# Emily C. Martin

#### EDUCATION

#### University of California, Los Angeles September 2018 Ph.D. in Astronomy Dissertation: Characterizing Low-Mass Stars and Brown Dwarfs and Upgrading NIRSPEC June 2014 M.S. in Astronomy 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**

Astronomical Instrumentation (Optical and Infrared); Exoplanet Atmospheres; Solar System and Exoplanet Synergies; Low-mass stars and Brown Dwarfs

## **POSITIONS HELD**

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 Keck Visiting Scholar	August – October 2018
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**

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

#### Awards and Honors

UCSC Outstanding Postdoc Award	2022
51 Pegasi b Fellow ( <i>\$355,589</i> )	2021
Kavli Frontiers of Science Fellow	2020, 2022

NSF Astronomy & Astrophysics Postdoctoral Fellowship (\$300,000)	2018 - 2021
UC Chancellor's Fellow; UC Santa Cruz (\$11,000)	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

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

## Observing Experience and Telescope Time

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

#### TEACHING EXPERIENCE

UCLA Teaching Assistant	
Astronomy 286, Graduate Level Exoplanets	Winter 2015
Astronomy 180, Upper Division Astronomy Lab	Fall 2014
Astronomy 3, Introduction to Astronomy Lab	Winter 2013, Spring 2013
Astronomy 4, Black Holes and Cosmic Catastrophes	Fall 2012
Other Teaching Experience	
AstroTech Lead Instructor	2021
Led activities on gratings and spectral resolution, science case development, and	$spectrograph\ conceptual$
design	
AstroTech Core Development Team	2020-current
Curriculum Development, Workshop planning, Instructor	
Institute for Scientist and Engineer Educators Professional Development Program	Summer 2019
Design Team Leader for AstroTech Lab Activity	
UCLA Astronomy Live! Summer High School Workshop	Summers 2013–2017
Instructor and Mentor	
Private Tutor for High School and College Physics and Math	2013 - 2018
Instructor for $>10$ students	
Institute for Scientist and Engineer Educators Professional Development Program	Spring 2015

## STUDENT ADVISING AND MENTORING

#### **Current Students**

Alexandra Mannings (thesis chapter) Commissioning, observations, and instrument development for PEAS Evan Morris (two thesis chapters) KPIC/NIRSPEC fiber fed observations of brown dwarfs and exoplanets; PEAS data reduction pipeline, observations, and data analysis

#### Former Students

Brittany Miles (thesis chapter) Testing 8-13  $\mu m$  detector at UCO shops, Infrared spectroscopy of cold brown dwarfs

José Colón Cancel (Undergraduate Research) Development of a quick-look data reduction tool for PEAS Judah Luberto (Undergraduate Research) Searching for microlensing events of cold brown dwarfs in the Solar Neighborhood

Julissa Villalobos (Undergraduate Research) Development of observing planning tool for PEASBade Sayki (Undergraduate Research) Infrared instrumentation and spectroscopy of brown dwarfsHayley Bricker (Undergraduate Mentoring) UCLA Women in Physics and Astronomy Mentoring Program

#### SERVICE

Reviewer for MIRMOS Instrument Conceptual Design Review	2021
Kavli Frontiers of Science Organizing Committee Member	2021 - 2022
Reviewer for NSF panel	2021
Reviewer for NASA panel	2020
ExoPAG SIG 3 Member	$2020 - \mathrm{current}$
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

UCO Living Room Talk	January 2021
Sequoyah 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 Astronomy Demo Coordinator	2016 - 2017
Impostor Syndrome Workshops Co-Leader, 5 workshops	2014 - 2017
Exploring Your Universe Rockets Booth Leader	2014 - 2016
UCLA Astronomy Live! Summer High School Workshop Co-Organizer	2013-2018
UCLA Planetarium Show Presenter	2012 - 2018
UCLA Astronomy Live! Outreach Visits to Local Schools	2012 - 2018

## Selected Talks

#### Invited Talks

University of Massachusetts at Amherst Colloquium, Amherst, MA, April 2022 University of Wisconsin - Madison Colloquium, Madison, WI, March 2022 University of Toronto/Dunlap Institute Colloquium (Virtual), March 2022 UT Austin Colloquium, Austin, TX, February 2022 Carnegie Observatories Colloquium, (Virtual), March 2021 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 **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 Dissertation Talk: American Astronomical Society Meeting, National Harbor, MD, January 2018

#### PUBLICATIONS

#### **Refereed Publications**

17.) Luberto, J.L., **Martin, E. C.**, McGill, P. E., et al. "A Search for Predicted Astrometric Microlensing Events by Nearby Brown Dwarfs", 2022, *in press* 

16.) Xuan J., et al., (incl. **Martin E. C.**), "A Clear View of a Cloudy Brown Dwarf Companion from High-resolution Spectroscopy", 2022, ApJ, 937, 2

15.) Wang J., et al., (incl. **Martin E. C.**), "Retrieving C and O Abundance of HR 8799 c by Combining High- and Low-Resolution Data", 2022, *in press* 

14.) Mayorga, L. C. et al., (incl. Martin E. C.), "Transmission Spectroscopy of the Earth-Sun System to Inform the Search for Extrasolar Life", 2021, PSJ, 2, 140.

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", 2021, JATIS, 7 (3), 035006

12.) Wang, J. J., et al.,(incl. Martin E. C.), "Detection and Bulk Properties of the HR 8799 Planets with High Resolution Spectroscopy", 2021, AJ, 162, 148

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", 2021, 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", 2021, 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 Haziest 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.

#### Conference Proceedings, Research Notes, and White Papers

19.) Mannings A. G., **Martin E. C.**, Skemer A. J., et al., "Throughput modeling of the Planet as Exoplanet Analog Spectrograph (PEAS)", 2022 SPIE proceedings.

18.) Finnerty L., Schofield T., Delorme J. R., et al. (incl **Martin E. C.**), "On-sky performance and lessons learned from the phase I KPIC fiber injection unit", 2022 SPIE proceedings.

17.) Echeverri D., Jovanovic N., Delorme J. R., et al. (incl **Martin E. C.**), "Phase II of the Keck Planet Imager and characterizer: system-level laboratory characterization and preliminary on-sky commissioning", 2022 SPIE proceedings.

16.) Skemer A. J., Stelter R. D., Sallum S., et al. (incl **Martin E. C.**), "Design of SCALES: a 2-5 micron coronographic integral field spectrograph for Keck Observatory", 2022 SPIE proceedings.

14.) Theissen C. A., Brugasser A. J., **Martin E. C.**, et al., "Keck NIRES Spectral Standards for L, T, and Y Dwarfs", Research Notes of the AAS, Volume 6, Issue 7, id.151.

13.) Martin E. C., Walkowicz L., Nesvold E., and Vidaurri M., "Ethics in Solar System Exploration", Nature Astronomy Meeting Reports, June 2022.

12.) Miles B. E., Hinz P., Skemer A., **Martin E. C.**, Stelter D., "Testing a 10 micron HgCdTe detector for ground-based exoplanet science", 2021 SPIE 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.