

Tracy M. Becker, Ph.D.

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Education

- 2010 - 2016** **University of Central Florida**
Orlando, FL, USA
Ph.D. in Physics - Planetary Sciences Track
- 2005 - 2010** **Lehigh University**
Bethlehem, PA, USA
Bachelors of Science in Astrophysics
Minor in Latin American Studies
- Jul - Dec 2007** **Pontificia Universidad Católica de Valparaíso**
Valparaíso, Chile
Concentration: Spanish Language and Literature
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Academic Appointments

- 2018 - Present** **Research Scientist**
Southwest Research Institute, San Antonio, TX USA
 - ◆ Remote Sensing Observers Technical Lead
 - ◆ Co-Investigator on Europa-UVS, Europa Clipper Mission
 - ◆ Hubble Space Telescope UV analyses of Europa, asteroids
- 2016 - 2018** **Postdoctoral Researcher**
Southwest Research Institute, San Antonio, TX USA
 - ◆ Hubble Space Telescope UV analyses of Europa, asteroids
 - ◆ Europa-UVS science team member
- 2011 - 2016** **Graduate Research Assistant**
University of Central Florida, Orlando, FL USA
 - ◆ Cassini UVIS graduate student science team member
 - ◆ Study of Saturn's ring system with computational modeling
- 2010 - 2013** **Graduate Teaching Assistant**
University of Central Florida, Orlando, FL USA
 - ◆ PHY 2053: Introductory Physics Lab Instructor
 - ◆ PHY 2053: Introductory Physics Lecture Assistant
 - ◆ Robinson Observatory Manager
- Jan - Mar 2009** **NSF Research Experience for Undergraduates (REU) at CTIO**
Cerro Tololo Inter-American Observatory, La Serena, Chile
 - ◆ Observations using 4-m Blanco telescope
 - ◆ Data reduction and analysis of accretion-powered millisecond pulsar HETE-J1900.1-2455

- Jun - Aug 2008** **NSF Research Experience for Undergraduates (REU) at AO**
Arecibo Observatory, Arecibo, Puerto Rico USA
- ◆ Shape modeling of first known triple near-Earth asteroid system 2001 SN₂₆₃
 - ◆ Radar observations of near-Earth asteroids
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Professional Experience

- 2019 - Present** **NASA Europa Clipper Composition Working Group Co-Chair**
- 2014 - 2018** **NASA SSERVI CLASS EPO Science Advisor**
University of Central Florida, Orlando, FL USA
- NASA's Solar System Exploration Virtual Institute (SSERVI) Science advisor / UCF liaison for the Center for Lunar and Asteroid Surface Science (CLASS) educational material for public engagement
- ◆ Develop public engagement materials
 - ◆ Work with teachers to implement educational material
- Mar - May 2014** **Contributor for Pearson Education, Inc.**
Pearson Education
- ◆ Developed lecture slides for the *Instructor's Resource DVD for College Physics: A Strategic Approach*
- 2013 - 2014** **Substitute Lecturing**
University of Central Florida, Orlando, FL USA
- ◆ Asteroids Comets & Meteors: Binary Asteroids (10/2013)
Undergraduate/Graduate small lecture course
 - ◆ Introductory Astronomy (2/2014)
Large undergraduate lecture course
- Jul - Aug 2012** **Visiting Student Researcher**
Nov - Dec 2009 *Arecibo Observatory, Arecibo, Puerto Rico USA*
- ◆ Shape modeling of first known triple near-Earth asteroid (NEA) system 2001 SN₂₆₃
 - ◆ Radar observations of NEAs
 - ◆ Remote observations of NEAs using Infrared Telescope Facility
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Research Interests

- ◆ The study of Europa's atmosphere and surface composition in the UV
 - ◆ Determining the composition of asteroids through UV surface reflectance observations
 - ◆ Radar observations and the derived physical shapes of near-Earth asteroids
 - ◆ Measuring particle properties of Saturn's rings from stellar occultation data
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Grants

- 2019 - 2022** **NASA ROSES Cassini Data Analysis Program (CDAP)**
Determining the Particle Size and Composition of Saturn's Rings from Unique Cassini Observations

2018 - 2021	HST Cycle 25 GO Program - Principle Investigator Europa in the Mid-UV: Constraining the composition of Europa at previously unexplored wavelengths.
2018 - 2021	HST Cycle 25 GO Program - Principle Investigator Stellar Occultation by Saturn's Rings: Additional ring particle and dynamics constraints
2017 - 2020	HST Cycle 24 GO Program - Principle Investigator Psyche's UV Reflectance Spectra: Exploring the origins of the largest exposed-core metallic asteroid.
2013 - 2016	NASA Florida Space Grant Consortium Space Grant Fellow Characterizing the Size Distribution and Vertical Displacement of Particles in Saturn's Rings

Publications

1. **Becker, T. M.**, Retherford, K. D., Roth, L., Hendrix, A. R., McGrath, M. A., Saur, J., 2018. The Far-UV Albedo of Europa from HST Observations. *Journal of Geophysical Research: Planets*, 123. <https://doi.org/10.1029/2018JE005570>
2. **Becker, T. M.**, Colwell, J. E., Esposito, L. W., Attree, N.O., Murray, C., 2018. Cassini UVIS Solar occultations by Saturn's F ring and the detection of collision-produced micron-sized dust. *Icarus* 306, 171 – 199. doi: 10.1016/j.icarus.2018.02.006.
3. Kammer, J. A., **Becker, T. M.**, Retherford, K. D., Stern, S.A., Olkin, C. B., Buie, M. W., Spencer, J. R., Bosh, A. S., Wasserman, L. H., 2018. Probing the Hill Sphere of (486958) 2014 MU69: HST FGS Observations during the 2017 July 17 Stellar Occultation. *The Astronomical Journal* 156:72. doi:10.3847/1538-3881/aacdf8
4. Alday, J., Roth, L., Ivchenko, N., Retherford, K. D., **Becker, T. M.**, Molyneux, P., Saur, J., 2017. New Constraints on Ganymede's hydrogen corona: Analysis of Lyman-alpha emissions observed by HST/STIS between 1998 and 2014. *Planetary and Space Science* 148, 35 - 44.
5. Roth, L., Alday, J., **Becker, T. M.**, Ivchenko, N., Retherford, K. D., 2017. Detection of a hydrogen corona at Callisto. *J. Geophys. Res. Planets*, 122, 1046–1055, doi: 10.1002/2017JE005294.
6. Roth, L., Retherford, K.D., Ivchenko, N., Schlatter, N., Strobel, D. F., **Becker, T. M.**, Grava, C., 2017. Detection of a Hydrogen corona in HST Lyman-alpha images of Europa in transit of Jupiter. *The Astronomical Journal*, 153:67. doi: 10.3847/1538-3881/153/2/67.
7. **Becker, T. M.**, Colwell, J. E., Esposito, L. W., Bratcher, A. D., 2016. Characterizing the Particle Size Distribution of Saturn's A Ring with Cassini UVIS Occultation Data. *Icarus* 279, 20 - 35.
8. **Becker, T. M.**, Howell, E.S., Nolan, M.C., Magri, C., Pravec, P., Taylor, P. A., Oey, J., Higgins, D., Világi, J., Kornoš, L., Galád, A., Gajdoš, Š., Gaftonyuk, N. M., Krugly, Y.N., Molotov, I. E., Hicks, M. D., Carbognani, A., Warner, B. D., Vachier, F., Marchis, F., Pollock, J. T. , 2015. Physical modeling of triple near-Earth Asteroid (153591) 2001 SN263

from radar and optical light curve observations. *Icarus*, 248, 499-515. [doi:10.1016/j.icarus.2014.10.048](https://doi.org/10.1016/j.icarus.2014.10.048)

30+ First-author conference abstracts

Professional Service

- 2015 - Present** **Proposal Reviewer**
◆ Arecibo Observatory Proposal Reviewer
◆ Hubble Space Telescope Proposal Reviewer
◆ Journal Reviews for *Nature Astronomy*; *Science Advances*; *Icarus*; *Planetary & Space Science*; *Earth, Moon, & Planets*
◆ Proposal Review Panelist, Chair for NASA ROSES grant programs
- 2018 - Present** **AGU Voices for Science**
Selected to represent the AGU as a science communicator
- 2017 - Present** **NASA JPL Solar System Ambassador**
Selected to promote broad interest in NASA missions and space exploration through education and public engagement
- 2017 - Present** **Space Science Seminar Series Coordinator**
Southwest Research Institute
- 2011 - 2015** **Physics Women Society**
University of Central Florida, Orlando, FL USA
◆ President (2013 - 2015), Secretary (2011 - 2013)
- 2011 - 2014** **Robinson Observatory Special Tours Director**
University of Central Florida, Orlando, FL USA
◆ Coordinate tours of observatory for scouts and classes
◆ Prepare/teach astronomy lessons
- 2006 - 2010** **Society of Physics Students**
Lehigh University, Bethlehem, PA USA
◆ President (2009 - 2010), Executive Board (2006 - 2010)
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Invited Presentations & Public Appearances

- Jan 18-20, 2019** **CUWiP Panel Speaker - Texas A&M Corpus Christi**
Served on “Imposter Syndrome” and “Undergraduate Opportunities” panels at the Conference for Undergraduate Women in Physics
- Oct 2018** **Targeting an Ocean World: The Exploration of Jupiter’s Icy Moon, Europa, Trinity University, San Antonio, TX**
- Dec 2017** **Beyond the MicroScope Podcast**
Podcast Interview on astronomy in the UV
- Aug 2017** **Solar Eclipse Presentation at Patrick Heath Library, Boerne, TX**

Apr 2017	<u>PBS NOVA Front Row Seat to Saturn</u> Featured on short video for promotion of Cassini Grand Finale
Mar 2017	San Antonio NEXT Lecture Series: Connecting to the Cosmos Public talk on the Europa Clipper mission
Mar 2017	<u>NASA Center for Lunar Science and Exploration YouTube Live</u> Webinar Q&A about current and past research
Aug 2016	The smallest particles in Saturn's Rings: Constraints on the particle size distribution from diffraction signatures in Cassini-UVIS occultation observations. Royal Institute of Technology (KTH), Stockholm, Sweden
Feb 2014	Why So Few? Women in Science, Technology, Engineering and Mathematics Presentation University of Central Florida, Orlando FL USA <i>Amer. Association of University Women study on women in STEM</i>
Feb 2014	Measuring the smallest particles in Saturn's Rings Florida Space Institute, Orlando FL USA
Feb 2013	Orlando Public Library Women in STEM Career Panel Orlando Public Library, Orlando, FL USA

Service Activities

2018 - present	Letters to a Pre-Scientist Pen-pal with low-income students interested in astronomy
2017 - present	Astronomy on Tap San Antonio Co-creator/organizer for monthly public astronomy presentations
2017 - present	Skype a Scientist Skype into classrooms around the country and answer questions
2017 - present	SwRI Lab Tours Organize and provide tours for Robotics teams, Physics Camps, etc.
2016 - present	Young Engineers and Scientists (YES) Program Southwest Research Institute, San Antonio, TX USA <ul style="list-style-type: none"> • Co-developed and implement 1-week spectroscopy program for advanced high school students
Mar 16-17 2019	Witte Museum Super Spring Break - Planet Pioneers "Build a comet" activities and science talks
Oct 28, 2018	Alamo City Comic Con Panel Led and participated on science-focused discussion panels
Oct 13, 2018	Día de la Física at SwRI - Local Organizer

- 1-day conference organized by National Society for Hispanic Physicists, during SACNAS conference, for 80+ undergraduates
- Nov 2017** **Core4STEM Family Day**
Hispanic Chamber of Commerce public presentations at the Scobee Education Center
- Jul 2017** **Boys & Girls Club of San Antonio Presentation**
Presentation on the Career of an Astronomer
- 2014 - 2016** **ASPIRE Mentor**
University of Central Florida, Orlando, FL USA
Mentor high school student on research project using Cassini data
- Nov 2014** **Knights Observe the Moon Night**
University of Central Florida, Orlando, FL USA
 - Co-organized family event for ~100 people to use telescopes and learn about the moon
- Sept 2014** **International Observe the Moon Night**
South Carolina State Museum, Columbia, SC USA
 - Ran a station to learn about moon phases for >500 people
- Oct 2013** **Women Faculty in Academia: Challenges and Successes**
University of Central Florida, Orlando, FL USA
 - Workshop panel moderator
- Oct 2013** **International Observe the Moon Night**
University of Central Florida, Orlando, FL USA
 - Co-organized family event for ~100 people to use telescopes and learn about the moon
- Jul 2013** **Science Café for Kids**
Orlando Public Library, Orlando, FL USA
 - Presentation on Light for Middle & High School students
- Feb 2013** **College of Sciences Gonfalon Recommendation Committee**
University of Central Florida, Orlando, FL USA
 - Chose top College of Sciences Gonfalon designs to recommend to Dean and administrators for selection
- Jan 2013** **Conference for Undergraduate Women in Physics Co-Organizer**
University of Central Florida, Orlando, FL USA
 - National Science Foundation & Dept. of Energy-sponsored
 - Southeast Conference Organizer, ~100 attendees, 3-day conference
 - Coordinator for speakers and sponsors
- 2011 - 2015** **Robinson Observatory Outreach Events**
University of Central Florida, Orlando, FL USA
 - Weekly Open Houses for public and introductory astronomy students
 - Bring telescopes to schools for observing and teaching

- Interact with nearly 1,000 members of the public (children and adults) in over 25 different outreach events

2011 - 2015

Physics Women Society Outreach Events

University of Central Florida, Orlando, FL USA

- Science Day: PWS & Women in Lasers and Optics present hands-on activities for ~150 local Middle School students
- Amer. Association of Univ. Women (AAUW) Tech Trek: provided tours of physics labs for 50 middle school girls
- Physics & Math Career Exploration Day volunteer
- Summer Research Academy

Jun 2012

National Planetary Exploration Car Wash and Bake Sale

University of Central Florida, Orlando, FL USA

- Media Coordinator
- Sent >200 signed letters from public to Congress to restore NASA budget cuts

May - Aug 2011

Professional Development Workshop on Gravity and Motion

University of Central Florida, Orlando, FL USA

- Helped develop and run three workshops for ~100 local Middle School and High School teachers
- Created worksheets for students to accompany various demonstrations provided to the teachers

2007 - 2010

Science Outreach Program

Lehigh University, Bethlehem, PA USA

- Various science programs in Elementary and Middle School classrooms

Aug - Oct 2009

Volunteer Teacher at Indigenous Mayan School

Global Vision International Phoenix School, Itzapa, Guatemala

- Educator of math, science, history, and language for 2nd and 3rd graders, in Spanish

Jan - Apr 2008

Sally Ride Outreach Program

Lehigh University, Bethlehem, PA USA

- Worked with selected 4th grad girls, discussing the role of women in STEM and astronomy concepts
- Prepared girls for their private meeting with Dr. Sally Ride, helped them develop questions for her

Jul - Dec 2007

Volunteer English Teacher

Open Doors Program, Viña del Mar, Chile

2006 - 2008

Spring Serve (Alternative Spring Break)

Lehigh University, Bethlehem, PA USA

- Hurricane Katrina Relief in Biloxi, Mississippi (2007)
- Give Kids the World/Make A Wish Foundation, Kissimmee, FL (2008)

Honors & Awards

Oct 2018	NASA Group Achievement Award for Cassini UVIS Science Team
Feb 2018	OPAG Early Career Funding Award
Jan 2017	College of Sciences Award for Outstanding Dissertation <i>Univ. of Central Florida award for excellence for a dissertation</i>
June 2016	Asteroid 26471 Tracybecker <i>Binary asteroid named in recognition of my research on the first triple near-Earth asteroid system</i>
2013 - 2015	Graduate Research Excellence Fellowship <i>2-year fellowship to pursue research at UCF</i>
May 2015	College of Sciences General Scholarship <i>Univ. of Central Florida's College of Science award for commitment and dedication to pursuit of educational goals</i>
Mar 2014	Order of Pegasus, Class of 2014 <i>Univ. of Central Florida's Most Prestigious Award for Graduate Students</i>
Aug 2013	Extreme Leadership Scholarship <i>Univ. of Central Florida's Student Government Association award for leadership in the community and at the university</i>
Apr 2013	2013 Statewide Graduate Student Research Symposium Univ. of South Florida, Tampa, FL USA <i>First place in category of STEM: Physical Sciences</i>
Apr 2013	2013 UCF Graduate Research Forum Best in Category Univ. of Central Florida, Orlando FL USA <i>1st place in category of Mathematics, Optics and Physical Sciences</i>
Mar 2008	Lehigh University Women's Club Scholar Award for the College of Arts and Sciences <i>Scholarship for high academic performance</i>

Student Advising

2018 - 2019	Jasmine Manansala (<i>high school Independent Study Mentorship</i>)
2014 - 2016	Nirja Shah (<i>high school ASPIRE student</i>)

Professional Societies

2011 - Present	American Geophysical Union
2008 - Present	American Astronomical Society, Division for Planetary Sciences