

# Emily C. Martin

1156 High St. Santa Cruz, CA 95064  
Office: CfAO 211  
emilymartin@ucsc.edu  
<https://emily-c-martin.com>

## EDUCATION

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### University of California, Los Angeles

Ph.D. in Astronomy September 2018  
Dissertation: *Characterizing Low-Mass Stars and Brown Dwarfs and Upgrading NIRSPEC*

M.S. in Astronomy June 2014  
Masters Thesis: *Surface Gravity Studies of Brown Dwarfs*  
Advisors: Ian McLean and Michael Fitzgerald

### Texas A&M University

B.S. in Physics, B.A. in French May 2012  
*magna cum laude*, Undergraduate Research Scholar  
Senior Thesis: *Optical Design of a Red Sensitive Spectrograph*  
Advisors: Darren DePoy and Jennifer Marshall

## RESEARCH INTERESTS

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Astronomical Instrumentation (Optical and Infrared); Optical and mechanical design; Low-mass stars and Brown Dwarfs; Infrared Spectroscopy; Astrometry; Substellar Mass Function; Solar System and Exoplanet Synergies

## POSITIONS HELD

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### University of California, Santa Cruz

51 Pegasi b Fellow September 2021 – Current  
NSF Postdoctoral Scholar, UC Chancellor's Fellow September 2018 – August 2021  
W. M. Keck Observatory August – October 2018

Keck Visiting Scholar

### University of California, Los Angeles

Graduate Research Assistant September 2012 – July 2018

### IPAC/Caltech

Visiting Graduate Fellow January – July 2016

### Texas A&M University

Undergraduate Research Assistant May 2011 – August 2012

## GRANTS AWARDED

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Keck Science Steering Committee White Paper Funding \$20,000 (Co-PI) 2020  
Heising Simons Foundation Award \$400,000 (PI) 2020–2022  
UCO Mini Grant \$34,000 (Co-I) 2020  
Keck Science Steering Committee White Paper Funding \$10,000 (Co-PI) 2019

## AWARDS AND HONORS

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51 Pegasi b Fellow 2021  
Kavli Frontiers of Science Fellow 2020  
NSF Astronomy & Astrophysics Postdoctoral Fellowship (\$300,000) 2018–2021

UC Chancellor's Fellow; UC Santa Cruz ( <i>\$11,000</i> )	2018–2020
Keck Visiting Scholar	2018
UCLA Dissertation Year Fellowship	2017–2018
NASA Group Achievement Award	2017
Charles E. and Sue K. Young Graduate Student Award	2017
IPAC Visiting Graduate Student Fellowship	2016
Bachmann Instrumentation Fellowship at UCLA	2015
UCLA Physics & Astronomy Outstanding Teaching Award	2013
Texas A & M Undergraduate Research Scholar	2012
Texas A & M Undergraduate Physics Scholarship	2011
Texas A & M University President's Endowed Scholar	2007–2011
National Merit Scholar	2007

## INSTRUMENTATION EXPERIENCE

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<b>PEAS: The Planet as Exoplanet Analog Spectrograph</b>	2019 – current
<i>PI</i> ; optical design, mechanical assembly, project management	
<b>IGNIS: Immersion Grating Near Infrared Spectrograph for Keck</b>	2019 – current
<i>Co-PI</i> ; instrument design and planning	
<b>NIRSPEC Upgrade for the Keck II Telescope</b>	2012–2018
<i>Instrument Scientist</i> ; optical design, mechanical assembly and cryogenic testing, project management, Teledyne H2RG HgCdTe detector testing and characterization, electronics design	
<b>Laser Comb Testing for NIRSPEC/Keck</b>	2013–2017
<i>Co-I</i> ; observations and analysis of data from two different laser frequency combs to test new technologies for radial velocity calibrations	
<b>Optical Design of a Red Sensitive Spectrograph</b>	2011–2012
<i>Undergraduate Researcher</i> ; optical design	
<b>DECAL: Dark Energy Survey Camera Calibration</b>	2011
<i>Undergraduate Researcher</i> ; assembly of calibration flat-field screen on Blanco 4-m at CTIO	
<b>HETDEX/VIRUS: Visible Integral Field Replicable Unit Spectrograph</b>	2011–2012
<i>Undergraduate Researcher</i> ; optical design of a method to align >150 spectrographs	

## OBSERVING EXPERIENCE AND TELESCOPE TIME

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<b>Lick Observatory</b>	
PEAS Instrument	> 20 nights
Nickel 1-m Imager	> 5 nights
<b>W. M. Keck Observatory</b>	
NIRSPEC on Keck II	>20 nights
MOSFIRE on Keck I	8 nights
NIRES on Keck II	3 nights
<b>Spitzer Space Telescope</b>	
Cycle 14 DDT (Co-I)	21.5 hours
Cycle 14 (Co-I)	230 hours
Cycle 13 (Co-I)	276 hours
<b>Gemini Observatory</b>	
IGRINS on Gemini South (Co-I)	20.2 hours
IGRINS on Gemini South (Co-I)	10.8 hours
<b>McDonald Observatory</b>	
Cassegrain Spectrometer (es2) on 82-inch	1 night

## TEACHING EXPERIENCE

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### UCLA Teaching Assistant

Astronomy 286, <i>Graduate Level Exoplanets</i>	Winter 2015
Astronomy 180, <i>Upper Division Astronomy Lab</i>	Fall 2014
Astronomy 3, <i>Introduction to Astronomy Lab</i>	Winter 2013, Spring 2013
Astronomy 4, <i>Black Holes and Cosmic Catastrophes</i>	Fall 2012

### Other Teaching Experience

AstroTech Lead Instructor	2021
<i>Led activities on gratings and spectral resolution, science case development, and spectrograph conceptual design</i>	
AstroTech Core Development Team	2020-current
<i>Curriculum Development, Workshop planning, Instructor</i>	
Institute for Scientist and Engineer Educators Professional Development Program	Summer 2019
<i>Design Team Leader for AstroTech Lab Activity</i>	
UCLA Astronomy Live! Summer High School Workshop	Summers 2013–2017
<i>Instructor and Mentor</i>	
Private Tutor for High School and College Physics and Math	2013–2018
<i>Instructor for &gt;10 students</i>	
Institute for Scientist and Engineer Educators Professional Development Program	Spring 2015

## STUDENT ADVISING AND MENTORING

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### Current Students

<b>José Colón Cancel</b> (Undergraduate Research) Development of a quick-look data reduction tool for PEAS
<b>Judah Luberto</b> (Undergraduate Research) Searching for microlensing events of cold brown dwarfs in the Solar Neighborhood
<b>Alexandra Mannings</b> (thesis chapter) Commissioning and observations with PEAS
<b>Brittany Miles</b> (thesis chapter) Testing 8-13 $\mu\text{m}$ detector at UCO shops, Infrared spectroscopy of cold brown dwarfs
<b>Evan Morris</b> (thesis chapter) KPIC/NIRSPEC fiber fed observations of brown dwarfs and exoplanets

### Former Students

<b>Julissa Villalobos</b> (Undergraduate Research) Development of observing planning tool for PEAS
<b>Bade Sayki</b> (Undergraduate Research) Infrared instrumentation and spectroscopy of brown dwarfs
<b>Hayley Bricker</b> (Undergraduate Mentoring) UCLA Women in Physics and Astronomy Mentoring Program

## SERVICE

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Kavli Frontiers of Science Organizing Committee Member	2021
Reviewer for NSF panel	2021
Reviewer for NASA panel	2020
ExoPAG SIG 3 Member	2020 – current
UCSC Astronomy & Astrophysics Postdoc Representative	2020 – current
UCSC Astronomy & Astrophysics Colloquium Committee member	2019 – 2021
Reviewer for AAS Journals	2018 – current
UCSC Equity & Inclusion Committee member	2018 – 2020
UCLA Planetarium Coordinator	2013–2018
UCLA Astronomy Graduate Student Mentor	2014–2018

Women in Physics & Astronomy (WIPA) Outreach Coordinator	2015–2018
WIPA Mentor to Undergraduate Students	2015–2018
Coordinator, WIPA Meetings with Female Colloquium Speakers	2016–2018
UCLA Astronomy Diversity Committee Member	2016–2018

## PUBLIC OUTREACH

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UCO Living Room Talk	January 2021
Sequoiah High School Science Symposium panel	December 2020
Astronomy on Tap, Santa Cruz Online Talk	September 2020
Public Talk for Keck Observatory Online	August 2020
Public Talk at Institute for Astronomy, Honolulu, HI	October 2019
Public Talk at Kahala Nui Retirement Community, Honolulu, HI	October 2019
Science Judge for Waimea Country School Science Fair	Fall 2018
AWiSE STEM Day <i>Astronomy Demo Coordinator</i>	2016–2017
Impostor Syndrome Workshops <i>Co-Leader, 5 workshops</i>	2014–2017
Exploring Your Universe <i>Rockets Booth Leader</i>	2014–2016
UCLA Astronomy Live! Summer High School Workshop <i>Co-Organizer</i>	2014–2018
UCLA Planetarium Show Presenter	2012–2018
UCLA Astronomy Live! Outreach Visits to Local Schools	2012–2018

## SELECTED TALKS

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### Invited Talks

Future Keck IR Spectroscopy Workshop, (Virtual), January 2021  
 Geophysical and Astrophysical Fluid Dynamics Seminar, UCSC (Virtual), December 2020  
 Engineering Coffee Seminar, Arizona State University (Virtual), November 2020  
 NSF Astronomy & Astrophysics Postdoctoral Fellow Symposium, Honolulu, HI, January 2020  
 Keck Science Meeting, Los Angeles, CA, September 2019  
 Lowell Observatory Colloquium, Flagstaff, AZ, May 2019  
 UC President's Postdoctoral Fellow Spring Retreat, Lake Arrowhead, CA, April 2019  
 NSF Astronomy & Astrophysics Postdoctoral Fellow Symposium, Seattle, WA, January 2019  
 Tech Talk Seminar, UH Hilo, Hilo, HI, December 2018  
 Keck Visiting Scholar Final Talk, W. M. Keck Observatory, Waimea, HI, December 2018  
 Seminar, Texas A & M University, College Station, TX, April 2018  
 Seminar, iREx Exoplanet Institute, Université de Montreal, February 2018  
 Seminar, Gemini Observatory (North), Hilo, HI, February 2018  
 Planet Lunch Seminar, UC Santa Cruz, Santa Cruz, CA, November 2017  
 Seminar, American Museum of Natural History, New York, NY, October 2017  
 Brown Dwarf to Exoplanet Connection Conference, University of Delaware, October 2017  
 Seminar, Carnegie DTM, Washington, DC, October 2017

### Contributed Talks

Space Telescope Science Symposium, April 2021  
 SPIE Astronomical Telescopes + Instrumentation Virtual Conference, December 2020  
 Bay Area Planetary Science Meeting, Virtual Meeting, July 2020  
 NASA ExoPAG 22, Virtual Meeting, June 2020  
 Bay Area Exoplanet Meeting, NASA Ames, December 2019  
 Keck Science Meeting, Los Angeles, CA, September 2019  
 SPIE Astronomical Telescopes and Instrumentation Conference, Austin, TX, June 2018  
 Rising Stars in Physics Workshop, MIT, Cambridge, MA, April 2018

## PUBLICATIONS

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### Refereed Publications

- 13.) Delorme, J.-R., et al., (incl. **Martin E. C.**), “The Keck Planet Imager and Characterizer: A dedicated single-mode fiber injection unit for high resolution exoplanet spectroscopy”, *JATIS*, *in press*, <https://arxiv.org/abs/2107.12556>
- 12.) Wang, J. J., et al., (incl. **Martin E. C.**), “Detection and Bulk Properties of the HR 8799 Planets with High Resolution Spectroscopy“, *AJ*, *in press*, <https://arxiv.org/abs/2107.06949>
- 11.) Kirkpatrick J. D., et al., (incl. **Martin E. C.**), “The Field Substellar Mass Function Based on the Full-sky 20-pc Census of 525 L, T, and Y Dwarfs”, *ApJS*, 253, 7.
- 10.) Bonev, B., et al., (incl. **Martin E. C.**), “First Comet Observations with NIRSPEC-2 at Keck: Outgassing Sources of Parent Volatiles and Abundances Based on Alternative Taxonomic Compositional Baselines in 46P/Wirtanen”, *PSJ*, 2, 45.
- 9.) Hood C. E., Fortney J. J., Line M. R., **Martin E. C.**, Morley C. V., Birkby J. L., Rustamkulov Z., et al., “Prospects for Characterizing the Hazy Sub-Neptune Exoplanets with High Resolution Spectroscopy.”, 2020, *AJ*, 160, 198.
- 8.) Suh M.-G., Yi X., Lai Y.-H., Leifer S., Grudinin I. S., Vasisht G., **Martin E. C.**, et al., “Searching for Exoplanets Using a Microresonator Astrocomb.” 2019, *Nature Photonics*, 13, 25-30.
- 7.) Kirkpatrick J. D., **Martin E. C.**, Smart R. L., Cayago A. J., Beichman C. A., Marocco F., Gelino C. R., et al., “Preliminary Trigonometric Parallaxes of 184 Late-T and Y Dwarfs and an Analysis of the Field Substellar Mass Function into the ‘Planetary’ Mass Regime.” 2019, *ApJS*, 240, 19
- 6.) **Martin E. C.**, Kirkpatrick J. D., Beichman C. A., Smart R. L., Faherty J. K., Gelino C. R., Cushing M. C., et al. “Y Dwarf Trigonometric Parallaxes from the Spitzer Space Telescope.” 2018, *ApJ*, 867, 109
- 5.) Logsdon S. E., Mace G. N., McLean I. S., **Martin E. C.** “Probing Late-type T dwarf  $J - H$  Color Outliers for Signs of Age.” 2018, *ApJ*, 867, 96
- 4.) Cohen D. P., Turner J. L., Consiglio S. M., **Martin E. C.**, Beck S. C., “Ionized Gas Motions and the Structure of Feedback near a Forming Globular Cluster in NGC 5253.” 2018, *ApJ*, 860, 47
- 3.) **Martin E. C.**, Mace G. N., McLean I. S., Logsdon S. E., Rice E. L., Kirkpatrick J. D., Burgasser A. J., et al., “Surface Gravities for 228 M, L, and T dwarfs in the NIRSPEC Brown Dwarf Spectroscopic Survey.” 2017, *ApJ*, 838, 73.
- 2.) Kirkpatrick J. D., Kellogg K., Schneider A. C., Fajardo-Acosta S., Cushing M. C., Greco J., Mace G. N., et al. (incl **Martin E. C.**), “The AllWISE Motion Survey, Part 2.” 2016, *ApJS*, 224, 36.
- 1.) Yi X., Vahala K., Li J., Diddams S., Ycas G., Plavchan P., Leifer S., et al. (incl. **Martin E. C.**), “Demonstration of a Near-IR Line-Referenced Electro-Optical Laser Frequency Comb for Precision Radial Velocity Measurements in Astronomy.” 2016, *Nature Communications*, 7, 10436.

### Instrumentation Conference Proceedings

- 11.) **Martin E. C.**, Skemer, A. J., Radovan, M. V., et al. “The Planet as Exoplanet Analog Spectrograph (PEAS): design and first-light.” 2020 SPIE Proceedings.
- 10.) López, R. A., Hoffman, E. B., Doppmann, G., et al., (incl **Martin E. C.**), “Characterization and performance of the upgraded NIRSPEC on the W. M. Keck Telescope.” 2020 SPIE Proceedings.

- 9.) **Martin E. C.**, Fitzgerald M. P., McLean I. S., Doppmann G., Kassis M., Aliado T., Canfield J., et al. "An Overview of the NIRSPEC Upgrade for the Keck II Telescope." 2018 SPIE Proceedings
- 8.) **Martin E. C.**, Fitzgerald M. P., McLean I. S., Kress E., Wang E., "Optical Design of the Slit-Viewing Camera for the NIRSPEC Upgrade." 2016 SPIE Proceedings.
- 7.) J. L. Marshall, J. P. Rheault, D. L. DePoy, T. Prochaska, R. Allen, T. W. Behm, **E. C. Martin**, B. Veal, S. Villanueva, Jr., P. Williams, J. Wise. "DECAL: A Spectrophotometric Calibration System for DECam." 2016 Proceedings Astronomical Society of the Pacific, The Science of Calibration.
- 6.) **Martin E. C.**, Fitzgerald M. P., McLean I. S., Adkins S. M., Aliado T., Brims G., Johnson C., et al., "Performance Modeling of an Upgraded NIRSPEC on Keck." 2014 SPIE Proceedings.
- 5.) Marshall J. L., DePoy D. L., Prochaska T., Allen R. D., Williams P., Rheault J.-P., Li T., et al., (incl **Martin E. C.**), "VIRUS Instrument Collimator Assembly." 2014 SPIE Proceedings.
- 4.) Marshall J. L., Rheault J.-P., DePoy D. L., Prochaska T., Allen R., Behm T. W., **Martin E. C.**, et al. "DECAL: A Spectrophotometric Calibration System for DECam." 2013 Proceedings, Calibration and Standardization of Large Surveys and Missions in Astronomy and Astrophysics.
- 3.) Rheault J.-P., DePoy D. L., Marshall J. L., Prochaska T., Allen R., Wise J., **Martin E. C.**, et al. "Spectrophotometric calibration system for DECam" 2012 SPIE Proceedings.
- 2.) Prochaska T., Allen R. D., Boster E., DePoy D. L., Herbig B., Hill G. J., Lee H., et al., (incl **Martin E. C.**), "VIRUS Spectrograph assembly and alignment procedures." 2012 SPIE Proceedings.
- 1.) **Martin E. C.**, DePoy D. L., Marshall J. L., "Optical Design of a Red Sensitive Spectrograph." 2012 SPIE Proceedings.