

# Laura B. Newburgh

## CURRICULUM VITAE

Wright Laboratory  
Department of Physics  
Yale University  
P.O. Box 208120  
New Haven, CT 06520

Phone: (203) 432-9168  
*laura.newburgh@yale.edu*

**Research Interests** Observational Cosmology and Instrumentation: Cosmic Microwave Background polarimetry, 21 cm probes of dark energy, multi-frequency intensity sky mapping

### Employment History

- 2017 – present **Assistant Professor, Yale University, Department of Physics**
- 2013 – 2016 **Dunlap Institute Postdoctoral Fellow, Dunlap Institute, University of Toronto**  
Measuring dark energy in redshift desert with CHIME and HIRAX using new 21 cm intensity mapping
- Coordinate calibration and lead the beam measurement effort for CHIME
  - Founding member of recently funded experiment HIRAX
- 2010 – 2013 **Postdoctoral Scholar, Princeton University**  
High resolution measurements with ACTPol of the polarized Cosmic Microwave Background for constraints on early Universe cosmological parameters
- Led Focal plane characterization and integration
- 2004 – 2010 **Graduate Student Research Assistant, Columbia University** *Advisor: Prof. Amber Miller*  
QUIET: a low resolution CMB polarization experiment to detect or place constraints on inflation
- Designed and built cryostat and associated vacuum window optics
  - Led testing and integration of QUIET 40 GHz focal plane
  - Deployed QUIET 40 GHz instrument in Chile
  - Led initial data cutting analysis for the maximum-likelihood pipeline
- 2004 Research Assistant, Astronomy, Columbia University *Advisor: Prof. David Helfand*
- 2003 Research Assistant, American Museum of Natural History *Advisor: Prof. Ben Oppenheimer*
- 2002 – 2003 Undergraduate Research Assistant, Physics, Columbia University *Advisor: Prof. Allen Caldwell*
- 2002 Undergraduate Research Assistant, Physics, Columbia University *Advisor: Prof. Phillip Kim*
- 2001 Undergraduate Research Assistant, Astronomy, UC Berkeley *Advisor: Dr. Ben Oppenheimer*

### Education

- 2004 – 2010 Ph.D. and M.S., Physics, Columbia University, *Advisor: Prof. Amber Miller*  
Thesis: “The Q/U Imaging Experiment (QUIET): The Q-band Receiver Array Instrument and Observations”
- 1999 – 2003 B.A. Physics, Barnard College, *Magna cum Laude and With Departmental Honors*

## Teaching

### *Academic*

Fall 2017 - PHYS 205/206 Modern Physical Measurement I and II (undergraduate level)

Summer 2017 - Instructor/lecturer for Dunlap Institute Instrumentation Summer School

Spring 2017 - PHYS515 Topics in Modern Physics Research (graduate level)

### *Direct Student Research Supervision*

Current students: Emily Kuhn, Lauren Saunders

Graduate students (Yale) Daniel Berkowitz, Rachel Cooper

Undergraduate students (Yale) Dominic Eggerman, Nathaniel Kerman, Walter Wilson,  
Alexa Murray, Micheal Gu, Aviram Durling

Undergraduate students (U of Toronto) - Luke Licursi, Stephanie Gerbrandt

Undergraduate students (Princeton) - Prajwal Niraula, Wendy Harris, Tom Chung, Albert Zhao

### *Student Mentoring*

Graduate students (U of Toronto) - Deborah Lokhorst, Phillippe Berger, Liam Connor

Graduate students (Princeton) - Sara Simon, Christine Pappas, Emily Grace

### *Teaching Assistantships*

2005 – 2006 - Preceptor for organizing pre-med laboratory course teaching

2004 – 2005 - TA for pre-med laboratory course

## Awards

2017 NSF CAREER award

2013 Dunlap Postdoctoral Fellowship

2009 Selvaggi Award for Excellence in Research

2008 Sigma Xi Grant-in-Aid of Research

2006 NSF Graduate Research Fellowship Program Honorable Mention

2003 Henry A. Boorse Prize (Barnard College)

2003 Stanley Schachter Scholarship (Barnard College)

2002 Hughes Grant (Barnard College)

## Service to the Community

2017 Intensity mapping workshop SOC member

2017 NASA Panel reviewer

2017 Yale Astronomy TAC Committee member (internal)

2017 NSF Panel reviewer

Reviewer for ApJ, PASP

Organized the 2015 Summer Undergraduate Research Program: 18 students across 3 departments

Member of the Dunlap Institute's Dunlap Diversity Committee

Member of the Princeton Inclusion and Equity group

Lab coordinator for Dunlap Institute Instrumentation Summer School

## Public Outreach

- 2015 Volunteer at Dunlap Institute Harvest moon eclipse event
- 2015 HotDocs Science panelist
- 2014 Astronomy on Tap (Toronto) presentation
- 2014 Public lecture for University of Toronto monthly AstroTour event
- 2014 Volunteer at Science Rendezvous (science street festival across Canada)
- 2013 Public talk to the Amateur Astronomer Association of New Jersey:  
*The Universe: What do we know and when did we know it*
- 2012 Volunteer at a Venus Transit Outreach event, Princeton New Jersey
- 2011 Invited guest to a dinner and discussion of women in science sponsored by WISC  
(Women in Science Colloquium) at Princeton
- 2009 Public Astronomy Lecture (Columbia University) : *The Dark Side of the Universe*
- 2004 – 2008 Demo Show Scientist for Girls Science Day (Columbia University)
- 2006 Invited talks at Amherst, Wellesley, Smith, Mount Holyoke, and Barnard Colleges  
*Everything you Ever Wanted to Know About Cosmology and Graduate School, in One Hour*

## Talks

### *Colloquia and Seminars*

- Sep 2017 Harvard University, CfA seminar “New Probes of Old Structure: 21cm Intensity Mapping and the CMB”
- May 2017 Northwestern University Physics colloquium “New Probes of Old Structure: 21cm Intensity Mapping and the CMB”
- May 2017 Stanford University Physics colloquium “New Probes of Old Structure: 21cm Intensity Mapping and the CMB”
- Apr 2017 Florida State University “21cm Cosmology at ‘Short Wavelengths’ ”
- Apr 2017 Brown University Physics colloquium “New Probes of Old Structure: 21cm Intensity Mapping and the CMB”
- Feb 2017 MIT Astronomy colloquium “New Probes of Old Structure: 21cm Intensity Mapping and the CMB”
- Apr 2015 CUNY Buffalo “21 cm Cosmology with CHIME”
- Mar 2015 U. of Chicago seminar “21 cm Cosmology with CHIME”
- Nov 2014 Princeton U. Cosmology Lunch “21 cm Cosmology with CHIME”
- Oct 2014 U. of Miami colloquium “21 cm Cosmology with CHIME”
- Apr 2014 U. of Michigan seminar “21 cm Cosmology with CHIME”
- Sep 2013 AID @ Dunlap Institute “Measuring the CMB with ACTPol”
- Jul 2013 DRAO seminar “ACTPol: A Polarized Receiver for ACT”
- Jan 2013 Caltech seminar “ACTPol: A Polarized Receiver for ACT”
- May 2012 U. of Chicago seminar “ACTPol: A Polarized Receiver for ACT”
- Apr 2010 U. of Pennsylvania seminar “QUIET - the Q/U Imaging Experiment”
- Apr 2010 U. of Minnesota seminar “QUIET - the Q/U Imaging Experiment”
- Jan 2010 Gravity Group seminar @ Princeton U “QUIET - the Q/U Imaging Experiment”
- Oct 2009 Caltech seminar “QUIET - the Q/U Imaging Experiment”

### *Conference and Symposia Presentations*

- Jun 2017 **Invited** Intensity Mapping workshop “21cm Cosmology at ‘low’ redshift”
- Oct 2016 **Invited** Coordinating Panel for Advanced Detectors “Future Intensity Mapping Surveys”
- Sept 2016 **Invited** CMB-S4 and Large Scale Structure Meeting “Low Redshift 21cm”
- May 2016 **Invited** Cross-Correlation Spectacular “21 cm Cosmology with CHIME”

Mar 2016	<b>Invited</b> Intensity Mapping workshop “Our low- $\nu$ Common Enemy”
Apr 2015	APS meeting “21 cm Cosmology with CHIME”
Dec 2014	<b>Invited</b> Tempe 2014: Early Science from Low-Frequency Radio Telescopes “Calibrating CHIME”
Sep 2014	DRAO John Galt Symposium “Calibrating CHIME”
Aug 2014	Cosmo14 conference “21 cm Cosmology with CHIME”
Oct 2013	<b>Invited</b> New Horizons in Astronomy @ UT Austin “An experimentalist’s guide to CMB measurements and prospects for the future”
Apr 2013	APS Meeting “ACTPol: Receiver Characterization, Instrument Deployment, and Current Status”
Jul 2012	SPIE Conference “QUIET Science Results and Instrument Performance: Towards Measurements of Inflation with the Polarized CMB”
Mar 2012	Moriond Conference “QUIET Science Results and Instrument Performance: Towards Measurements of Inflation with the Polarized CMB”
Jan 2012	<b>Invited</b> Aspen Cosmology conference “ACTPol: A Polarized Receiver for ACT”
Feb 2011	<b>Invited</b> Planck Workshop “Polarized Results at 43GHz with the Q/U Imaging Experiment”
Mar 2010	Snowpac workshop “QUIET - the Q/U Imaging Experiment”
Jan 2010	AAS Meeting “QUIET - the Q/U Imaging Experiment”
Jul 2009	12th Marcel Grossman Meeting “QUIET - the Q/U Imaging Experiment”
Jan 2006	Annual AAS meeting poster presentation: “QUIET: Q/U Imaging Experiment”
Dec 2003	Barnard Guest Lecturer “Prospects for Finding Exoplanets”
Apr 2003	Hughes Grant Presentation of Research “Frictional Muon Cooling”

## Publications – Refereed

- Hilton, M., et al [44 authors, including **Newburgh, L.**], *The Atacama Cosmology Telescope: The Two-Season ACTPol Sunyaev-Zel’dovich Effect Selected Cluster Catalog*, ApJS, accepted
- The CHIME Scientific Collaboration [36 authors, including **Newburgh, L.**], *Limits on the ultra-bright Fast Radio Burst population from the CHIME Pathfinder*, ApJ 884, 2, 2017
- Sherwin, B., et al [46 authors, including **Newburgh, L.**], *The Atacama Cosmology Telescope: Two-Season ACTPol Lensing Power Spectrum*, PRD 95, 123529, 2017
- De Bernardis, F. et al [58 authors, including **Newburgh, L.**], *Detection of the pairwise kinematic Sunyaev-Zel’dovich effect with BOSS DR11 and the Atacama Cosmology Telescope*, JCAP 03, 08, 2017
- Thornton, R.J., et al [56 authors, including **Newburgh, L.**], *The Atacama Cosmology Telescope: The polarization-sensitive ACTPol instrument*, ApJS 227, 2, 2016
- Schaan, E. [46 authors, including **Newburgh, L.**], *Evidence for the kinematic Sunyaev-Zedovich effect with ACTPol and velocity reconstruction from BOSS*, PRD 93, 082002, 2016
- van Engelen, A. et al [52 authors, including **Newburgh, L.**], *The Atacama Cosmology Telescope: Lensing of CMB Temperature and Polarization Derived from Cosmic Infrared Background Cross-correlation*, Ap.J. 808, 7, 2015
- Allison, R., et al [28 authors, including **Newburgh, L.**], *The Atacama Cosmology Telescope: measuring radio galaxy bias through cross-correlation with lensing*, MNRAS 451, 1, 2015
- Madhavacheril et al [43 authors, including **Newburgh, L.**], *Evidence of Lensing of the Cosmic Microwave Background by Dark Matter Halos*, PRL 114, 15, 2015

10. QUIET Collaboration; Huffenberger, K. M. et al [26 authors, including **Newburgh, L**], *The Q/U Imaging Experiment: Polarization Measurements of Radio Sources at 43 and 95 GHz*, ApJ. 806, 1, 2015
11. QUIET Collaboration; Ruud, T. M. et al [41 authors, including **Newburgh, L**], *The Q/U Imaging Experiment: Polarization Measurements of the Galactic Plane at 43 and 95 GHz*, ApJ. 811, 89, 2015
12. Naess, S. et al [75 authors, including **Newburgh, L**], *The Atacama Cosmology Telescope: CMB polarization at  $200 < \ell < 9000$* , JCAP 10, 2014
13. Calabrese, E. et al [24 authors, including **Newburgh, L**], *Precision Epoch of Reionization Studies with Next-generation CMB Experiments*, JCAP 8, 2014
14. Datta, R. et al [19 authors, including **Newburgh, L**], *Large-aperture Wide-bandwidth Antireflection-coated Silicon Lenses for Millimeter Wavelengths*, Applied Optics, Vol. 52, 36, 2013
15. Calabrese, E. et al [34 authors, including **Newburgh, L**], *Cosmological Parameters from Pre-Planck Cosmic Microwave Background Measurements*: PRD 87, 10, 2013
16. \* The QUIET Collaboration [corresponding author **Newburgh, L**, 54 authors] *The QUIET Instrument*: ApJ 768, 9, 2013
17. The QUIET Collaboration [50 authors, including **Newburgh, L**] *Second Season QUIET Observations: Measurements of the CMB Polarization Power Spectrum at 95 GHz*: ApJ 760, 145, 2012
18. The QUIET Collaboration [50 authors, including **Newburgh, L**] *First Season of QUIET Observations: Measurements of the Cosmic Microwave Background Polarization Power Spectra in the Multipole Range  $25 < \ell < 475$* : ApJ 741, 2011
19. Gotthelf, E., Helfand, D., **Newburgh, L.** , *A Shell of Thermal X-ray Emission Associated with the Young Crab-like Remnant 3C58*: ApJ 654: 267-272, 2006
20. Galea R., Caldwell A., **Newburgh L.**, *A Frictional Cooling Demonstration Experiment with Protons*: NIM A, 524, 27-38, 2004

### Publications – Proceedings and White Papers

1. **Newburgh, L.B.** et al [36 authors], *HIRAX: A Probe of Dark Energy and Radio Transients* , SPIE 9910, 2016
2. Berger, P., **Newburgh, L.B.** et al [35 authors], *Holographic Beam Mapping of the CHIME Pathfinder Array*, SPIE 9910, 2016
3. De Bernardis, F. et al [37 authors, including **Newburgh, L.B.**], *Survey strategy optimization for the Atacama Cosmology Telescope*, SPIE 9910, 2016
4. Koopman, B. et al [24 authors, including **Newburgh, L.B.**], *Optical modeling and polarization calibration for CMB measurements with ACTPol and Advanced ACTPol*, SPIE 9910, 2016
5. Henderson, S. W. et al [57 authors, including **Newburgh, L**], *Advanced ACTPol Cryogenic Detector Arrays and Readout*, Proceedings in Journal of Low Temperature Physics, 2015
6. Denman, N. et al [20 authors, including **Newburgh, L**], *A GPU-based Correlator X-engine Implemented on the CHIME Pathfinder*, Proceedings of the 2015 IEEE 26th International Conference on Application-specific Systems, Architectures and Processors (ASAP), Pages 35-40
7. Masui, K. et al [14 authors, including **Newburgh, L**], *A compression scheme for radio data in high performance computing*, preprint 1503.00638

8. Pappas, C. G. et al [22 authors, including **Newburgh, L**], *Optical Efficiency and R(T,I) Measurements of ACTPol TESes Using Time Domain Multiplexing Electronics*, Journal of Low Temperature Physics, 176, 2014
9. Grace, E. A. et al [21 authors, including **Newburgh, L**], *Characterization and Performance of a Kilo- TES Sub-Array for ACTPol*, Journal of Low Temperature Physics, 176, 2014
10. **Newburgh, L. B.** , et al [35 authors], *Calibrating CHIME: A New Radio Interferometer to Probe Dark Energy*, SPIE 9145, 2014
11. Bandura, K. et al [34 authors, including **Newburgh, L**], *Canadian Hydrogen Intensity Mapping Experiment (CHIME) Pathfinder*, SPIE9145, 2014
12. Abazajian, K. N., et al. [77 authors, including **Newburgh, L**] *Neutrino Physics from the Cosmic Microwave Background and Large Scale Structure* : AstroParticle Physics 63, 2015
13. Abazajian, K. N., et al. [93 authors, including **Newburgh, L**] *Inflation Physics from the Cosmic Microwave Background and Large Scale Structure*: ArXiv 1309.5381
14. Datta, R. et al [20 authors, including **Newburgh, L**], *Horn Coupled Multichroic Polarimeters for the Atacama Cosmology Telescope Polarization Experiment*, JLTP 176, 2014
15. Hubmayr, J. et al [34 authors, including **Newburgh, L**], *An All Silicon Feedhorn-Coupled Focal Plane for Cosmic Microwave Background Polarimetry*: Journal of Low Temperature Physics, 2012
16. **Newburgh, L. B.** for the QUIET Collaboration, *Measuring CMB Polarization with QUIET: the Q/U Imaging Experiment*: Twelfth Marcel Grossmann Meeting on General Relativity, 2012
17. Oppenheimer, Ben R.; Digby, Andrew P.; **Newburgh, Laura**; Brenner, Douglas; Shara, Micheal; Mey, Jacob; Madeville, Charles; Makidon, Russell B.; Sivaramakrishnan, Anand; Soummer, Remi; Graham, James R.; Kalas, Paul; Perrin, Marshall D.; Roberts, Lewis C.; Kuhn, Jeffrey R.; Whitman, Kathryn; Lloyd, James P., *The Lyot Project: Toward Exoplanet Imaging and Spectroscopy*: Proceedings of the SPIE 5490, 433-442, 2004