

Kristin Rose Kulas

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RESEARCH INTERESTS	My work has focused on infrared instrumentation and the study of the formation and evolution of high-redshift galaxies at $z \sim 2-3$. I am currently working at NASA Ames on instrumentation for the EXES project for SOFIA , which will allow for high-resolution ($R \sim 100,000$) mid-IR spectroscopy. In addition, while at NASA I have extended my research to understanding how outflows affect the formation of local galaxies.	
EDUCATION	University of California, Los Angeles , Los Angeles, California USA Ph.D. Track Graduate Student, Astrophysics, 09/2007 - 06/2013 <ul style="list-style-type: none">• Advisors: Dr. Ian S. McLean and Dr. Alice E. Shapley• Topic: Galaxy Formation at High Redshift and the Development of MOSFIRE M.S., Astrophysics, 06/2009 <ul style="list-style-type: none">• Advisor: Dr. Ian S. McLean• Topic: The MOSFIRE Detector System University of California, San Diego , La Jolla, California USA B.S., Physics with a specialization in Astrophysics, Minor in Mathematics 09/2004 - 12/2006 <ul style="list-style-type: none">• Advisor (06/2006 - 12/2006): Dr. Tom Murphy• Advisor (03/2005 - 09/2005): Dr. Paolo Padoan Sierra College , Rocklin, California USA A.S., Physics; A.S. Natural Science; A.A. Liberal Arts, 08/2001 - 12/2003	
RESEARCH EXPERIENCE	NASA Ames Research Center <i>NASA Postdoctoral Fellow</i> August 2013 - Present <ul style="list-style-type: none">• Instrumentation: I am involved in the characterization of the Echelon-Cross-Echelle Spectrograph (EXES) in order to prepare it for commissioning and science deployment on SOFIA. This work includes hardware and software testing, in addition to analyzing different characteristics of the instrument, such as throughput of the system and linearization of the detector. The first round of EXES commissioning will take place during April 2014.• Extragalactic Science: I am examining the affects that outflows have on the formation of local galaxies at sub-galactic scales by obtaining high-resolution spectral and spatial maps of strong mid-infrared ionization lines, such as [Ar II] and [Ne II]. This mapping will illuminate whether the gas has a large enough velocity to escape the galaxy and pollute the intergalactic medium (IGM) or if it “fountains” back into the galaxy, increasing the metallicity for the next generation of stars.	

University of California, Los Angeles

Graduate Student Researcher

Summer 2008 - Summer 2013

- Instrumentation: I led the work on the characterization of the Hawaii2-RG detector for [MOSFIRE](#) (Multi-Object Spectrometer For InfraRed Exploration). I also worked on the development of the detector system. I have focused my work on measuring the read noise, linearity, dark current, gain setting, and the persistence of the MOSFIRE detector, as well as determining the best voltage settings for our system.
- Extragalactic Science: With MOSFIRE data I am currently analyzing two protoclusters (galaxies found in an overdense region with respect to redshift space) at $z \sim 2$ and 3 to understand what role environment plays in the formation of galaxies at this epoch. To accomplish this, I am measuring numerous physical properties, such as velocity dispersion, star-formation rate, metallicity, and electron density, of protocluster and “field” galaxies to examine the effects of environment at these early redshifts.
- Extragalactic Science: I have studied UV-selected star-forming galaxies at $z \sim 2-3$ with multiple-peaked Lyman α emission. These profiles provide additional constraints on the escape of Lyman α photons due to the rich velocity structure in the emergent line. We obtained H α or [OIII] measurements for 18 double-peaked objects using NIRSPEC on Keck to calculate accurate systemic redshifts, nebular line widths, and intrinsic ionizing photon fluxes to better understanding the physical properties of the outflowing and inflowing material from these galaxies.

University of California, San Diego

Undergraduate Researcher

Summer 2003 - Summer 2004

- Analyzed the PSF of guide stars, as well as worked to reduce noise interference from the optics in the [APOLLO](#) project. APOLLO’s science goal is to study the relative acceleration of the earth and moon toward the sun to understand if there is a violation of the Equivalence Principle, which is predicted by various string-motivated theories, quintessence, and other alternatives to General Relativity.
- Simulated interstellar medium (ISM) particle interactions of varying grain size, speeds, and densities to better understand how they may break apart or clump together to form larger structures.

TEACHING EXPERIENCE

University of California, Los Angeles

Teaching Assistant

F07, W08, Sp08, Sp09, W10, Sp10

- Led weekly lab sessions for Astronomy 3, Introduction to Astronomy, which includes students from all disciplines

Teaching Assistant Coordinator (TAC)

Fall 2008

- Assisted with a class designed to help first year physics and astronomy graduate students become better teachers in a classroom lab and discussion section setting.

University of California, Santa Cruz

Lab Design

Summer 2008, 2009

- Designed an inquiry-based lab on the components of a galaxy for the summer session of Astronomy 2 (Introduction to Astronomy) at UC, Santa Cruz through the Center for Adaptive Optics’ (CfAOs) ISEE program. A paper has been published in the ASP Conference Series about the implementation of this lab.

University of California, San Diego

Lead Teaching Assistant

Winter 2007

- Led the Physics 1A labs, which focused on mechanics. This lab was meant primarily for pre-medicine students. Duties included teaching labs, teaching the other lab TAs how the lab was to be conducted, and office hours for students.

Teaching Assistant

Fall 2004 - Fall 2006

- Taught Physics 1A, 1B, and 1C labs for two years and one quarter. The 1 series was meant primarily for the pre-medicine students at UC, San Diego. The labs covered a range of topic from mechanics, to electromagnetism, to optics.

HONORS AND AWARDS

2012-2013: Graduate Division Dissertation Year Fellowship: *Given to one Astronomy graduate student per year for outstanding research and promising future career*

2012-2013: Abelmann-Rudnick Scholarship: *Given to two graduate students in the Physics and Astronomy Department per year to recognize exceptional achievement*

Spring 2011: Bruin Hero: *Given to two UCLA student groups a quarter to recognize excellence in community outreach. Awarded during my tenure as coordinator of Astronomy Live!.*

ORGANIZATIONS

SPIE

- Member from 03/2012 - Present

American Astronomical Society

- Member from 08/2008 - Present

Astronomy Live! - University of California, Los Angeles

- Co-Founder of [Astronomy Live!](#), the UCLA Astronomy Graduate Outreach Program (Fall 2009)
- Coordinator (Fall 2009 - Spring 2011): Our goal is to inform the local community about the makings of our Universe in a fun, interactive way. We organize our annual [Exploring Your Universe](#) event, which is free to the public and draws thousands of people from the surrounding LA areas. As well, we visit local schools to engage students interactively about astronomy.

My main duties as coordinator of Astronomy Live! was to write grants in order to fund our different activities, recruit and organize volunteers, work with facilities to ensure we had adequate space for on-campus events, communicate with teachers for off-campus events, and create new interactive activities and update old activities each year. Throughout the year, I also conducted planetarium shows for the general public.

Astrophysics Club - University of California, San Diego

- President (09/2005 - 06/2006) and Vice President (09/2004 - 08/2005): My main duties were to organize speakers to talk about their current research, as well as organize educational trips.

TALKS

“*The Study of Galaxy Formation in the Near-Infrared at $z \sim 2 - 3$* ”, February 2014, UCD Cosmology Seminar

“*The Study of Galaxy Formation in the Near-Infrared at $z \sim 2 - 3$* ”, June 2013, UCSB Astrophysics Seminar

“*A Detailed Study of Galaxies in High-Redshift Protoclusters with MOSFIRE*”, January 2013, 221st AAS Conference

“*Galaxy Formation At High Redshift and the Development of MOSFIRE*”, November 2012, NASA Ames Space Sciences Division Invited Colloquium

“*Performance of the HgCdTe Detector for MOSFIRE, an Imager and Multi-Object Spectrometer for Keck Observatory*”, July 2012, SPIE Astronomical Telescopes and Instrumentation Conference

“*The Kinematics Of Multiple-Peaked Lyman α Emission In Star-forming Galaxies At $z \sim 2-3$* ”,
January 2012, 219th AAS Conference

REFEREED
PUBLICATIONS

Kulas, K. R.; McLean, I. S.; Shapley, A. E.; Steidel, C. C.; Konidaris, N. P.; Matthews, K.; Mace, G. N.; Rudie, G. C.; Trainor, R. F.; Reddy, N. A.; *The Mass-Metallicity Relation Of A $z \sim 2$ Protocluster With MOSFIRE*, 2013, ApJ, 774, 130

Kulas, K. R.; Shapley, A. E.; Kollmeier, J. A.; Zheng, Z.; Steidel, C. C.; Hainline, K. N.; *The Kinematics Of Multiple-Peaked Lyman α Emission In Star-forming Galaxies At $z \sim 2-3$* , 2012, ApJ, 745, 33

CONFERENCE
PROCEEDINGS AND
POSTERS

Kulas, K. R.; McLean, I.S.; Steidel, C.; *Performance of the HgCdTe Detector for MOSFIRE, an Imager and Multi-Object Spectrometer for Keck Observatory*, 2012, Proceedings of SPIE, 8453-63

McLean, I.; Steidel, C.; Epps, H.; Konidaris, N.; Matthews, K.; Adkins, S.; Aliado, T.; Brims, G.; Canfield, J.; Cromer, J.; Fucik, J.; **Kulas, K. R.**; Mace, G.; Magnone, K; Rodriguez, H.; Rudie, G.; Trainor, R.; Wang, E.; Weber, B.; Weiss, J.; *MOSFIRE, the Multi-Object Spectrometer For Infra-Red Exploration at the Keck Observatory*; 2012, Proceedings of SPIE, 8446-17

Montgomery, R.; **Kulas, K. R.**; *The Design and Implementation of the Galaxy Component Inquiry*, 2010, Astronomical Society of the Pacific, 436, 120

McLean, I.S.; Steidel, C.; Epps, H.; Matthews, K.; Adkins, S.; Konidaris, N.; Weber, B.; Aliado, T.; Brims G.; Canfield, J.; Cromer, J.; Fucik, J.; **Kulas, K. R.**; Mace, G.; Magnone, K; Rodriguez, H.; Wang, E.; and Weiss, J.; *Design and Development of MOSFIRE: the Multi-Object Spectrometer for Infrared Exploration at the Keck Observatory*, 2010, Proceedings of the SPIE, 7735, 77351E

Kulas, K. R.; Shapley, A. E.; Hainline, K. N.; *The Kinematics Of Multiple-peaked Lyman α Emission In Star-forming Galaxies At $z \sim 2-3$* , 2010, 216th AAS Conference

Kulas, K. R.; McLean, I. S.; *Evaluation Of The ASIC-Controlled H2-RG Science-Grade Detector For MOSFIRE*, 2010, 215th AAS Conference

Kulas, K. R.; McLean, I. S.; *Evaluation Of The ASIC-Controlled H2-RG Detector For MOS-FIRE*, 2010, 213th AAS Conference