

Jessica Ryan Lu

CONTACT INFORMATION	Astronomy Department University of California, Berkeley 501 Campbell Hall #3411 Berkeley, CA 94720-3411	Voice: (310)-709-0471 Email: jlu.astro@berkeley.edu http://astro.berkeley.edu/faculty-profile/jessica-lu
RESEARCH INTERESTS	Black holes, star and cluster formation, initial mass function, galactic centers, stellar dynamics, adaptive optics, astrometry, astrometric microlensing.	
EDUCATION	University of California, Los Angeles , Ph.D., Astrophysics 2008 <ul style="list-style-type: none">• Adviser: Prof. Andrea Ghez• Thesis: <i>Origins of Young Stars in the Central Parsec of the Milky Way</i> University of California, Los Angeles , M.S., Astrophysics 2005 Massachusetts Institute of Technology , S.B., Physics 2000 <ul style="list-style-type: none">• Adviser: Prof. Victoria Kaspi• Thesis: <i>Monitoring Anomalous X-ray Pulsars with RXTE</i>	
RESEARCH APPOINTMENTS	Assistant Professor , University of California, Berkeley 2016 - current Assistant Astronomer Institute for Astronomy, University of Hawaii 2013 - 2016 NSF Astronomy and Astrophysics Postdoctoral Fellow , IfA Hawaii 2011 - 2013 Millikan Postdoctoral Fellow in Obs. Astronomy , Caltech 2008 - 2011 Graduate Researcher , UCLA 2003 - 2005 NSF Graduate Research Fellow , UCLA 2005 - 2008 Undergraduate Researcher , MIT 1997 - 2000	
RESEARCH ACTIVITIES	co-PI, Keck Ground Layer Adaptive Optics Feasibility Study 2016 - present Project Scientist, 'imaka Ground Layer Adaptive Optics Demonstrator 2013 - present Member, Galactic Center Group @ UCLA 2003 - present Project Manager, UCLA/Keck AO Optimization 2014 - present	
HONORS AND AWARDS	2014 Kavli Fellow 2011 NSF Astronomy Postdoctoral Fellowship (IfA, UH Manoa) 2008 Caltech Millikan Postdoctoral Fellowship in Observational Astronomy 2005 NSF Graduate Research Fellowship 2000 MIT Barrett Award for Excellence in Astrophysics 1997-1999 Spertus Family MIT Research Support Grant	
SERVICE AND OTHER EXPERIENCES	Professional Activities <ul style="list-style-type: none">• 2016-present, WFIRST Astrometry Working Group, WFIRST Milky Way SIT• 2015, Keck NIRC2 Distortion Characterization Effort• 2012-present, TMT Co-convener for Science Definition Team on Star and Planet Formation• 2012-present, TMT Astrometry Advisory Group• 2008-present, TMT IRIS Instrument Science Team• 2006-present, Keck Next Generation Adaptive Optics, Science Team• 2006-2007, Keck Next Generation Adaptive Optics, Astrometry Technical Team• 2007, Keck NIRC2 Distortion Characterization Effort• Co-Founder of the AstroBetter.com wiki Professional Memberships <ul style="list-style-type: none">• American Astronomical Society Public Outreach <ul style="list-style-type: none">• Work with Iolani high school Girls Who Code program to provide astronomy applications.	

- Designed and led physics-based inquiry activity for ~150 middle school girls as part of Space Center Houston's Diva Design Series.
- Collaborated with Adler Planetarium and University of Chicago Cosmus program in creating a 3D visualization of the stars orbiting the supermassive black hole at the center of the Milky Way. <http://astro.uchicago.edu/cosmus/projects/stararoundblackhole/>
- Collaborated with National Center for Supercomputing Applications to incorporate above with a simulated animation of the entire Galactic Center region
- Participated in filming and graphic design for the NSF funded NOVA show, *Monster of the Milky Way*, which exhibited research from our UCLA Galactic Center Group.

Service

- 2018 Microlensing 22 SOC
- 2017 TMT Forum SOC
- 2017 CfAO Fall Retreat SOC
- 2017 Galactic Center Group Retreat SOC
- 2016-current UC Berkeley Astronomy Climate Advisory Committee
- 2016-current UC Berkeley Astronomy Grad Admissions Committee
- 2016-current UC Berkeley Astronomy Miller Fellow Selection Committee
- 2016 Keck Science Meeting SOC
- 2016 SPIE AO SOC
- 2015 AO4ELT4 SOC
- 2015 TMT Forum SOC
- 2015 Galactic Center Group Workshop organizer
- 2014-2016 IfA Strategic Planning Committee
- 2013-2016 IfA Grad Admissions Committee Member
- 2013-2016 IfA Astro-ph Discussion Organizer
- 2012-2015 IfA TAC Member
- 2012 IfA AstroCoffee Organizer
- 2011, 2014 HST TAC Panel Member
- 2011 Caltech Astronomy Colloquium Committee Member
- 2011, Adaptive Optics Astrometry Workshop, Lead Organizer
- 2009,2011 TAC Member for Caltech Optical Observatories
- 2009, Keck OSIRIS Workshop, Lead Organizer
- 2008-2011, Caltech Astro-ph Discussion Organizer
- 2003-2006, UCLA Astronomy Webmaster
- 2006-2007, UCLA Faculty Rep. for Grad Students
- Referee for *ApJ*, *A&A*, and *MNRAS*

Software Engineer

- 06/2000 - 05/2003, Alphablox Corporation, Mountain View, CA

TEACHING EXPERIENCE

Intro. to Research, UC Berkeley Graduate Class, Fall, 2017
Designed/taught new research and professional skills course for 1st year graduate students.

Order of Magnitude Astrophysics, UC Berkeley Graduate Class, Spring, 2017
Designed/taught a new class focused on order-of-magnitude problem solving skills in astrophysical research for early graduate students.

Intro. to Research, IfA Graduate Class, Fall, 2013-2015, 2017
Co-designed/taught new research and professional skills course for 1st year graduate students.

Intro to Research Short-Course, IfA Summer REU Summer 2012
Developed and taught a short-course for incoming undergraduate researchers. Activities included a statistics inquiry and interactive discussions on abstract writing, efficiently reading scientific literature, and research methods.

Participant, CfAO/ISEE Professional Development Workshop 2006, 2012

Training in inquiry (and other) teaching styles.

Final Project Advisor, Caltech AY 117 Fall 2010
Developed 3 week final project for an undergraduate student in statistical a astronomy course.

AO Lab Design, CfAO Summer School 2006-2007
Member of team that designed and taught three interactive optics labs that incorporate inquiry methods on an advanced topic previously taught as a lecture.

Teaching Assistant, UCLA, Astro. 81 Spring 2006, 2008
Introductory astronomy course for astronomy/physics majors. Received Teaching Award.

Teaching Assistant, UCLA, Astro. 3 Fall 2004
Introductory astronomy course for non-science majors. Received Teaching Award.

STUDENTS

UH IfA Graduate Students

Fatima Abdurrahman - PhD	2016 -
Siyao Jia - PhD	2015 -
Max Service - PhD (co-advised with Mark Chun)	2014 -
Matt Hosek - PhD	2013 -
Kelly Lockhart - PhD	2013 - 2017
Elizabeth Toller - 1st year project	2014-2015
Evan Sinukoff - 2nd year project	2013-2014
Laurie Urban - 2nd year project	2013-2014
Ding Bon Huang	M.S. 2013

Undergraduate Students

Delphine Veronese-Milin (UCB)	2017
Nicholas Rui (UCB)	2016-2017
Haynes Stephens (UCB)	2016-2017
Nijaaid Arredondo (UCB)	2016-2017
Vida Khademi (UCB)	2016-2017
Corey Mutnick (UH)	2015-2016
Jennifer Greco (Caltech)	Summer 2009
Hal Cambier* (UCLA)	Summer 2006
James Dunn* (UCLA)	2006-2008
Jill Naiman* (UCLA)	2005-2006
Lia Corralles* (UCLA)	Summer 2005
Javiera Guedes* (UCLA)	Summer 2004

**Served as a graduate student advisor for undergrads advised by Prof. Andrea Ghez*

High School Students

Annie Chu	Summer 2017
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PAPERS IN PREPARATION

† = *unrefereed publications*

* = *directly supervised students or postdocs*

*Lockhart, K.E.; **Lu, J.R.**; Peiris, H.V.; Rich, R.M.; Bouchez, A.; Ghez, A.M.; *A Slowly Precessing Disk in the Nucleus of M31 as the Feeding Mechanism for a Central Starburst*, 2017, ApJ, submitted

*Hosek Jr., M.W.; **Lu, J.R.**; Anderson, J.; Do, T.; Schlafly, E.F.; Ghez, A.M.; Clarkson, W.I.; Morris, M.R.; Albers, S.M.; Weisz, D.R.; *The Optical/Near-Infrared Extinction Law in Highly Reddened Regions*, ApJ, in prep.

PUBLICATIONS

[70] **Lu, J.R.**; *Massive Young Clusters Near the Galactic Center*, The Birth of Star Clusters,

S. Stahler (ed.), 2017, Springer: Nature, in press

[69] Witzel, G.; Sitarski, B.N.; Ghez, A.M.; Morris, M.R.; Hees, A.H.; Do, T.; **Lu, J.R.**; Naoz, S.; Boehle, A.; Martinez, G.D.; Chappell, S.; Schodel, R.; Meyer, L.; Yelda, S.; Becklin, E.E.; Matthews, K.; *The Post-Periapse Evolution of Galactic Center Source G1: The Second Case of a Resolved Tidal Interaction with a Supermassive Black Hole*, ApJ, in press

[68] Hees, A.; Do, T.; Ghez, A. M.; Martinez, G.D.; Naoz, S.; Becklin, E. E.; Boehle, A.; Chappell, S.; Chu, D.; Dehghanfar, A.; Kosmo, K.; Lu, J. R.; Matthews, K.; Morris, M.R.; Sakai, S.; Shodel, R.; Witzel, G.; *Testing General Relativity with Stellar Orbits around the Supermassive Black Hole in Our Galactic Center*, 2017, Phys. Rev. Lett., 118, 211101

[67] †Gautam, A.K.; Do, T.; Ghez, A.M.; **Lu, J.R.**; Morris, M.R.; Sakai, S.; Witzel, G.; Sitarski, B.N.; Chappell, S.; *Constraining the Variability and Binary Fraction of Galactic Center Young Stars*, 2017, Proc. of IAU Symposium, 322, 237

[65] †Chappell, S.N.; Ghez, A.M.; Do, T.; Martinez, G.; Yelda, S.; Sitarski, B.N.; **Lu, J.R.**; Morris, M.R.; *The Late-Type Stellar Density Profile in the Galactic Center: A Statistical Approach*, 2017, Proc. of IAU Symposium, 322, 235

[64] †Do, T.; Ghez, A.; Morris, M.; **Lu, J.R.**; Chappell, S.; Feldmeier-Krause, A.; Kerzendorf, W.; Martinez, G.D.; Murray, N.; Winsor, N.; *Observational Constraints on the Formation and Evolution of the Milky Way Nuclear Star Cluster with Keck and Gemini*, 2017, Proc. of IAU Symposium, 322, 222

[63] Bowler, B.P.; Liu, M.C.; Mawet, D.; Ngo, H.; Malo, L.; Mace, G.N.; McLane, J.N.; **Lu, J.R.**; Tristan, I.I.; Hinkley, S.; Hillenbrand, L.A.; Shkolnik, E.L.; Benneke, B.; Best, W.M.J.; *Planets Around Low-Mass Stars (PALMS). VI. Discovery of a Remarkably Red Planetary-Mass Companion to the AB Dor Moving Group Candidate 2MASS J22362452+4751425*, 2017, AJ, 153, 18

[62] **Lu, J.R.**; Sinukoff, E.; Ofek, E.O.; Udalski, A., Kozłowski, S.; *A Search for Stellar-Mass Black Holes Via Astrometric Microlensing*, 2016, ApJ, 830, 41

[61] †Ammons, S.M.; Garcia, E.V.; Salama, M.; Neichel, B.; **Lu, J.R.**; Marois, C.; Macintosh, B.; Savransky, D.; Bendek, E.; Guyon, O.; Marin, E.; Garrel, V.; Sivo, G.; *Precision Astronomy with Adaptive Optics: Constraints on the Mutual Orbit of Luhman 16AB from GeMS*, 2016, SPIE, 9909-5T

[60] †Ragland, S.; Jolissaint, L.; Wizinowich, P.; van Dam, M.A.; Mugnier, L.; Bouxin, A.; Chock, J.; Kwok, S.; Mader, J.; Witzel, G.; Do, T.; Fitzgerald, M.; Ghez, A.; **Lu, J.R.**; Martinez, G.; Morris, M.; Sitarski, B.; *Point Spread Function Determination for Keck Adaptive Optics*, 2016, SPIE, 9909-1P

[59] †Witzel, G.; **Lu, J.R.**; Ghez, A.M.; Martinez, G.D.; Fitzgerald, M.P.; Britton, M.; Sitarski, B.N.; Do, T.; Campbell, R.D.; Service, M.; Matthews, K.; Morris, M.R.; Becklin, E.E.; Wizinowich, P.L.; Ragland, S.; Doppmann, G.; Neyman, C.; Lyke, J.; Kassis, M.; Rizzi, L.; Lilley, S.; Rampy, R.; *The AIROPA Software Package: Milestones for Testing General Relativity in the Strong Gravity Regime with AO*, 2016, SPIE, 9909-1O

[58] †Baranec, C.; **Lu, J.R.**; Wright, S.A.; Tonry, J.; Tully, R.B.; Szapudi, I.; Takamiya, M.; Hunter, L.; Riddle, R.; Chen, S.; Chun, M.; *The Rapid Transient Surveyor*, 2016, SPIE, 9909-0F

[57] †Wright, S.A.; Walth, G.; Do, T.; Marshall, D.; Larkin, J.E.; Moore, A.M.; Adamkovics, M.; Anderson, D.; Armus, L.; Barth, A.; Cote, P.; Cooke, J.; Chisholm, E.M.; Davidge, T.; Dunn, J.S.; Dumas, C.; Ellerbroek, B.L.; Ghez, A.M.; Hao, L.; Hayano, Y.; Liu, M.; Lopez-

- Rodriguez, E.; **Lu, J.R.**; Mao, S.; Marois, C.; Pandey, S.B.; Phillips, A.C.; Schoeck, M.; Subramaniam, A.; Subramanian, S.; Suzuki, R.; Tan, J.C.; Terai, T.; Treu, T.; Simard, L.; Weiss, J.L.; Wincentzen, J.; Wong, M.; Zhang, K.; *The Infrared Imaging Spectrograph (IRIS) for TMT: Latest Science Cases and Simulations*, 2016, SPIE, 9909-05
- [56] †Chun, M.R.; Lai, O.; Toomey, D.; **Lu, J.R.**; Service, M.; Baranec, C.; Thibault, S.; Brousseau, D.; Hayano, Y.; Oya, S.; Santi, S.; Kingery, C.; Loss, K.; Gardiner, J.; Steele, B.; *Imaka: A Ground-Layer Adaptive Optics System on Maunakea*, 2016, SPIE, 9909-02
- [55] Boehle, A.; Ghez, A.M.; Schodel, R.; Meyer, L.; Yelda, S.; Albers, S.; Martinez, G.D.; Becklin, E.E.; Do, T.; **Lu, J.R.**; Matthews, K.; Morris, M.R.; Sitarski, B.; Witzel, G.; *An Improved Distance and Mass Estimate for Sgr A* from a Multi-Star Orbit Analysis*, 2016, ApJ, 830, 17
- [54] *Service, M.; **Lu, J.R.**; Campbell, R.; Sitarski, B.; Ghez, A. M.; Anderson, J.; *A New Distortion Solution for NIRC2 on the Keck II Telescope*, 2016, PASP, 128, 9
- [53] McConnell, N.; **Lu, J.R.**; Mann, A.; *Radial Trends in IMF-Sensitive Absorption Features in Two Early-Type Galaxies: Evidence for Abundance-Driven Gradients*, 2016, ApJ, 821, 39
- [52] *Hosek Jr., M.W.; **Lu, J.R.**; Anderson, J.; Ghez, A.M.; Morris, M.R.; Clarkson, W.I.; *The Arches Cluster: Extended Structure and Tidal Radius*, 2015, ApJ, 813, 27
- [51] *Lockhart, K.E.; Kewley, L.J.; **Lu, J.R.**; Allen, M.G.; Rupke, D.; Calzetti, D.; Davies, R.I.; Dopita, M.A.; Engel, H.; Heckman, T.M.; Leitherer, C.; Sanders, D.B.; *HST/WFC Observations of an Off-Nuclear Superbubble in Arp 220*, 2015, ApJ, 810, 149
- [50] Do, T.; Kerzendorf, W.; Winsor, N.; Stostad, M.; Morris, M.R.; **Lu, J.R.**; Ghez, A.M.; *Discovery of low-metallicity stars in the central parsec of the Milky Way*, 2015, ApJ, 809, 143
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- [48] †Skidmore et al.; *Thirty Meter Telescope Detailed Science Case: 2015*, arXiv-1505.01195
- [47] Stolte, A.; Hubmann, B.; Olczak, C.; Brandner, W.; Habibi, M.; Ghez, A.M.; Morris, M.R.; **Lu, J.R.**; Clarkson, W.I.; Anderson, J.; *Circumstellar Discs in Galactic Center Clusters: Disc-bearing B-type Stars in the Quintuplet and Arches Clusters*, 2015, A&A, 578, A4
- [46] †Lai, O.; Chun, M.; **Lu, J.R.**; Hayano, Y.; Oya, S.; Toomey, D.; *LOTTTUCE: Layer-oriented tip-tilt turbulence tomography using covariance and elevation*, 2014, Journal of Physics: Conference Proceeding, 595, 012018
- [45] Witzel, G.; Ghez, A.M.; Morris, M.R.; Sitarski, B.N.; Boehle, A.; Naoz, S.; Campbell, R.; Becklin, E.E.; Canalizo, G.; Chappell, S.; Do, T.; **Lu, J.R.**; Matthews, K.; Meyer, L.; Stockton, A.; Wizinowich, P.; Yelda, S.; *Detection of Galactic center source G2 at 3.8 μ m during periaapse passage*, 2014, ApJ, 796, L8
- [44] Neichel, B.; **Lu, J.R.**; Rigaut, F.; Ammons, S.M.; Carrasco, E.R.; Lassalle, E.; *Astrometric Performance of the Gemini Multi-Conjugate Adaptive Optics System in Crowded Fields*, 2014, MNRAS, 445, 500
- [43] †**Lu, J.R.**; Anderson, J.; Do, T.; Ghez, A.; Morris, M.; *The Galactic Center through the Eye of Webb*, 2014, STScI Newsletter, 31
- [42] †**Lu, J.R.**; Neichel, B.; Anderson, J.; Sinukoff, E.; Hosek Jr., M.W.; Ghez, A.M.; Rigaut,

F.; *Near-Infrared Astrometry of Star Clusters with Different Flavors of Adaptive Optics and HST*, 2014, Proceedings of SPIE, 9148-10

[41] †Baranec, C.; Riddle, R.; Law, N.M.; Chun, M.R.; **Lu, J.R.**; Connelley, M.S.; Hall, D.; Atkinson, D.; Jacobson, S.; *Second generation Robo-AO instruments and systems*, 2014, Proceedings of SPIE, 9148-12

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[39] †Sitarski, B.N.; Witzel, G.; Fitzgerald, M.P.; Meyer, L.; Ghez, A.M.; Campbell, R.D.; **Lu, J.R.**; Matthews, K.; Wizinowich, P.; Lyke, J.; *Modeling instrumental field-dependent aberrations in the NIRC2 instrument on the Keck II telescope*, 2014 Proceedings of SPIE, 9148-6T

[38] †Wright, S.A.; Larkin, J.E.; Moore, A.M.; Do, T.; Simard, L.; Adamkovics, M.; Armus, L.; Barth, A.J.; Barton, E.; Boyce, H.; Cooke, J.; Cote, P.; Davidge, T.; Ellerbroek, B.; Ghez, A.M.; Liu, M.C.; **Lu, J.R.**; Macintosh, B.A.; Mao, S.; Marois, C.; Schoeck, M.; Suzuki, R.; Tan, J.C.; Treu, T.; Wang, L.; Weiss, J.; *The infrared imaging spectrograph (IRIS) for TMT: Overview of innovative science programs*, 2014 Proceedings of SPIE, 9147-9S

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[36] Ghez, A.M.; Witzel, G.; Sitarski, B.; Meyer, L.; Yelda, S.; Boehle, A.; Becklin, E.E.; Campbell, R.; Canalizo, G.; Do, T.; **Lu, J.R.**; Matthews, K.; Morris, M.R.; Stockton, A.; *Detection of Galactic Center Source G2 at 3.8 Micron During Periapse Passage Around the Central Black Hole*, 2014, The Astronomer's Telegram, 6110

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[34] Do, T.; Martinez, G.D.; Yelda, S.; Ghez, A.; Bullock, J.; Kaplinghat, M.; **Lu, J.R.**; Peter, A.H. Phifer, K.; *Three-dimensional Stellar Kinematics at the Galactic Center: Measuring the Nuclear Star Cluster Spatial Density Profile, Black Hole Mass, and Distance*, 2013, ApJ, 779, L6

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[31] **Lu, J.R.**; Do, T.; Ghez, A.M.; Morris, M.R.; Yelda, S.; Matthews, K.; *The Stellar Population in the Central 0.5 pc of the Milky Way II: The Initial Mass Function*, 2013, ApJ, 764, 155

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- [28] †Fitzgerald, M.P.; Witzel, G.; Britton, M.C.; Ghez, A.M.; Meyer, L.; Sitarski, B.N.; Cheng, C.; Becklin, E.E.; Campbell, R.D.; Do, T.; **Lu, J.R.**; Matthews, K.; Morris, M.R.; Neyman, C.R.; Tyler, G.A.; Wizinowich, P.L.; Yelda, S.; *Modeling anisoplanatism in the Keck II laser guide star AO system*, 2012, *Proceedings of SPIE*, 8447
- [27] †Yelda, S.; Ghez, A.M.; **Lu, J.R.**; Do, T.; Meyer, L.; Morris, M.R.; *Adaptive Optics Observations of the Galactic Center Young Stars*, 2012, *Proceedings of SPIE*, 8447, astro-ph/1208.3466
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- [24] †**Lu, J.R.**; Ghez, A.M.; Yelda, S.; Do, T.; Clarkson, W.; McCrady, N.; Morris, M.R.; “*Recent Results and Perspectives for Precision Astrometry and Photometry with Adaptive Optics*”; 2010, *Proceedings of SPIE*, 7736, astro-ph/1008.1293
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TALKS AND
POSTERS

Summary: 76 talks (49 invited, 4 public), 6 posters

Talk: **AO4ELT5** Conference, Tenerife, Spain 06/2017, *'imaka Wide-Field Ground Layer Adaptive Optics on Maunakea*

Invited Talk: **Lawrence Berkeley Labs** Seminar, Baltimore, MD 05/2017, *New Developments in Adaptive Optics: Wide Fields and Precise PSFs*

Invited Talk: **UC Berkeley** Colloquium, Baltimore, MD 03/2017, *Black Holes, Big and Small: An Adaptive Optics View*

Invited Talk: **UC Berkeley** Colloquium, Baltimore, MD 03/2017, *Black Holes, Big and Small: An Adaptive Optics View*

Invited Talk: **STScI** Colloquium, Baltimore, MD 02/2017, *Finding Stellar Mass Black Holes via Astrometric Microlensing*

Invited Talk: **Microlensing 21** Conference, Pasadena, CA 02/2017, *Finding Stellar Mass Black Holes via Astrometric Microlensing*

Talk: **AAS Meeting**, Dallas, TX 01/2017, *Finding Stellar Mass Black Holes via Astrometric Microlensing*

Talk: **Galactic Center Group** Workshop, Los Angeles, CA, 12/2016, *JWST on the Galactic Center*

Invited Talk: **Stellar Aggregates** Conference, Bad Honnef, Germany, 12/2016, *Review: The Milky Way's Central Molecular Zone and its Stellar Population*

Talk: **Berkeley Computational Imaging Lunch**, Berkeley, CA 11/2016, *Finding Stellar Mass Black Holes via Astrometric Microlensing*

Talk: **Berkeley Astronomy Lunch**, Berkeley, CA 09/2016, *Finding Stellar Mass Black Holes via Astrometric Microlensing*

Talk: **Keck Science Meeting**, Pasadena, CA, 09/2016, *Finding Free-Floating Black Holes via Astrometric Microlensing*

Invited Talk: **SPIE**, Edinburgh, Scotland, 06/2016, *Astrometry with Adaptive Optics*

Public Talk: **From Stars to Massive Stars**, Gainesville, FL, 04/2016 **The Heart of Our Milky Way: An Extreme Stellar Nursery Around a Black Hole**

Invited Talk: **From Stars to Massive Stars**, Gainesville, FL, 04/2016 **The IMF in Massive Young Clusters in the Milky Way Disk and Center**

Invited Talk: **Caltech** Colloquium, Pasadena, CA, 03/2016 **Stars in Motion**

Invited Talk: **UC Berkeley** Colloquium, Berkeley, CA, 02/2016 **Stars in Motion**

Invited Talk: **Dynamics and Accretion at the Galactic Center**, Aspen, CO, 02/2016, *The Dynamics and IMF of the Young Nuclear Star Cluster*

Talk: **AO4ELT4**, Lake Arrowhead, CA, 10/2015, *Search for Free-Floating Black Holes with Astrometric Microlensing*

Talk: **IAU General Assembly**, Honolulu, HI, 08/2015, *The Initial Mass Function in the Massive Young Cluster, Westerlund 1*

Public Talk: **Hawaiian Astronomical Society**, Honolulu, CA, 07/2015, *The Center of Our Milky Way: An Unusual and Extreme Stellar Nursery*

Invited Talk: **NRC-HIA Colloquium**, Victoria, Canada, 02/2015, *Star Formation in Extreme Environments*

Invited Talk: **Stanford Colloquium**, Palo Alto, CA, 11/2014, *Stars In Motion: Impact in Star Formation, Compact Objects, Galactic Centers*

Talk: **Center for Adaptive Optics Fall Retreat**, 11/2014, *Finding Free-Floating Black Holes with Astrometric Microlensing*

Invited Talk: **Kavli Frontiers of Science, Chinese-American Symposium**, Beijing, China, 10/2014, *The Center of Our Milky Way: An Unusual and Extreme Stellar Nursery*

Invited Talk: **Caltech GLAO Workshop**, Pasadena, CA, 09/2014, *GLAO Science: 'imaka and Beyond*

Talk: **Galactic and Extra-galactic Star Formation Conference**, Marseille, France, 09/2014, *The Initial Mass Function of Wd 1 from HST Astrometry and Photometry*

Invited Talk: **SPIE Conference**, Montreal, Canada, 06/2014, *Massive Clusters, the Galactic Center, and Astrometry*

Invited Talk: **Harvard-Smithsonian CfA**, Colloquium, Harvard, MA, 03/2014, *Star Formation in Extreme Environments*

Invited Talk: **UCSC**, Astronomy Colloquium, Santa Cruz, CA, 12/2013, *Young Stars in the Central Parsec of Our Galaxy*

Invited Talk: **The Orion Nebular Cluster Workshop**, STScI, Baltimore, MD, 10/2013, *Star Formation in Extreme Environments: Massive Clusters and the Galactic Center*

Invited Talk: **IAU303 Galactic Center Symposium**, Santa Fe, NM, 10/2013, *Young Stars in the Central Parsec of Our Galaxy*

Talk: **Adaptive Optics for Extremely Large Telescopes**, Florence, Italy, 5/2013, *Astrometry with the Gemini MCAO System*

Invited Talk: **UCLA** Astronomy Colloquium, Los Angeles, CA, 3/2013, *Star Formation in Extreme Environments: Massive Young Clusters and Galactic Centers*

Talk: **TMT Science and Instrumentation Workshop**, Pune, India, 12/2012, *Stars in Formation, In Motion*

Invited Talk: **MIT** Astronomy Colloquium, Boston, MA, 11/2012, *Star Formation in Extreme Environments near Supermassive Black Holes and in Massive Star Clusters*

Talk: **Center for Adaptive Optics Fall Retreat**, 10/2012, *Precision astrometry with Gemini's Multi-Conjugate Adaptive Optics System*

Invited Talk: **Univ. of Toronto** Astronomy Colloquium, Toronto, ON, 10/2012, *Star Formation in Extreme Environments near Supermassive Black Holes and in Massive Star Clusters*

Invited Talk: **STScI** Colloquium, Baltimore, MD, 10/2012, *Extremophiles: Stars Born around Black Holes and in Dense Clusters*

Public Talk: **Keck Astronomy Lecture Series**, Waimea, HI, 9/2012, *Stars Born in Extreme Environments*

Invited Talk: **UC Riverside** Astrophysics Seminar, Riverside, CA, 3/2012, *Star Formation in Extreme Environments*

Invited Talk: **UC San Diego** Astrophysics Seminar, San Diego, CA, 2/2012, *Star Formation in Extreme Environments*

Talk: **AAS Meeting**, Austin, TX, 1/2012, *Keck LGS-AO Observations of the Central 5 pc of M31*

Talk: **NSF AAPF Symposium**, Austin, TX, 1/2012, *Does Star Formation Differ Around the Supermassive Black Hole at the Galactic Center?*

Invited Talk: **IfA Star and Planet Formation Workshop**, Honolulu, HI, 12/2011, *The IMF in the Milky Way's Young Nuclear Star Cluster*

Invited Talk: **TMT Workshop**, Victoria, BC, 3/2011, *Astrometry with ELTs*

Invited Talk: **Univ. of Texas** Astronomy Colloquium, Austin, TX, 2/2011, *Clarifying our View of Milky Way Massive Young Star Clusters with Adaptive Optics*

Invited Talk: **Drexel University** Physics Colloquium, Philadelphia, PA, 1/2011, *Star Formation in Extreme Environments, Including Around the Milky Way's Supermassive Black Hole*

Invited Talk: **Institute for Astronomy, UHawaii** Astronomy Colloquium, Honolulu, HI, 1/2011, *Clarifying our View of Milky Way Massive Young Star Clusters with Adaptive Optics*

Talk: **AAS Meeting**, Seattle, WA 1/2011, *Clarifying our View of Milky Way Massive Young Star Clusters with Adaptive Optics*

Invited Talk: **Caltech** Astronomy Colloquium, Pasadena, CA, 12/2010, *Clarifying our View of Star Formation in Massive Young Clusters with Adaptive Optics*

Invited Talk: **Carnegie Observatories** Astronomy Colloquium, Pasadena, CA, 11/2010, *Clarifying our View of Star Formation in Massive Young Clusters with Adaptive Optics*

Invited Talk: **SPIE Conference**, San Deigo, CA, 6/2010, *Recent Results and Perspectives for Precision Astrometry and Photometry with Adaptive Optics*

Invited Talk: **UP 2010 Conference**, Sedona, AZ, 6/2010, *Clarifying our View of Star Formation in Massive Young Clusters and the Galactic Center with Adaptive Optics*

Invited Talk: **From Stars To Galaxies Conference**, U. of Florida, 4/2010, *Massive Young Star Clusters in Different Milky Way Environments*

Invited Talk: **Lawrence Livermore National Labs** Colloquium, 3/2010, *Clarifying our View of Star Formation in Massive Young Clusters with Adaptive Optics*

Invited Talk: **AAS Science with Adaptive Optics on Large Telescopes**, 6/2009, *Origin of Young Stars in the Galactic Center and M31*

Invited Talk: **AAS 2010-2020: The Decade of Astrometry**, 6/2009, *Relative Astrometry with Ground-Based Adaptive Optics Imaging*

Invited Talk: **UC Irvine Astrophysics Seminar**, 6/2009, *Origins of Young Stars Around the Two Closest Supermassive Black Holes*

Poster: **Intermediate-Mass Black Holes Conference**, UC Irvine, 4/2009, *Observational Constraints on Fueling the Starburst in the Central Parsec of M31*

Invited Talk: **Cal Poly Pomona Physics Colloquium**, 1/2009, *Star Formation Around the Supermassive Black Hole at the Center of our Galaxy*

Invited Talk: **U. of Florida, Gainseville Astronomy Colloquium**, 11/2008, *Young Stars in the Central Parsec of Our Galaxy*

Invited Talk: **Center for Adaptive Optics Fall Retreat**, 10/2008, *Characterizing and Improving Ground Based Astrometry from Keck*, joint talk with Sylvana Yelda

Public Talk: **Tarzana Medical Center Astronomy Symposium**, 08/2008, *Forming Stars Around the Supermassive Black Hole in Our Galaxy*

Invited Talk: **The Universe Under the Microscope Conference**, 04/2008, *Dynamics of the Stars Around Our Galaxy's Supermassive Black Hole*

Talk: **AAS Meeting**, 01/2008, *Orbits and Origins of Young Stars in the Central Parsec of the Milky Way*

Invited Talk: **Keck Science Meeting**, 09/2007, *Astrometry with the Next Generation Adaptive Optics System at Keck*, joint talk with Brian Cameron

Poster: **Science in the Era of TMT Conference**, 07/2007, *A Magnified View of the Nucleus of M31 with TMT*

Invited Talk: **Galactic Center Workshop**, Ringberg, 06/2007, *Young Stellar Disks in the Galactic Center*

Invited Talk: **Center for Adaptive Optics Spring Retreat**, 03/2007, *Astrometry with Adaptive Optics Imaging*

Invited Talk: **UC Berkeley**, Theoretical Astrophysics Center Seminar, 10/2006, *The Galactic Center: Star Formation Near a Supermassive Black Hole?*

Talk: **Keck Science Meeting**, 09/2006, *Orbits and Origins of the Young Stars at the Center of Our Milky Way Galaxy*

Talk: **Galactic Center Workshop**, 04/2006, *Galactic Center Youth: Orbits and Origins of the Young Stars in the Central Parsec*

Invited Talk: **USC Viterbi School of Engineering Undergraduate Honors Colloquium**, 04/2006, *The Supermassive Black Hole at the Center of the Milky Way*

Talk: **AAS Meeting**, 01/2006, *Orbits and Origins of the Young Stars at the Center of Our Milky Way Galaxy*

Talk: **Center for Adaptive Optics NSF Site Visit**, 11/2005, *Overview of UCLA Galactic Center Research with Keck*

Talk: **Center for Adaptive Optics Fall Retreat**, 10/2005, *Overview of UCLA Galactic Center Research with Keck*

Poster: **KITP Galactic Center Conference**, 04/2005, *IRS 16 SW - A New Comoving Group of Young Stars in the Central Parsec of Our Galaxy*

Poster: **AAS Meeting**, 01/2005, *IRS 16 SW - A New Cluster of Young Stars in the Central Parsec of Our Galaxy*

Poster: **Center for Adaptive Optics Fall Retreat**, 10/2004, *IRS 16 SW - A New Co-moving Group of Young Stars in the Central Parsec of Our Galaxy*

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