



Jack H. Madden

PHD CANDIDATE IN ASTROPHYSICS AT CORNELL UNIVERSITY

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Education

Cornell University

PH.D. CANDIDATE IN ASTROPHYSICS, M.S. AWARDED IN 2017 - ADVISED BY DR. LISA KALTENEGGER

Ithaca, New York

Sept. 2014 - Present

Franklin and Marshall College

B.A. IN ASTRONOMY - ADVISED BY DR. FRONEY CRAWFORD III

Lancaster, PA

Sept. 2010 - May 2014

Research Experience

Cornell Astronomy and Space Sciences

GRADUATE RESEARCH ASSISTANT - DR. LISA KALTENEGGER

Ithaca, NY

Fall 2014 - Present

- Calculated and assembled a catalog of spectra and albedos for 19 Solar System objects to be used as references in exoplanet characterization.
- Updated and optimized 1D climate and photochemistry models, and observation simulations for exoplanet use.
- Modeling of the climate and photochemistry of terrestrial exoplanets to determine suitable conditions for life and detectable biosignatures in regard to the effect of surface albedo.
- Modeled the climate and determined the habitability of the planet Gl 357 d.

Cornell Physics Education Research Lab

GRADUATE RESEARCH ASSISTANT - DR. NATASHA HOLMES

Ithaca, NY

Fall 2018 - Spring 2019

- Explored the differences in learning outcomes between virtual reality, computer simulation, and hands-on activities for Moon phases.
- Designed and built a full Moon phase demonstration using the Unity game engine for Oculus Rift.

Goddard Spaceflight Center

SUMMER INTERNSHIP PROGRAM - DR. LYNN CARTER & DR. CATHERINE NEISH

Greenbelt, MD

Summer 2013

- Scanned the entire Moon for lunar impact melts and cataloged their features.
- Discovered 24 new impact melts and updated the global melt statistics.

Franklin and Marshall College

UNDERGRADUATE RESEARCH ASSISTANT - DR. FRONEY CRAWFORD III

Lancaster, PA

Fall 2010 - May 2014

- Investigated pulsar candidates in the Small and Large Magellanic clouds using data from the Parkes Multibeam Pulsar Survey.
- Discovered PSR J0456-69 and tested image recognition techniques for pulsar identification.

Honors, Awards, & Fellowships

2019	Brinson Foundation research funding	<i>Cornell</i>
2018	Branson and Edna B. Shelley Service Award	<i>Cornell</i>
2017	Center for Teaching Innovation Graduate Research Teaching Fellowship	<i>Cornell</i>
2016	Branson and Edna B. Shelley Outstanding Teaching Assistant Award	<i>Cornell</i>
2016	NY Space Grant Fellowship	<i>Cornell</i>
2014	Honors Societies: Phi Beta Kappa, Sigma Xi, Sigma Pi Sigma	<i>F&M</i>
2013	Kershner Scholar	<i>F&M</i>
2013	Micheal J. Mumma Prize in Physics and Astronomy	<i>F&M</i>
2012	Hackman Summer Research Scholarship	<i>F&M</i>

Professional Service

Co-chair - Astronomy Climate and Diversity Committee

FOUNDING MEMBER - COORDINATED TASKS SUCH AS A CREATING A VALUES STATEMENT, TRAININGS, AND METRICS.

Cornell

2019-Present

President - Astronomy Graduate Network

COORDINATED SEMINARS, SPEAKERS, EVENTS, AND SOCIAL PROGRAMING FOR THE ASTRONOMY GRADUATES.

Cornell

2017-2018

Graphic design and concept art

CREATED PRESS RELEASE IMAGES AND JOURNAL COVERS AS WELL AS GIVEN TALKS+WORKSHOPS ON GRAPHIC DESIGN

[Cornell](#)

2016-Present

Emergency Medical Technician

VOLUNTEER ON CAMPUS AND IN THE COMMUNITY AS AN EMT. APPROX. 3000 HOURS SINCE 2011

[NY, and PA](#)

2011-Present

Teaching Experience

Graduate Research Teaching Fellowship

[Ithaca, NY](#)

TEACHING ASSISTANT, AND GRADER

Fall 2017 - Spring 2018

- Took 2 semesters of pedagogy and teaching as research courses and conducted original research in teaching.
- Taught several workshops for graduate students on teaching and course management

Cornell University

[Ithaca, NY](#)

TEACHING ASSISTANT, AND GRADER

Fall 2014 - Spring 2016

- Teaching assistant for 3 semesters of introductory astronomy. Taught 30 students in 2 discussion sessions per week. Made homeworks, held office hours, graded, taught several full lectures of 200+ students.
- Head teaching assistant for 1 semester. Extensive course management and revamping the department's TA policy.

Franklin and Marshall College

[Lancaster, PA](#)

TUTOR, LAB INSTRUCTOR, AND TEACHING ASSISTANT

Fall 2010 - May 2014

- Astronomy and physics tutor and lab assistant for all 4 years.
- Teaching assistant for 2 courses. Gave lectures, wrote assignments, and held office hours

In Media

- 10.7.19 **Leading Lines Podcast Episode 65: Jack Madden and Swati Pandita**, Derek Bruff [Leading Lines](#)
- 7.31.19 **TESS satellite uncovers 'first nearby super-Earth'**, Blaine Friedlander [Cornell Chronicle](#)
- 2.5.19 **Study probes effect of virtual reality on learning**, Linda Glaser [Cornell Chronicle](#)
- 9.19.18 **One (Solar System) catalog to aid them all**, Amber Hornsby [Astrobites.org](#)
- 7.31.18 **This Solar System Catalog Could Be Key to Finding an Earth-Like Exoplanet**, Ryan Mandelbaum [Gizmodo.com](#)
- 7.26.18 **Exoplanet detectives create catalog of 'light-fingerprints'**, Linda Glaser [Cornell Chronicle](#)
- 3.14.18 **Elevator Art Contest Winners**, Melanie Lefkowitz [Cornell Library](#)
- 9.13.12 **F&M Student Discovers Rare Extragalactic Pulsar**, Chris Karlesky [F&M News](#)
- 10.23.12 **F&M student makes rare scientific discovery**, Jere Gish [WGAL 8 TV](#)

Outreach

EVENTS AND Q&AS

Ask an Astronomer

[Cornell](#)

ANSWERED QUESTIONS SUBMITTED TO OUR WEBSITE FROM THE PUBLIC ABOUT ASTRONOMY

2014-present

4-H Career Explorations

[Cornell](#)

WORKED WITH KIDS

Summer 2017

Museum in the Dark

[Ithaca, NY](#)

HALLOWEEN THEMED NIGHTTIME EVENT IN A LOCAL MUSEUM WITH DEMONSTRATIONS ABOUT ASTRONOMY

2014-2019

PUBLIC TALKS

Tompkins County Public Library

[Ithaca, NY](#)

THE NEW SEARCH FOR LIFE

April 2018

Museum of the Earth - Darwin Days

[Ithaca, NY](#)

HOW LIFE ON EARTH CHANGES HOW WE SEARCH FOR LIFE ON OTHER PLANETS

February 2018

Mann Library - SPARK talks

[Ithaca, NY](#)

ARE WE ALONE?

October 2015

Conference Abstracts

2019	J. Madden , L. Kaltenecker, How surface albedo shapes a planet — inside our Solar System and out	ESS IV
2014	J. Madden , C. Neish, L. Carter, B. Hawke, & T. Giguere, The Discovery of New Impact Melts Using MINI-RF on LRO	LPSC 44
2013	J. Ridley, D. Lorimer, S. Bailey, F. Crawford, & J. Madden , R. Anella, New Radio Pulsars in the Large Magellanic Cloud, #218.02	AAS Meeting 222
2013	F. Crawford, D. Lorimer, J. Ridley, & J. Madden , A Survey for Millisecond Pulsars and Fast Transients in the Large Magellanic Cloud, #412.04	AAS Meeting 221

Conference Talks

AbGradCon

1D EXOPLANET HABITABILITY: NOW IN TECHNICOLOR

[University of Utah](#)

[July 2019](#)

ERES V Symposium

EFFECT OF SURFACE TYPE FOR EARTH-LIKE PLANETS ORBITING FGKM STARS

[Cornell University](#)

[June 2019](#)

Breakthrough Starshot Workshop

CHIPSAT SCIENCE CASES FOR VENUS AND TITAN

[Auckland, NZ](#)

[March 2019](#)

Connecting Teaching and Research Conference

VIRTUAL REALITY AS A TEACHING TOOL FOR MOON PHASES AND BEYOND

[Cornell University](#)

[May 2018](#)

ERES IV Symposium

SOLAR SYSTEM BODIES FOR EXOPLANET COMPARISON

[Penn State University](#)

[June 2018](#)

American Association of Physics Teachers

VIRTUAL REALITY AS A TEACHING TOOL FOR MOON PHASES AND BEYOND

[Washington D.C.](#)

[July 2018](#)

Central Pennsylvania Consortium

IMAGE RECOGNITION TO FIND PULSARS

[Lancaster, PA](#)

[April 2014](#)

Posters

Extreme Solar Systems IV

INTERACTION OF SURFACE ALBEDO AND STAR TYPE IN PLANETARY HABITABILITY WITH 1D MODELING

[Reykjavik, Iceland](#)

[August 2019](#)

Physics Education Research Conference (PERC)

VIRTUAL REALITY AS A TEACHING TOOL FOR MOON PHASES AND BEYOND

[Washington D.C.](#)

[August 2018](#)

Exoplanets II

A CATALOG OF SPECTRA, ALBEDOS, AND COLORS OF SOLAR SYSTEM BODIES FOR EXOPLANET COMPARISON

[Cambridge, UK](#)

[July 2018](#)

Simons Foundation Meeting

A CATALOG OF SPECTRA, ALBEDOS, AND COLORS OF SOLAR SYSTEM BODIES FOR EXOPLANET COMPARISON

[New York, NY](#)

[April 2018](#)

AbGradCon

CLOUDY WITH A CHANCE OF HIGH UNCERTAINTY

[Charlottesville, VA](#)

[June 2018](#)

ERES II Symposium

ALBEDOS AND COLORS OF SOLAR SYSTEM BODIES AROUND F, G, K, AND M STARS

[Washington D.C.](#)

[July 2018](#)

AbSciCon

A DATABASE OF SPECTRA, ALBEDOS AND COLORS OF SOLAR SYSTEM BODIES FOR EXOPLANET COMPARISON

[Mesa, AZ](#)

[April 2017](#)

Goddard Summer Research Showcase

THE DISCOVERY OF NEW IMPACT MELTS USING MINI-RF ON LRO

[Greenbelt, MD](#)

[August 2013](#)

F&M Hackman Research

BENCHMARK TESTING AND OPTIMIZED PROCESSING OF A PULSAR SURVEY IN THE LARGE MAGELLANIC CLOUD

[Lancaster, PA](#)

[August 2012](#)

F&M Closer Look

A NEW SURVEY FOR PULSARS IN THE LARGE MAGELLANIC CLOUD

[Lancaster, PA](#)

[April 2012](#)

Software

High proficiency	Mathematica, bash, Photoshop, Illustrator, Inkscape, \LaTeX , Terragen, Word/Excel/Powerpoint
Working proficiency	Python, C sharp, Blender, Unity, Git, Fortran, HTML, InDesign, Premiere Pro

Peer Reviewed Papers

In Review	J. Madden , & L. Kaltenegger, How planetary surfaces can shape the climate of habitable exoplanets	<i>MNRAS</i>
In Review	L. Kaltenegger, Z. Lin, & J. Madden , High-Resolution Transmission Spectra of Earth through Geological Time (on ArXiv)	<i>ApJL</i>
In Review	J. H. Madden , S. Pandita, B. Kim, J. P. Schuldt, A. S. Won & N. G. Holmes, Ready Student One: Exploring predictors for student learning in virtual reality (on ArXiv)	<i>PLOS ONE</i>
2019	L. Kaltenegger, J. Madden , Z. Lin, S. Rugheimer, A. Segura, R. Luque, E. Pallé, N. Espinoza , The Habitability of GJ 357 d: Possible Climates and Observability	<i>ApJL</i>
2019	R. Luque et al. , Planetary system around the nearby M dwarf GJ 357 including a transiting, hot, Earth-sized planet optimal for atmospheric characterization	<i>A&A</i>
2018	J. Madden , & L. Kaltenegger , A Catalog of Spectra, Albedos, and Colors of Solar System Bodies for Exoplanet Comparison	<i>Astrobiology</i>
2018	J. H. Madden , A. S. Won, J. P. Schuldt, B. Kim, S. Pandita, Y. Sun, T. J. Stone, & N. G. Holmes, Virtual Reality as a Teaching Tool for Moon Phases and Beyond	<i>PERC Proceedings</i>
2014	C. Neish, J. Madden , L. Carter, B. Hawke, T. Giguere, V. Bray, G. Osinski, & J. Cahill, Global Distribution of Lunar Impact Melt Flows	<i>Icarus</i>
2013	J. Ridley, F. Crawford, D. Lorimer, S. Bailey, J. Madden , R. Anella, & J. Chennamangalam, Eight New Radio Pulsars in the Large Magellanic Cloud	<i>MNRAS</i>