Lulu Liu

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AREAS OF INTEREST

Optics, microscopy, high-precision measurements, scientific instrumentation, experimental physics.

EDUCATION

Ph.D. Applied Physics - Optics *Aug 2011 - present*
Harvard University, Cambridge MA

M.A. Physics *Received May 2014*
Harvard University, Cambridge MA

B.S. Physics - GPA 3.8/4.0 *Aug 2005 - Jun 2009*
Massachusetts Institute of Technology, Cambridge MA

RESEARCH OVERVIEW

Harvard University Aug 2011 - Present
Graduate Student Researcher *Cambridge, MA*

- Designed and built microscopy apparatus for optical trapping/sensing to affect and detect angstrom scale displacements of micron-size particles. First measurement of sub-femtonewton optical forces in fluid. Apparatus enables very precise and contact-free manipulation of small matter probes for the investigation of surface and optical forces.
- Mentored undergraduates, graduates, and post-docs as the lead on the project.

Stanford University - Astrophysics/Cosmology Center (KIPAC) Sept 2009 - Oct 2010
Research Assistant *Palo Alto, CA*

- Developed new statistical ensemble approach to investigation of deep-space objects with inadequate redshift information. Used this approach to determine the abundance of large satellites around Milky-Way sized galaxies and confirm its statistical agreement with numerical simulations running LCDM cosmological models.

NASA - Transiting Exoplanet Survey Satellite (TESS) May 2007 - Jun 2009
Intern *Mountain View, CA*

- Worked on the core science team of a space-based planet-finder mission scheduled for launch in 2017. Designed a concept of operations. Tested the reaction wheel assembly. Characterized and improved the sensitivity of the main CCD array for the spacecraft.

MIT - Laser Interferometer Gravitational Wave Observatory (LIGO) May 2006 - Sept 2006
Student Researcher *Cambridge, MA*

- Joined the waveform-simulations team of the LIGO collaboration at MIT. Wrote code to inject and discriminate test signals from the noisy background environment.

GRANTS, AWARDS, AND HONORS

Paper Selected for Editor's Suggestion, Physical Review Letters 2016
Bok Center Certificate of Distinction in Teaching Award, Harvard University 2016
Kao Fellowship, Harvard University 2013 - present
Graduate Research Fellowship, NSF 2011 - present
Graduate Research Fellowship, NDSEG awarded/declined
2010 Mass Media Fellowship for Science Writing, AAAS May 2010
Letter of Distinction, MIT Physics Lab Faculty June 2008

SELECTED PUBLICATIONS AND PRESENTATIONS

I have published first-author papers in various high profile journals such as the Proceedings of the National Academy of Sciences and Physical Review Letters, including a paper which was selected as an "Editor's Suggestion" in PRL. I have given talks at conferences in optics, physics, and metamaterials and have been an invited speaker on two occasions. Additionally, in the capacity of a science journalist, I have published stories and essays in Sacramento Bee, APS News, and MIT Technology Review.

Force spectroscopy at the thermal limit Jul 2016
Invited Talk - Malaga, Spain *META Conference*

Sub-femtonewton Force Spectroscopy at the Thermal Limit in Liquids Jun 2016
L. Liu, S. Kheifets, V. Ginis, F. Capasso *Physical Review Letters*

Measurement of surface plasmon forces at a metal-dielectric interface Mar 2015
Oral Presentation - San Antonio, TX *APS March Meeting*

Absolute position total internal reflection microscopy with an optical tweezer Dec 2014
L. Liu, A. Woolf, A. Rodriguez, F. Capasso *PNAS*

New Techniques in Optical Trapping and Sensing Jun 2014
Oral Presentation - San Jose, CA *CLEO Conference*

Mind the Gap: The Science Communication Problem Feb 2013
Essay *MIT Technology Review*

How Common are the Magellanic Clouds? May 2011
L. Liu, B. Gerke, R. Wechsler, P. Behroozi, M. Busha *The Astrophysical Journal*

CCD Photometric Precision for the Transiting Exoplanet Survey Satellite May 2009
Senior thesis on TESS - an ongoing satellite project *MIT / NASA*

EMPLOYMENT AND EXPERIENCE

I have industry experience in solar metrology, and an substantial teaching, writing, and arts background.

Harvard College Aug 2015 - Dec 2015
Teaching Fellow / Section Leader *Cambridge, MA*

· Led two sections for undergraduate class "SPU-27 Science and Cooking". Duties included lecturing, mentoring, grading, and proctoring exams. Received Bok Center prize for excellence in teaching.

Harvard Graduate School of Arts and Sciences Jul 2013 - present
Photographer *Cambridge, MA*

· Photograph Harvard events and individual portraits for news publications and alumni magazines.

Alta Devices Sept 2010 - Aug 2011
Metrology Engineer *Santa Clara, CA*

· Worked directly under chief technologist to design and build many high-throughput metrology tools for characterizing solar film quality at the thin film solar start-up.

Sacramento Bee Newspaper May 2010 - Aug 2010
Science Reporter *Sacramento, CA*

· Intern science writer at the Sacramento Bee newspaper. Published 10 stories in all including 3 front page features.

UC Santa Cruz Sept 2009 - Dec 2009
Teaching Assistant / Lecturer *Santa Cruz, CA*

· Lectured and graded for introductory physics laboratory courses 5L and 6L.

VOLUNTEER, OUTREACH, LEADERSHIP

Scientific Reports, NPG, Referee	Feb 2016 - present
Climate Change National Forum, Columnist	Jan 2013 - present
Technology Review, Contributor	Feb 2013 - present
MIT Admissions Department, Blogger / Photographer	Sept 2005 - Jul 2009
MIT Lit / Art Magazine (Rune), Editor-in-Chief	Sept 2006 - Jun 2009

TECHNICAL STRENGTHS

Computer Languages	MATLAB, Python, Javascript, D3, HTML/CSS, Unix, Mathematica, Scheme, IDL, Labview, Igor Pro
Databases	MySQL
Tools	SVN, COMSOL, Lumerical, STK, CAD, LaTeX

Nationality: USA