



Jack H. Madden

PH.D. IN ASTROPHYSICS, CORNELL UNIVERSITY

514 Space Sciences Building, Cornell University, Ithaca NY 14850

☎ (607) 255-6420

✉ jmadden@astro.cornell.edu

🏠 jmadden.org

📺 [JackHMadden](#)

ORCID [0000-0002-4701-7833](#)

Education

M.F.A. Rhode Island School of Design

DIGITAL+MEDIA

Providence, Rhode Island

Sept. 2020 - May 2022

Ph.D. Cornell University

ASTROPHYSICS - M.S. AWARDED IN 2017 - ADVISED BY DR. LISA KALTENEGGER

Ithaca, New York

Sept. 2014 - May 2020

B.A. Franklin and Marshall College

ASTRONOMY - ADVISED BY DR. FRONEY CRAWFORD III

Lancaster, PA

Sept. 2010 - May 2014

Research Experience

Cornell Astronomy and Space Sciences

Ithaca, NY

GRADUATE RESEARCH ASSISTANT - DR. LISA KALTENEGGER

Fall 2014 - Summer 2020

- 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.
- Created a database of habitable exoplanet models and high resolution observations for different surfaces types.

Cornell Physics Education Research Lab

Ithaca, NY

GRADUATE RESEARCH ASSISTANT - DR. NATASHA HOLMES

Fall 2018 - Spring 2019

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

Goddard Spaceflight Center

Greenbelt, MD

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

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

Lancaster, PA

UNDERGRADUATE RESEARCH ASSISTANT - DR. FRONEY CRAWFORD III

Fall 2010 - May 2014

- Investigated pulsar candidates in the Small and Large Magellanic clouds using data from the Parkes Multibeam Pulsar Survey and tested image recognition techniques for pulsar identification.
- Discovered PSR J0456-69, one of only 28 known extragalactic pulsars at the time.

Honors, Awards, & Fellowships

2019 **Brinson Foundation research funding**

Cornell

2018 **Branson and Edna B. Shelley Service Award**

Cornell

2017 **Center for Teaching Innovation Graduate Research Teaching Fellowship**

Cornell

2016 **Branson and Edna B. Shelley Outstanding Teaching Assistant Award**

Cornell

2016 **NY Space Grant Fellowship**

Cornell

2014 **Honors Societies: Phi Beta Kappa, Sigma Xi, Sigma Pi Sigma**

F&M

2013 **Kershner Scholar**

F&M

2013 **Micheal J. Mumma Prize in Physics and Astronomy**

F&M

2012 **Hackman Summer Research Scholarship**

F&M

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

INSTRUCTOR, AND RESEARCHER

[Ithaca, NY](#)

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

TEACHING ASSISTANT, GRADER, AND GUEST LECTURER

[Ithaca, NY](#)

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, and graded
- Head teaching assistant for 1 semester. Extensive course management and leading of TA activities.
- Taught several full lectures of 200+ students for introductory astronomy.
- Worked with faculty revamp the current policies and procedures for TAs and Head TAs. Created an online archive of course material and guides for TAs.

Franklin and Marshall College

TUTOR, LAB INSTRUCTOR, AND TEACHING ASSISTANT

[Lancaster, PA](#)

Fall 2010 - May 2014

- Astronomy and physics tutor and lab assistant for all 4 years. Covered 1st and 2nd year physics and astronomy courses and labs.
- Teaching assistant for 2 courses. Gave lectures, wrote assignments, held office hours, and graded.

In Media

5.23.20	New Planetary Color Models Will Decode Signs Of Extrasolar Life , Bruce Dorminey	Forbes.com
5.18.20	Astronomers develop 'decoder' to gauge exoplanet climate , Blaine Friedlander	Cornell Chronicle
3.25.20	Video game experience or gender may improve VR learning, study finds , Melanie Lefkowitz	Cornell Chronicle
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

ANSWERED QUESTIONS SUBMITTED TO OUR WEBSITE FROM THE PUBLIC ABOUT ASTRONOMY

[Cornell](#)

2014-present

4-H Career Explorations

WORKED WITH KIDS

[Cornell](#)

Summer 2017

Museum in the Dark

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

[Ithaca, NY](#)

2014-2019

PUBLIC TALKS

Tompkins County Public Library

THE NEW SEARCH FOR LIFE

[Ithaca, NY](#)

[April 2018](#)

Museum of the Earth - Darwin Days

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

[Ithaca, NY](#)

[February 2018](#)

Mann Library - SPARK talks

ARE WE ALONE?

[Ithaca, NY](#)

[October 2015](#)

Conference Abstracts

- | | | |
|------|--|---------------------------------|
| 2019 | J. Madden , L. Kaltenegger, 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

AAS 235

REVEALING THE IMPORTANCE OF SURFACE COLOR IN MODELING HABITABLE EXOPLANET ATMOSPHERES

[Honolulu, HI](#)

[January 2020](#)

AAS 235

READY STUDENT ONE: EXPLORING THE PREDICTORS OF STUDENT LEARNING IN VIRTUAL REALITY

[Honolulu, HI](#)

[January 2020](#)

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

Goddard Summer Research Showcase

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

F&M Hackman Research

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

F&M Closer Look

A NEW SURVEY FOR PULSARS IN THE LARGE MAGELLANIC CLOUD

Mesa, AZ

April 2017

Greenbelt, MD

August 2013

Lancaster, PA

August 2012

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

Certifications

BLS Emergency Medical Technician, New York

2011-Present

Wilderness EMT, Wilderness Medical Associates

2018-present

Advanced Open Water Diver, PADI

2015-Present

BLS & Wilderness Emergency Care Instructor, American Health & Safety Institute

2018-Present

Peer Reviewed Papers

2020	J. Madden , & L. Kaltenegger, High-resolution Spectra for a Wide Range of Habitable Zone Planets around Sun-like Stars	ApJL
2020	J. Madden , & L. Kaltenegger, How surfaces shape the climate of habitable exoplanets (ADS)	MNRAS
2020	L. Kaltenegger, Z. Lin, & J. Madden , High-Resolution Transmission Spectra of Earth through Geological Time (ADS)	ApJL
2020	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 (ADS)	PLOS ONE
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 (ADS)	ApJL
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 (ADS)	A&A
2018	J. Madden , & L. Kaltenegger, A Catalog of Spectra, Albedos, and Colors of Solar System Bodies for Exoplanet Comparison (ADS)	Astrobiology
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	PERC Proceedings
2014	C. Neish, J. Madden , L. Carter, B. Hawke, T. Giguere, V. Bray, G. Osinski, & J. Cahill, Global Distribution of Lunar Impact Melt Flows (ADS)	Icarus
2013	J. Ridley, F. Crawford, D. Lorimer, S. Bailey, J. Madden , R. Anella, & J. Chennamangalam, Eight New Radio Pulsars in the Large Magellanic Cloud (ADS)	MNRAS