV **Interviewee**
Raleigh, North Carolina
- *Stars, Galaxies, and the Universe* **Lecturer**
Oscher Lifelong Learning Institute, Raleigh, North Carolina
- Astronomy Club **Speaker**
Raleigh Charter High School, Raleigh, North Carolina
- Science Seminar **Speaker**
Durham Technical Community College, Durham, North Carolina

SERVICE

- Ongoing Manuscript Reviewer
Astronomy and Computing (1x), *Monthly Notices of Royal Astronomical Society* (1x)
- 2014, August Proposal Reviewer
NASA Astrophysical Data Analysis Program
- 2014, June Dissertation Committee Member (Amber Sierra)
Dept. of Physics & Astronomy, University of Arkansas at Little Rock, Little Rock, Arkansas
- 2014, June Dissertation Committee Member (Ismaeel Al-Baidhany)
Dept. of Physics & Astronomy, University of Arkansas at Little Rock, Little Rock, Arkansas
- 2013, August Member of the Scientific Organizing Committee and Session Chair
Structure and Dynamics of Disk Galaxies, Petit Jean Mountain, Arkansas
- 2012, August Chair for IAU SpS3 *Galaxy Evolution Through Secular Processes* session 10
IAU XXVIII General Assembly, Beijing, China
- 2012, April Chair for Physics and Astronomy session
20th Annual Arkansas Space Grant Consortium Symposium, Morrilton, Arkansas
- 2010, April Chair for Physics & Astronomy session
– Judge for Graduate student oral presentations
94th Annual Meeting of The Arkansas Academy of Science, Little Rock, Arkansas

GRANTS AND AWARDS

- 2015 International Travel Grant, American Astronomical Society
- 2013 North Carolina State Government Internship Program funding, NC Internship Council
- 2012 International Travel Grant, American Astronomical Society
- 2011 International Travel Grant, American Astronomical Society
- 2006 2 nights, RC Spectrograph, 4-meter telescope, Kitt Peak National Observatory
- 2005 Outstanding Teaching by a Graduate Student, University of Alabama
- 2004 3 nights, FLAMINGOS, 2.1-meter telescope, Kitt Peak National Observatory
- 2004 4 nights, Fabry-Perot interferometer, 1.9-m telescope, Observatoire de Haute-Provence
- 2004 Graduate Student Research and Travel Support Fund, University of Alabama
- 2003 Student Activity and Research Travel Grant, University of Alabama
- 1996 – 1998 Competitive Scholarship, New Mexico Institute of Mining and Technology
- 1996 Magna Cum Laude, Associate of General Studies, Macomb Community College

SPECIAL SKILLS

German language proficiency

Skills associated with the acquisition and analysis of data, including:

- Proficiency with IRAF and IDL
- Proficiency with Unix/Linux, Mac, and Windows operating systems
- Experienced with Unix shell scripting, LaTeX, HTML, C/C++, LabVIEW, Pascal, OpenOffice, and Microsoft Office (including Word, Excel, and Powerpoint)
- Experienced in writing competitive proposals for telescope observing time
- Experienced in the use of large telescopes and supporting software for near-IR imaging and both 1D and 2D spectroscopy