Jack H. **Madden**

Ph.D. in astrophysics from Cornell, MFA student at RISD (He/Him/His)

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Education

M.F.A. Rhode Island School of Design — *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 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

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*

In Media

12.13.21	**Astrophysicist Earns Dorner Prize**, Simone Solondz	*RISD News*
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*

Art Exhibitions

Solo

2021	**Dorner Prize (Complete Definitions)**	*RISD Museum*

Group

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*

Peer Reviewed Papers

2021	L. Coelho, **J. Madden**, L. Kaltenegger, S. Zinder, W. Philpot, M. G. Esquível, J. Canário, R. Costa, W. Vincent, Z. Martins, Color catalogue of life in ice: Surface biosignatures on icy worlds (ADS)	*Astrobiology*
2020	**J. Madden**, & L. Kaltenegger, High-resolution Spectra for a Wide Range of Habitable Zone Planets around Sun-like Stars (ADS)	*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*

Professional Service

SEI Assistantship — *RISD*

Assisted with Digital+Media department social equity and inclusion initiatives. — *2021*

Co-chair - Cornell Astronomy Department Climate and Diversity Committee — *Cornell*

Founding member - coordinated tasks such as a creating a values statement, trainings, and metrics. — *2019-2020*

ERES V Conference LOC/SOC — *Cornell*

Selected talks, scheduled, and designed print media for a science conference. — *2019*

President - Astronomy Graduate Network — *Cornell*

Coordinated seminars, speakers, events, and social programing for the astronomy graduates. — *2017-2018*

Scientific Visualizations — *Cornell/CSI*

Created press release imagery, journal covers, and ran scientific graphic design workshops. — *2016-2021*

Emergency Medical Technician - Basic — *NY, and PA*

Volunteer on campus and in the community as an EMT. Approx. 3000 hours since 2011 — *2011-2020*

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

2020	N. Kutsop, **et. al.**, Addressing Diversity, Inclusion, and Values in the Cornell Astronomy Community: The Graduate Students Response #502.08	*DPS 52*
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*

Guest Lectures and Public Talks

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

Teaching Experience

Undergraduate course: 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

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 — *Washington D.C.*

Virtual Reality as a Teaching Tool for Moon Phases and Beyond — *July 2018*

Central Pennsylvania Consortium — *Lancaster, PA*

Image recognition to Find Pulsars — *April 2014*

Posters

Extreme Solar Systems IV — *Reykjavik, Iceland*

Interaction of surface albedo and star type in planetary habitability with 1D modeling — *August 2019*

Physics Education Research Conference (PERC) — *Washington D.C.*

Virtual Reality as a Teaching Tool for Moon Phases and Beyond — *August 2018*

Exoplanets II — *Cambridge, UK*

A Catalog of Spectra, Albedos, and Colors of Solar System Bodies for Exoplanet Comparison — *July 2018*

Simons Foundation Meeting — *New York, NY*

A Catalog of Spectra, Albedos, and Colors of Solar System Bodies for Exoplanet Comparison — *April 2018*

AbGradCon — *Charlottesville, VA*

Cloudy with a chance of high uncertainty — *June 2018*

ERES II Symposium — *Washington D.C.*

Albedos and Colors of Solar System Bodies around F, G, K, and M Stars — *July 2018*

AbSciCon — *Mesa, AZ*

A Database of Spectra, Albedos and Colors of Solar System Bodies for Exoplanet Comparison — *April 2017*

Goddard Summer Research Showcase — *Greenbelt, MD*

The Discovery of New Impact Melts Using MINI-RF on LRO — *August 2013*

F&M Hackman Research — *Lancaster, PA*

Benchmark Testing and Optimized Processing of a Pulsar Survey in the Large Magellanic Cloud — *August 2012*

F&M Closer Look — *Lancaster, PA*

A New Survey for Pulsars in the Large Magellanic Cloud — *April 2012*

Software/Equipment

Software	Mathematica, bash, Python, 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