



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](https://www.linkedin.com/in/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

GRADUATE RESEARCH ASSISTANT - DR. LISA KALTENEGGER

Ithaca, NY

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

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.
- 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

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 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	<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

Cornell

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

2019-Present

President - Astronomy Graduate Network

Cornell

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

2017-2018

Graphic design and concept art

Cornell

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

2016-Present

Emergency Medical Technician

NY, and PA

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

2011-Present

Teaching Experience

Graduate Research Teaching Fellowship

Ithaca, NY

INSTRUCTOR, AND RESEARCHER

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, GRADER, AND GUEST LECTURER

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

Lancaster, PA

TUTOR, LAB INSTRUCTOR, AND TEACHING ASSISTANT

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

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

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. 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

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

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

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

In review	J. Madden , & L. Kaltenegger, High-resolution Spectra for a Wide Range of Habitable Zone Planets around Sun-like Stars	<i>ApJL</i>
2020	J. Madden , & L. Kaltenegger, How surfaces shape the climate of habitable exoplanets (ADS)	<i>MNRAS</i>
2020	L. Kaltenegger, Z. Lin, & J. Madden , High-Resolution Transmission Spectra of Earth through Geological Time (ADS)	<i>ApJL</i>
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)	<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 (ADS)	<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 (ADS)	<i>A&A</i>
2018	J. Madden , & L. Kaltenegger, A Catalog of Spectra, Albedos, and Colors of Solar System Bodies for Exoplanet Comparison (ADS)	<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 (ADS)	<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 (ADS)	<i>MNRAS</i>