

Jack H. Madden

PH.D. IN ASTROPHYSICS FROM CORNELL, MFA STUDENT AT RISD

Rhode Island School of Design, 2 College St. #2459, Providence, RI 02903

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Education

M.F.A. Rhode Island School of Design [current student]

Providence, Rhode Island

DIGITAL+MEDIA

Sept. 2020 - May 2022

Ph.D. Cornell University - Thesis: The Color of Habitability

Ithaca, New York

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

Sept. 2014 - May 2020

B.A. Franklin and Marshall College

Lancaster, Pennsylvania

ASTRONOMY - ADVISED BY DR. FRONEY CRAWFORD III

Sept. 2010 - May 2014

Awards, Fellowships, & Residencies

Art

| | | |
|------|------------------------------------|---------|
| 2021 | RISD Museum Dornier Prize | RISD |
| 2021 | Artist Residency at Wendy.Network | Virtual |
| 2021 | Nature Lab Vis-a-thon Collaborator | RISD |
| 2020 | RISD Tuition Fellowship | RISD |

Science

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|------|--|---------|
| 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 |

In Media

| | | |
|----------|--|-------------------|
| 11.1.20 | Bringing Exoplanets to Life, Christian Fogerty | StarDate Magazine |
| 10.25.20 | The Color of Habitable Worlds, Matthew Cimone | Universe Today |
| 8.8.20 | Discussed: What If We Lived on a Super Earth? - with Jack Madden, What If | YouTube |
| 5.23.20 | New Planetary Color Models Will Decode Signs Of Extrasolar Life, Bruce Dorminey | Forbes |
| 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 |

Science 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.

Conference Abstracts

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|------|--|------------------------|
| 2020 | N. Kutsop, et. al. , Addressing Diversity, Inclusion, and Values in the Cornell Astronomy Community: The Graduate Students Response #502.08 | <i>DPS 52</i> |
| 2019 | J. Madden , L. Kaltenegger, How surface albedo shapes a planet — inside our Solar System and out | <i>ESS IV</i> |
| 2014 | J. Madden , C. Neish, L. Carter, B. Hawke, & T. Giguere, The Discovery of New Impact Melts Using MINI-RF on LRO | <i>LPSC 44</i> |
| 2013 | J. Ridley, D. Lorimer, S. Bailey, F. Crawford, & J. Madden , R. Anella, New Radio Pulsars in the Large Magellanic Cloud, #218.02 | <i>AAS Meeting 222</i> |
| 2013 | F. Crawford, D. Lorimer, J. Ridley, & J. Madden , A Survey for Millisecond Pulsars and Fast Transients in the Large Magellanic Cloud, #412.04 | <i>AAS Meeting 221</i> |

Conference Talks

AAS 235

Honolulu, HI

REVEALING THE IMPORTANCE OF SURFACE COLOR IN MODELING HABITABLE EXOPLANET ATMOSPHERES

January 2020

AAS 235

Honolulu, HI

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

January 2020

AbGradCon

University of Utah

1D EXOPLANET HABITABILITY: NOW IN TECHNICOLOR

July 2019

ERES V Symposium

Cornell University

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

June 2019

Breakthrough Starshot Workshop

Auckland, NZ

CHIPSAT SCIENCE CASES FOR VENUS AND TITAN

March 2019

Connecting Teaching and Research Conference

Cornell University

VIRTUAL REALITY AS A TEACHING TOOL FOR MOON PHASES AND BEYOND

May 2018

ERES IV Symposium

Penn State University

SOLAR SYSTEM BODIES FOR EXOPLANET COMPARISON

June 2018

American Association of Physics Teachers

VIRTUAL REALITY AS A TEACHING TOOL FOR MOON PHASES AND BEYOND

Central Pennsylvania Consortium

IMAGE RECOGNITION TO FIND PULSARS

Washington D.C.

July 2018

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

Professional Service

SEI Assistantship

ASSISTED WITH DIGITAL+MEDIA DEPARTMENT SOCIAL EQUITY AND INCLUSION INITIATIVES.

RISD

2021

Co-chair - Cornell Astronomy Department Climate and Diversity Committee

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

Cornell

2019-2020

President - Astronomy Graduate Network

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

Cornell

2017-2018

Scientific Visualizations

PRESS RELEASE IMAGERY, JOURNAL COVERS, AND SCIENTIFIC GRAPHIC DESIGN WORKSHOPS.

Cornell/CSI

2016-2021

Emergency Medical Technician - Basic

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

NY, and PA

2011-2020

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

Teaching Experience

Graduate Research Teaching Fellow

CORNELL UNIVERSITY

Ithaca, NY

Fall 2017 - Spring 2018

- 2 semesters of pedagogy and teaching as research courses.
- Conducted original education research on VR for physics labs.
- Designed and taught 4 workshops for graduate students on teaching and course management.

Head Teaching assistant

CORNELL UNIVERSITY

Ithaca, NY

Spring 2016

- Head teaching assistant for 1 semester. Extensive course management and leading of TA activities.
- Designed and taught 2 discussion sections per week. Wrote lesson plans, designed homeworks, and graded.
- Worked with faculty to revamp the policies and procedures for TAs and Head TAs.
- Created an online archive of course material and guides for TAs.

Teaching Assistant

CORNELL UNIVERSITY

Ithaca, NY

Fall 2014 - Fall 2015

- 3 semesters of designing and teaching 2 discussion sections per week. Wrote lesson plans, designed homeworks, held office hours, review sessions, and graded.

Undergraduate Teaching Assistant

FRANKLIN AND MARSHALL COLLEGE

Lancaster, PA

Fall 2013 - Spring 2014

- Teaching assistant for 2 semesters. Helped with lectures, wrote assignments, held office hours, and graded.

Tutor and lab instructor

FRANKLIN AND MARSHALL COLLEGE

Lancaster, PA

Fall 2010 - May 2014

- Astronomy and physics tutor for 4 years. Covered 1st and 2nd semester physics, astrophysics, and astronomy.
- Lab assistant for 1st, 2nd, and 3rd semester physics, and observational astronomy.

Guest Lectures

2021 **Frontier Science Visualizations**, DM-1519 LITERACY_IN_3D.OBJ

RISD

2019 **How we see the sky**, ASTRO1101 Introductory Astronomy

Cornell

2017 **Causality and Black Holes**, ASTRO1101 Introductory Astronomy

Cornell

2015 **Black Holes**, ASTRO1101 Introductory Astronomy

Cornell

Public Outreach

EVENTS AND Q&AS

Ask an Astronomer

Cornell

ANSWERED QUESTIONS SUBMITTED TO OUR WEBSITE FROM THE PUBLIC ABOUT ASTRONOMY

2014-2020

4-H Career Explorations

Cornell

WORKED WITH MIDDLE AND HIGH SCHOOL STUDENTS TO LEARN ABOUT ASTRONOMY AND SCIENCE CAREERS

Summer 2017

Museum in the Dark

Ithaca, NY

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

2014-2019

PUBLIC TALKS

Fuertes Observatory

Ithaca, NY

SEARCHING FOR INTELLIGENT LIFE IN CORNELL CLASSROOMS AND BEYOND

November 2018

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

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*