

# Jack H. Madden

PH.D. IN ASTROPHYSICS FROM CORNELL, M.F.A. IN DIGITAL+MEDIA FROM RISD (HE/HIM/HIS)

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## Recent Highlight

2023 TEDx Talk, How to make art like an astrophysicist

[TEDx YouTube](#)

## Education

**M.F.A. Rhode Island School of Design - Thesis: Abyss without Vertigo**

[Providence, Rhode Island](#)

DIGITAL+MEDIA - ADVISED BY SHONA KITCHEN

[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 KALTENEGGER

[Sept. 2014 - June 2020](#)

**B.A. Franklin and Marshall College**

[Lancaster, Pennsylvania](#)

ASTROPHYSICS - ADVISED BY DR. FRONEY CRAWFORD III

[Sept. 2010 - May 2014](#)

## Awards, Fellowships, & Residencies

### ART

2023 **Miniature Monumental Recognition award**

[Bristol Art Museum](#)

2022 **Get Visual Award**

[Wolfram](#)

2021 **RISD Museum Dorner Prize**

[RISD](#)

2021 **Artist Residency at Wendy.Network**

[Virtual](#)

2021 **Nature Lab Vis-a-thon Collaborator**

[RISD](#)

2020 **RISD Tuition Fellowship**

[RISD](#)

### SCIENCE

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](#)

## Art Exhibitions

### SOLO AND GROUP

2021 **[SOLO] Curator: Deborah Clemons - Dorner Prize (Complete Definitions)**

[RISD Museum](#)

2023 **Miniature Monumental (22 Atmospheres, The Individual)**

[Bristol Art Museum](#)

2023 **The Art of Planetary Science (22 Atmospheres, The Otherview Effect)**

[University of Arizona](#)

2022 **Grad Thesis Show (Untitled Space no.4)**

[RISD](#)

2022 **2nd Festival of the Smallest (The Individual)**

[222Lodge](#)

2022 **Transitory Void (see Equations)**

[Boston CyberArts](#)

2022 **1+1=22 (see Equations)**

[Sol Koffler Gallery](#)

2021 **NG-17 test flight to International Space Station (The Individual)**

[MoonGallery](#)

2020 **Pandemic Publishing (Orthodox Nihilism)**

[volume.1](#)

2020 **Code as Medium (Books for Robots (only))**

[Places Instead](#)

2020 **Alone/Together (Untitled)**

[IncuArts Gallery](#)

## In Media

5.27.22	<b>Art and design on display at the 2022 RISD Graduate Exhibition</b> , Kris Craig	<i>Providence Journal</i>
12.13.21	<b>Astrophysicist Earns Dornier Prize</b> , Simone Solondz	<i>RISD News</i>
11.1.20	<b>Bringing Exoplanets to Life</b> , Christian Fogerty	<i>StarDate Magazine</i>
10.25.20	<b>The Color of Habitable Worlds</b> , Matthew Cimone	<i>Universe Today</i>
8.8.20	<b>Discussed: What If We Lived on a Super Earth? - with Jack Madden</b> , What If	<i>YouTube</i>
5.23.20	<b>New Planetary Color Models Will Decode Signs Of Extrasolar Life</b> , Bruce Dorminey	<i>Forbes</i>
5.18.20	<b>Astronomers develop 'decoder' to gauge exoplanet climate</b> , Blaine Friedlander	<i>Cornell Chronicle</i>
3.25.20	<b>Video game experience or gender may improve VR learning, study finds</b> , Melanie Lefkowitz	<i>Cornell Chronicle</i>
10.7.19	<b>Leading Lines Podcast Episode 65: Jack Madden and Swati Pandita</b> , Derek Bruff	<i>Leading Lines</i>
7.31.19	<b>TESS satellite uncovers 'first nearby super-Earth'</b> , Blaine Friedlander	<i>Cornell Chronicle</i>
2.5.19	<b>Study probes effect of virtual reality on learning</b> , Linda Glaser	<i>Cornell Chronicle</i>
9.19.18	<b>One (Solar System) catalog to aid them all</b> , Amber Hornsby	<i>Astrobiters.org</i>
7.31.18	<b>This Solar System Catalog Could Be Key to Finding an Earth-Like Exoplanet</b> , Ryan Mandelbaum	<i>Gizmodo.com</i>
7.26.18	<b>Exoplanet detectives create catalog of 'light-fingerprints'</b> , Linda Glaser	<i>Cornell Chronicle</i>
3.14.18	<b>Elevator Art Contest Winners</b> , Melanie Lefkowitz	<i>Cornell Library</i>
9.13.12	<b>F&amp;M Student Discovers Rare Extragalactic Pulsar</b> , Chris Karlesky	<i>F&amp;M News</i>
10.23.12	<b>F&amp;M student makes rare scientific discovery</b> , Jere Gish	<i>WGAL 8 TV</i>

## Peer Reviewed Papers

in review	N. Kutsop, A. G. Hayes, <b>et al.</b> , Investigating the Spectral Diversity of Titan' Equatorial Region from Patterns Identified in the Cassini VIMS Dataset ()	<i>Icarus</i>
2021	L. Coelho, <b>J. Madden</b> , L. Kaltenegger, S. Zinder, W. Philpot, M. G. Esquivel, J. Canário, R. Costa, W. Vincent, Z. Martins, Color catalogue of life in ice: Surface biosignatures on icy worlds ( <a href="#">ADS</a> )	<i>Astrobiology</i>
2020	<b>J. Madden</b> , & L. Kaltenegger, High-resolution Spectra for a Wide Range of Habitable Zone Planets around Sun-like Stars ( <a href="#">ADS</a> )	<i>ApJL</i>
2020	<b>J. Madden</b> , & L. Kaltenegger, How surfaces shape the climate of habitable exoplanets ( <a href="#">ADS</a> )	<i>MNRAS</i>
2020	L. Kaltenegger, Z. Lin, & <b>J. Madden</b> , High-Resolution Transmission Spectra of Earth through Geological Time ( <a href="#">ADS</a> )	<i>ApJL</i>
2020	<b>J. H. Madden</b> , S. Pandita, B. Kim, J. P. Schuldt, A. S. Won & N. G. Holmes, Ready Student One: Exploring predictors for student learning in virtual reality ( <a href="#">ADS</a> )	<i>PLOS ONE</i>
2019	L. Kaltenegger, <b>J. Madden</b> , Z. Lin, S. Rugheimer, A. Segura, R. Luque, E. Pallé, N. Espinoza, The Habitability of GJ 357 d: Possible Climates and Observability ( <a href="#">ADS</a> )	<i>ApJL</i>
2019	R. Luque <b>et al.</b> , Planetary system around the nearby M dwarf GJ 357 including a transiting, hot, Earth-sized planet optimal for atmospheric characterization ( <a href="#">ADS</a> )	<i>A&amp;A</i>
2018	<b>J. Madden</b> , & L. Kaltenegger, A Catalog of Spectra, Albedos, and Colors of Solar System Bodies for Exoplanet Comparison ( <a href="#">ADS</a> )	<i>Astrobiology</i>
2018	<b>J. H. Madden</b> , 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, <b>J. Madden</b> , L. Carter, B. Hawke, T. Giguere, V. Bray, G. Osinski, & J. Cahill, Global Distribution of Lunar Impact Melt Flows ( <a href="#">ADS</a> )	<i>Icarus</i>
2013	J. Ridley, F. Crawford, D. Lorimer, S. Bailey, <b>J. Madden</b> , R. Anella, & J. Chennamangalam, Eight New Radio Pulsars in the Large Magellanic Cloud ( <a href="#">ADS</a> )	<i>MNRAS</i>

## 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

### ERES V Conference LOC/SOC

SELECTED TALKS, SCHEDULED, AND DESIGNED PRINT MEDIA FOR A SCIENCE CONFERENCE.

*Cornell*

2019

## Science Research Experience

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### 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, <b>et. al.</b> , Addressing Diversity, Inclusion, and Values in the Cornell Astronomy Community: The Graduate Students Response #502.08	<i>DPS 52</i>
2019	<b>J. Madden</b> , L. Kaltenegger, How surface albedo shapes a planet — inside our Solar System and out	<i>ESS IV</i>
2014	<b>J. Madden</b> , 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, & <b>J. Madden</b> , R. Anella, New Radio Pulsars in the Large Magellanic Cloud, #218.02	<i>AAS Meeting 222</i>
2013	F. Crawford, D. Lorimer, J. Ridley, & <b>J. Madden</b> , A Survey for Millisecond Pulsars and Fast Transients in the Large Magellanic Cloud, #412.04	<i>AAS Meeting 221</i>

## Guest Lectures and Public Talks

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2023	<b>How to make art like an astrophysicist</b> , TEDxRISD	<i>Providence, RI</i>
2022	<b>Light Pollution</b> , DM-7152 RESEARCH STUDIO: TECHLANDS	<i>RISD</i>
2022	<b>A guide to the anthro-post-centric universe</b> , DM-1551 SPECULATIVE SPECIES	<i>RISD</i>
2022	<b>Theoretical Photorealism</b> , DM-1560 DEEPFAKES	<i>RISD</i>
2021	<b>Frontier Science Visualizations</b> , DM-1519 LITERACY_IN_3D.OBJ	<i>RISD</i>
2019	<b>How we see the sky</b> , ASTRO1101 Introductory Astronomy	<i>Cornell</i>
2018	<b>Searching for Intelligent Life in Cornell Classrooms and Beyond</b> , Fuertes Observatory	<i>Ithaca, NY</i>
2018	<b>The New Search for Life</b> , Tompkins County Public Library	<i>Ithaca, NY</i>
2018	<b>How We Search for Life on Other Planets</b> , Museum of The Earth, Darwin Days	<i>Ithaca, NY</i>
2017	<b>Causality and Black Holes</b> , ASTRO1101 Introductory Astronomy	<i>Cornell</i>
2015	<b>Black Holes</b> , ASTRO1101 Introductory Astronomy	<i>Cornell</i>
2015	<b>Are we alone?</b> , Mann Library, SPARK Talk	<i>Ithaca, NY</i>

## Teaching Experience

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### Courses

*Providence, RI*

RHODE ISLAND SCHOOL OF DESIGN

- Fall 2022: Introduction to Design
- Fall 2022: Digital+Media MFA Studio/Seminar
- Winter 2023: Introduction to Computation

### Astrophysics for Artists

*Providence, RI*

RHODE ISLAND SCHOOL OF DESIGN

*Winter 2022*

- Designed, planned, and taught my own course at RISD during Wintersession 2022.
- Provided remote and in-person teaching experience.
- Included scientific lecture, studio workshops, and critiques.

### Certificate in Collegiate Teaching in Art and Design

*Providence, RI*

RHODE ISLAND SCHOOL OF DESIGN

*Fall 2021 - Winter 2022*

- Course I designed was competitively selected to be taught in RISD's curriculum.
- 2 semesters of collegiate teaching and practicum.

### Graduate Research Teaching Fellow

*Ithaca, NY*

CORNELL UNIVERSITY

*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

*Ithaca, NY*

CORNELL UNIVERSITY

*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, created 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

*Ithaca, NY*

CORNELL UNIVERSITY

*Fall 2014 - Fall 2015*

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

### Undergraduate Teaching Assistant

*Lancaster, PA*

FRANKLIN AND MARSHALL COLLEGE

*Fall 2013 - Spring 2014*

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

### Tutor and lab instructor

*Lancaster, PA*

FRANKLIN AND MARSHALL COLLEGE

*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.

## Conference Talks

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### 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

VIRTUAL REALITY AS A TEACHING TOOL FOR MOON PHASES AND BEYOND

### ERES IV Symposium

SOLAR SYSTEM BODIES FOR EXOPLANET COMPARISON

### American Association of Physics Teachers

VIRTUAL REALITY AS A TEACHING TOOL FOR MOON PHASES AND BEYOND

### Central Pennsylvania Consortium

IMAGE RECOGNITION TO FIND PULSARS

[Cornell University](#)

May 2018

[Penn State University](#)

June 2018

[Washington D.C.](#)

July 2018

[Lancaster, PA](#)

April 2014

## Posters

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### Extreme Solar Systems IV

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

### Physics Education Research Conference (PERC)

VIRTUAL REALITY AS A TEACHING TOOL FOR MOON PHASES AND BEYOND

### Exoplanets II

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

### Simons Foundation Meeting

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

### AbGradCon

CLOUDY WITH A CHANCE OF HIGH UNCERTAINTY

### ERES II Symposium

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

### 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

[Reykjavik, Iceland](#)

August 2019

[Washington D.C.](#)

August 2018

[Cambridge, UK](#)

July 2018

[New York, NY](#)

April 2018

[Charlottesville, VA](#)

June 2018

[Washington D.C.](#)

July 2018

[Mesa, AZ](#)

April 2017

[Greenbelt, MD](#)

August 2013

[Lancaster, PA](#)

August 2012

[Lancaster, PA](#)

April 2012

## Software/Equipment

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### Software

Mathematica, bash, Python,  $\text{\LaTeX}$ , C sharp, Git, Fortran, HTML, Javascript, Terragen, Blender, Unity, GIMP, Inkscape, Photoshop, Illustrator, InDesign, Premiere Pro, Lightroom

### Equipment

3D Printing, Resin Printing, CNC, Laser Cutting, 3D Scanning, Macropod depth stacking, Scanning Electron Microscopy