

Jessica Ryan Lu

CONTACT INFORMATION California Institute of Technology *Voice:* (626) 395-3693
Astronomy Department *Fax:* (626) 568-9352
1200 E. California Blvd., MC 105-24 *E-mail:* jlu@astro.caltech.edu
Pasadena, CA 91125 *WWW:* www.astro.caltech.edu/~jlu

RESEARCH INTERESTS High-mass star and cluster formation, galactic centers, stellar dynamics, high-angular resolution imaging and spectroscopy, adaptive optics, astrometry, infrared astronomy.

EDUCATION **University of California, Los Angeles** , Los Angeles, California USA
Ph.D. Candidate, Astrophysics, 06/2003 - 08/2008 (expected graduation date)

- Adviser: Prof. Andrea Ghez
- Topic: “Origins of Young Stars in the Central Parsec of the Milky Way”

M.S., Astrophysics, 05/2003 - 05/2005

- Adviser: Prof. Andrea Ghez
- Topic: “IRS 16 SW - A New Comoving Group of Young Stars in the Central Parsec of the Milky Way”

Massachusetts Institute of Technology, Boston, Massachusetts USA

S.B., Physics, 05/2000

- Adviser: Prof. Victoria Kaspi
- Topic: “Monitoring Anomalous X-ray Pulsars with RXTE”

HONORS AND AWARDS 2008 Millikan Postdoctoral Fellowship (California Institute of Technology)
2008 Hubble Postdoctoral Fellowship (declined)
2008 NSF Astronomy Postdoctoral Fellowship (declined)
2005-2008: NSF Graduate Research Fellowship
2003-2004: Center for Adaptive Optics Graduate Student Fellowship
May 2000: MIT Barrett Award for Excellence in Astrophysics
1997-1999: Spertus Family MIT Research Support Grant

RESEARCH APPOINTMENTS *Millikan Postdoctoral Fellow*, Caltech **10/2008 - present**

Graduate Student Researcher, UCLA **06/2003 - 09/2008**

- Dynamical studies of the young stars in the central parsec of the Milky Way in order to understand their origins.
- Search for infrared counterparts to transient X-ray sources in the Galactic Center (with Mike Muno).
- Spectroscopic studies of the young stars closest to the supermassive black hole in order to look for extended mass distributions.

Undergraduate Researcher, MIT **06/1997 - 06/2000**

- Long-term monitoring of four anomalous X-ray pulsars (AXPs) using phase coherent timing methods to determine the relationship between AXPs and Soft-Gamma repeaters.
- Used the Compton Gamma-Ray Observatory/EGRET instrument, to observe 2 unidentified gamma-ray sources that were spatially coincident with 2 young energetic radio pulsars. Through timing analysis, we found evidence for gamma-ray emission from PSR B1046-58.

SERVICE
AND OTHER
EXPERIENCES

Committees

- 2008-present, TMT IRIS Instrument Science Team
- 2006-2007, Keck Next Generation Adaptive Optics, Galactic Science Team
- 2006-2007, Keck Next Generation Adaptive Optics, Astrometry Technical Team
- 2007, Keck NIRC2 Distortion Characterization Effort

Professional Memberships

- American Astronomical Society
- Center for Adaptive Optics

Public Outreach

- Collaborating with Adler Planetarium and University of Chicago Cosmos 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/>
- Collaborating with National Center for Supercomputing Applications to incorporate above with a simulated animation of the entire Galactic Center region (in progress)
- 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.
- Created the UCLA Galactic Center Group website. *<http://www.astro.ucla.edu/research/galcenter>*

Departmental Service

- 2003-2006, UCLA Astronomy Webmaster
- 2006-2007, UCLA Faculty Rep. for Grad Students

Software Engineer

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

TEACHING
EXPERIENCE

Teaching Assistant, UCLA **Spring 2008**
Design and teach weekly recitation sessions for ASTRO 81, an introductory astronomy course for astronomy/physics majors.

Lesson/Lab Design, CfAO Summer School **2006-2007**
Part of a team that designed and implemented three interactive labs for the Center for Adaptive Optics Summer School. The labs use facilities and equipment provided by the Moore Lab for Adaptive Optics and attempts to incorporate Inquiry teaching methods for an advanced topic previously taught only in lecture format.

Teaching Assistant, UCLA **Spring 2006**
Design and teach weekly recitation sessions for ASTRO 81, an introductory astronomy course for astronomy/physics majors.

Participant, CfAO Professional Development Workshop **Spring 2006**
Training in inquiry (and other) teaching styles.

Teaching Assistant, UCLA **Fall 2004**
Teach weekly lab sessions for ASTRO 3, an introductory astronomy course for non-science majors.

PAPERS IN
PREPARATION

Yelda, S.; **Lu, J. R.**; Ghez, A. M.; Anderson, J.; *“Improving the Precision of Keck/LGS AO Astrometry by Reducing the Effects of Geometric Distortion”*, 2009, in preparation

Do, T.; Ghez, A. M.; Morris, M. R.; **Lu, J. R.**; Matthews, K.; Yelda, S.; Larkin, J.; *“High*

Angular Resolution Integral-Field Spectroscopy of the Galaxy's Nuclear Cluster: A Missing Stellar Cusp?", 2009, in preparation

PUBLICATIONS

***Note: some publications under maiden name, Jessica Lackey*

Do, T.; Ghez, A. M.; Morris, M. R.; Yelda, S.; Meyer, L.; **Lu, J. R.**; Hornstein, S. D.; and Matthews, K.; "A Near-IR Variability Study of the Galactic Black Hole: A Red Noise Source with No Detected Periodicity", 2009, The Astrophysical Journal, in press

Lu, J. R.; "Exploring the Origins of Young Stars in the Central Parsec of our Galaxy with Stellar Dynamics", 2008, UCLA Ph.D. Thesis

Lu, J. R.; Ghez, A. M.; Hornstein, S. D.; Morris, M. R.; Becklin, E. E.; Matthews, K.; "A Disk of Young Stars at the Galactic Center as Determined by Individual Stellar Orbits", 2009, The Astrophysical Journal, 690, 1463

Ghez, A. M.; Salim, S.; Weinberg, N. N.; **Lu, J. R.**; Do, T.; Dunn, J. K.; Matthews, K.; Morris, M.; Yelda, S.; Becklin, E. E.; Kremenek, T.; Milosavljevic, M.; and Naiman, J.; "Measuring the Distance and Properties of the Milky Way's Central Supermassive Black Hole with Stellar Orbits", 2008, The Astrophysical Journal, 689, 1044

Stolte, A.; Ghez, A. M.; Morris, M. R.; **Lu, J. R.**; Brandner, W.; Matthews, K.; "The Proper Motion of the Arches Cluster with Keck Laser-Guide Star Adaptive Optics", 2007, The Astrophysical Journal, 675, 1278

Hornstein, S. D.; Matthews, K.; Ghez, A. M.; **Lu, J. R.**; Morris, M. R.; Becklin, E. E.; Rafelski, M.; Baganoff, F. K.; "A Constant Spectral Index for Sagittarius A* during Infrared/X-Ray Intensity Variations", 2007, The Astrophysical Journal, 667, 900

Lu, J. R.; Ghez, A. M.; Hornstein, S. D.; Morris, M. R.; Matthews, K.; Thompson, D. J.; Becklin, E. E.; "Orbits and Origins of the Young Stars in the Central Parsec", 2006, Galactic Center Newsletter, 25, invited article

Lu, J. R.; Ghez, A. M.; Hornstein, S. D.; Morris, M. R.; Matthews, K.; Thompson, D. J.; Becklin, E. E.; "Galactic Center Youth: Orbits and Origins of the Young Stars in the Central Parsec", 2006, Journal of Physics: Conference Series, 54, 279

Rafelski, M.; Ghez, A. M.; Hornstein, S. D.; **Lu, J. R.**; Morris, M.; "Photometric Stellar Variability in the Galactic Center", 2007, The Astrophysical Journal, 659, 1241

Lu, J. R.; Ghez, A. M.; Hornstein, S. D.; Morris, M.; Becklin, E. E.; "IRS 16 SW - A New Comoving Group of Young Stars in the Central Parsec of the Milky Way", 2005, The Astrophysical Journal, 625, L51

Ghez, A. M.; Hornstein, S. D.; **Lu, J. R.**; Bouchez, A.; LeMignant, D.; Wizinowich, P.; Matthews, K.; Morris, M.; Becklin, E. E.; Campbell, R. D.; Chin, J. C. Y.; van Dam, M. A.; Hartman, S. K.; Johansson, E. M.; Lafon, R. E.; Stomski, P. J.; Summers, D. M.; "The First Laser Guide Star Adaptive Optics Observations of the Galactic Center: Sgr A*'s Infrared Color and the Discovery of Extended Red Emission in its Vicinity", 2005, The Astrophysical Journal, 635, 1087

Muno, M. P.; **Lu, J. R.**; Baganoff, F. K.; Brandt, W. N.; Garmire, G. P.; Ghez, A. M.; Hornstein, S. D.; Morris, M. R.; "A Remarkable Low-Mass X-Ray Binary within 0.1 Parsecs of the Galactic Center", 2005, The Astrophysical Journal, 633, 228

Muno, M. P.; Pfahl, E.; Baganoff, F. K.; Brandt, W. N.; Ghez, A.; **Lu, J. R.**; Morris, M. R.; "*An Overabundance of Transient X-Ray Binaries within 1 Parsec of the Galactic Center*", 2005, *The Astrophysical Journal*, 622, L113

Ghez, A. M.; Salim, S.; Hornstein, S. D.; Tanner, A.; **Lu, J. R.**; Morris, M.; Becklin, E. E.; Duchêne, G.; "*Stellar Orbits around the Galactic Center Black Hole*", 2005, *The Astrophysical Journal*, 620, 744

Kaspi, V. M.; Gavriil, F. P.; Chakrabarty, D.; **Lackey, J. R.**; Muno, M. P.; "*Long-Term Rossi X-ray Timing Explorer Monitoring of the Anomalous X-ray Pulsar 1E 1048.1-5937*", 2001, *The Astrophysical Journal*, 558, 253

Lackey, J. R.; "*Monitoring Anomalous X-ray Pulsars with RXTE*", 2000, MIT Undergraduate Thesis

Kaspi, V. M.; **Lackey, J. R.**; Chakrabarty, D., "*A Glitch in an Anomalous X-ray Pulsar*", 2000, *The Astrophysical Journal*, 537, L31

Kaspi, V. M.; **Lackey, J. R.**; Mattox, J.; Manchester, R. N.; Bailes, M.; Pace, R.; "*High-Energy Gamma-Ray Observations of Two Young, Energetic Radio Pulsars*", 2000, *The Astrophysical Journal*, 528, 445

TALKS AND POSTERS

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

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

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

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

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

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

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

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

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

Talk: *Orbits and Origins of Young Stars in the Central Parsec of the Milky Way*, American Astronomical Society, 01/2008

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

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

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

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

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

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

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

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

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

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

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

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

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

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