

# Curriculum Vitae Amber Dawn Miller

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## Research Interests

Experimental Cosmology, Physics of the Early Universe, The Origin and Evolution of the Universe, Temperature and Polarization Anisotropy in the Cosmic Microwave Background, Sunyaev-Zel'dovich effect in clusters of galaxies.

## Positions Held

2008 – present	<b>Columbia University</b> , Walter LeCroy Jr. Associate Professor of Physics
2006–2008	<b>Columbia University</b> , Associate Professor of Physics
2002–2006	<b>Columbia University</b> , Assistant Professor of Physics
2000–2002	<b>The University of Chicago</b> , Hubble Fellow
1997- 2000	<b>Princeton University</b> , NASA GSRP Fellow
1995–1997	<b>Princeton University</b> , Princeton University President's Fellow
1994–1995	<b>U. C. Berkeley</b> , Research Assistant, Department of Astronomy
1992–1994	<b>U. C. Berkeley</b> , Research Assistant, Department of Physics

## Education

- **Princeton University - Ph. D. Physics, 2000**
- **University of California at Berkeley  
B. A. Physics and Astronomy (Honors Program), 1995**

## Honors and Distinctions

Lenfest Distinguished Faculty Award	2008
NSF CAREER Award	2005
Alfred P. Sloan Fellow	2005-2007
Hubble Fellowship (Space Telescope Science Institute)	2000-2002
Dodds Foundation Fellowship for Outstanding Thesis Research (Princeton)	2000
Graduate Student Research Program (GSRP) Fellowship (NASA)	1997-2000
President's Fellowship (Princeton University)	1995-1997
Klumpke Award (U. C. Berkeley)	1995
University Honors in Physics (U. C. Berkeley)	1995

## Professional Society Memberships

2011 – present American Physical Society  
2011 – present Simons Science Series  
2008 - present Council on Foreign Relations  
1996 – present American Astronomical Society

### **Courses Taught**

- Physics C1001 – Physics for Poets
- Physics 1601 – Introductory Mechanics and Relativity
- Physics 1602 – Introduction to Electricity, Magnetism, and Thermodynamics
- Physics V1900 – Seminar on Contemporary Cosmology
- Physics V1900 – Physics, Politics, and Critical Thinking
- EES W3018 - Weapons of Mass Destruction

### **Service to Profession**

- Member NASA Review of Astrophysics programs for Research, Analysis and Enabling Technology (2011)
- Member NASA Primordial Polarization Program Definition Team (2007- 2010)
- Reviewer and panel chair for various programs - NASA (ongoing)
- Reviewer for various programs - NSF
- Reviewer for various programs - NRAO (ongoing)
- Reviewer Fondazione Cariparo (2008)
- Reviewer for Physics Review Letters (ongoing)
- Reviewer for Astronomy and Astrophysics (ongoing)
- Reviewer for Astrophysical Journal (ongoing)

### **Service to Columbia**

ECFAS (chair) 2009-2010

ECFAS (member ) 2008-2009

Space Planning Committee 2008-2010

Faculty Budget Group 2008-2010

ARC (ex officio) 2009-2010

Jr. Faculty Search Committee 2003-2010

Qualifying Exam Committee 2008-2009

Building Committee (Chair) 2007-2008

Nevis Retreat Committee 2007-2008

Graduate Admissions Committee 2003-2004, 2007-2008

Student-faculty Issues Committee 2005-2006

Machine Shop Committee (Chair) 2004-2007

Machine Shop Committee 2003-2004

Thesis Committees (Jameson Rollins 2010, Maurice Leutnegger 2007, Jun Zhang 2007, Adam Litz 2005, John Peterson 2004, Tzu-Ching Chang 2004)

### **Postdoctoral Advising**

Will Grainger (former)

Ross Williamson (former)

Jonathan Zwart (current)

Britt Reichborn-Kjennerud (current)

### **Graduate Advising (PhD students)**

- Robert Dumoulin (current)
- Daniel Chapman (current)
- Seth Hillbrand (current) NSF Graduate Fellow 2010-present
- Joy Didier (current)
- Britt Reichborn-Kjennerud (PhD 2010) NASA GSRP Fellow 2007-2010, NSF AAP Postdoctoral Fellow 2011 - present
- Laura Newburgh (PhD 2010) Princeton Postdoctoral Scholar 2010 - present
- Tony Mroczkowski (PhD 2008) NASA Einstein Postdoctoral Fellow 2009 – present
- Stephen Muchovej (PhD 2008) NSF Graduate Fellow 2005-2008, NSF AAP Postdoctoral Fellow 2008 - present

### **Undergraduate Advising**

supervised approximately 50 undergraduate research students between 2002 and 2011

### **Selected Educational Outreach Activities**

- Enrichment Speaker business organizations, ongoing
- Enrichment Speaker community outreach, ongoing
- Invited Speaker, General Studies Alumni Event, New York, 2010
- Invited Speaker, Houston Alumni Organization, Houston. 2010
- Café Science Speaker, “Decoding Cosmic Cryptography in Search of the Holy Grail”, 2007
- Physics Consultant to screenwriter Rachel Johnson for screenplay based on the life of Mileva Maric, 2007.
- Speaker at post-show forum, Epic Theater Center, 2006.
- Leader of NSF REU (Research Experience for Undergraduates) 2005-present
- Leader of NSF-funded partnership with School for Democracy and Leadership summer program for high school students
- Leader of partnership with Renaissance Charter School for participation of high school students in the construction of the Sunyaev-Zel’dovich Array

### **Selected Refereed Publications**

- N. Hasler, E. Bulbul, M. Bonamente, J. E. Carlstrom, T. L. Culverhouse, M. Gralla, D. Hawkins, R. Hennessy, M. Joy, H. W. Lamb, D. Landry, E. M. Leitch, A. Mantz, D. P. Marrone, A. D. Miller, T. Mroczkowski, S. Muchovej, T. Plagge, C. Pryke, D. Woody, “Analytic Modeling of the Physical Properties of Galaxy Clusters: Joint Analysis of X-ray and Sunyaev-Zel’dovich Observations, In preparation, 2011.
- N. N. Jetha, M. J. Hardcastle, M. Bonamente, E. M. Leitch, A. D. Miller, and S. Muchovej, “Constraints on Spectral Aging of Radio Galaxy Jets from High-Frequency Observations with CARMA, In preparation, 2011.
- QUIET Collaboration: C. Bischoff, A. Brizius, I. Buder, Y. Chinone, K. Cleary, R. N. Dumoulin, A. Kusaka, R. Monsalve, S. K. Næss, L. B. Newburgh, R. Reeves, K. M. Smith, I. K. Wehus, J. A. Zuntz, J. T. L. Zwart, L. Bronfman, R.

- Bustos, S. E. Church, C. Dickinson, H. K. Eriksen, P. G. Ferreira, T. Gaier, J. O. Gundersen, M. Hasegawa, M. Hazumi, K. M. Huffenberger, M. E. Jones, P. Kangaslahti, D. J. Kapner, C. R. Lawrence, M. Limon, J. May, J. J. McMahon, A. D. Miller, H. Nguyen, G. W. Nixon, T. J. Pearson, L. Piccirillo, S. J. E. Radford, A. C. S. Readhead, J. L. Richards, D. Samtleben, M. Seiffert, M. C. Shepherd, S. T. Staggs, O. Tajima, K. L. Thompson, K. Vanderlinde, R. Williamson, B. Winstein, First Season QUIET Observations: Measurements of CMB Polarization Power Spectra at 43 GHz in the Multipole Range  $25 < l < 475$ , Submitted to ApJ, 2010 (arXiv:1012.3191).
- Stephen Muchovej, Erik Leitch, John E Carlstrom, Thomas Culverhouse, Chris Greer, David Hawkins, Ryan Hennessy, Marshall Joy, James Lamb, Michael Loh, Daniel P Marrone, Amber Miller, Tony Mroczkowski, Clem Pryke, Matthew Sharp, David Woody, Cosmological Constraints from a 31 GHz Sky Survey with the Sunyaev-Zel'dovich Array, Accepted for Publication, ApJ, 2011. (arXiv:1012.1610).
  - Megan B. Gralla, Keren Sharon, Michael D. Gladders, Daniel P. Marrone, L. Felipe Barrientos, Matthew Bayliss, Massimiliano Bonamente, Esra Bulbul, John E. Carlstrom, Thomas Culverhouse, David G. Gilbank, Christopher Greer, Nicole Hasler, David Hawkins, Ryan Hennessy, Marshall Joy, Benjamin Koester, James Lamb, Erik Leitch, Amber Miller, Tony Mroczkowski, Stephen Muchovej, Masamune Oguri, Tom Plagge, Clem Pryke, David Woody, Sunyaev Zel'dovich Effect Observations of Strong Lensing Galaxy Clusters: Probing the Over-Concentration Problem, Submitted to ApJ, 2010 (arXiv:1011.6341).
  - Culverhouse, T. L.; Bonamente, M.; Bulbul, E.; Carlstrom, J. E.; Gralla, M. B.; Greer, C.; Hasler, N.; Hawkins, D.; Hennessy, R.; Jetha, N. N.; Joy, M.; Lamb, J. W.; Leitch, E. M.; Marrone, D. P.; Miller, A.; Mroczkowski, T.; Muchovej, S.; Pryke, C.; Sharp, M.; Woody, D.; Andreon, S.; Maughan, B.; Stanford, S. A., Galaxy Clusters at  $z \geq 1$ : Gas Constraints from the Sunyaev-Zel'dovich Array, ApJL, Volume 723, Issue 1, pp. L78-L83, 2010 (arXiv:1007.2853).
  - Stephen Muchovej, Erik Leitch, John E. Carlstrom, Thomas Culverhouse, Chris Greer, David Hawkins, Ryan Hennessy, Marshall Joy, James Lamb, Michael Loh, Daniel P. Marrone, Amber Miller, Tony Mroczkowski, Clem Pryke, Matthew Sharp, David Woody “Radio Sources from a 31 GHz Sky Survey with the Sunyaev-Zel'dovich Array”, ApJ Volume 716, Issue 1, pp. 521-529, 2010 (arXiv:0912.2335).
  - M. Sharp, D. P. Marrone, J. E. Carlstrom, T. Culverhouse, C. Greer, D. Hawkins, R. Hennessy, M. Joy, J. Lamb, E. M. Leitch, M. Loh, A. D. Miller, T. Mroczkowski, S. Muchovej, C. Pryke, and D. Woody, “A Measurement of Arcminute Anisotropy in the Cosmic Microwave Background with the Sunyaev-Zel'dovich Array”, 713, Issue 1, pp. 82-89 2010 (astro-ph/0901.4342).
  - D. Marrone, G. P. Smith, J. Richard, M. Joy, M. Bonamente, N. Hasler, V. Hamilton-Morris, J. Kneib, T. Culverhouse, J. E. Carlstrom, C. Greer, D. Hawkins, R. Hennessy, J. W. Lamb, E. M. Leitch, M. Loh, A. D. Miller, T. Mroczkowski, S. Muchovej, C. Pryke, M. K. Sharp, D. Woody, “LoCuSS: A Comparison of Sunyaev-Zel'dovich Effect and Gravitational Lensing

- Measurements of Galaxy Clusters, Volume 701, Issue 2, pp. L114-L118, 2009 (astro-ph/0907.1687).
- T. Mroczkowski, M. Bonamente, J. E. Carlstrom, T. Culverhouse, C. Greer, D. Hawkins, R. Hennessy, M. Joy, J. Lamb, E. M. Leitch, M. Loh, B. Maughan, D. P. Marrone, A. D. Miller, D. Nagai, S. Muchovej, C. Pryke, M. Sharp, and D. Woody, “Application of a Self-Similar Pressure Profile to Sunyaev-Zel’dovich Effect Data from Galaxy Clusters”, *ApJ*, 694, 1034-1044, 2009 (astro-ph/08095077)
  - M. LoVerde, A. D. Miller, S. Shandera, and L. Verde, “Effects of Scale-Dependent Non-Gaussianity on Cosmological Structure”, *JCAP*, 0804, 014, 2008 (astro-ph/0711.4126v3).
  - S. Muchovej, J. Carlstrom, J. Cartwright, C. Greer, D. Hawkins, R. Hennessy, M. Joy, E. Leitch, M. Loh, A. D. Miller, T. Mroczkowski, C. Pryke, B. Reddall, M. Runyan, M. Sharp, and D. Woody, “Observations of High-Redshift X-ray Selected Clusters with the Sunyaev-Zel’dovich Array”, *ApJ*, 663, 708, 2007 (astro-ph/0610115).
  - A. Oliveira-Costa, M. Tegmark, M. Devlin, L. Page, A. Miller, B. Netterfield, Y. Xu, “How accurately can suborbital experiments measure the CMB?”, *Phys. Rev. D* 71, 2005. (astro-ph/0406375).
  - M. R. Nolta, M. J. Devlin, W. B. Dorwart, A. D. Miller, L. A. Page, J. Puchalla, E. Torbet, H. T. Tran, “The MAT/TOCO Measurement of the Angular Power Spectrum of the Cosmic Microwave Background at 30 and 40 GHz”, *ApJ*, 598, 97-101, 2003.
  - S. J. LaRoque, M. Joy, J. E. Carlstrom, H. Ebeling, M. Bonamente, K. S. Dawson, A. Edge, W. L. Holzapfel, A. D. Miller, D. Nagai, S. K. Patel, and E. D. Reese, “Sunyaev-Zel’dovich Imaging of MACS Galaxy Clusters at  $z > 0.5$ ”, *ApJ*, 583:559, 2003.
  - K. S. Dawson, W. L. Holzapfel, J. E. Carlstrom, S. J. LaRoque, A. D. Miller, D. Nagai, M. Joy, "Measurement of Arcminute Scale Anisotropy with the BIMA Array", *ApJ*, 581:86 – 95, 2002 (astro-ph/0206012).
  - A. D. Miller, J. Beach, S. Bradley, R. Caldwell, H. Chapman, M. Devlin, W. B. Dorwart, T. Herbig, D. Jones, G. Monnelly, C. B. Netterfield, M. Nolta, L. A. Page, J. Puchalla, T. Robertson, E. Torbet, H. Tran, and B. Vinje, "The QMAP and MAT/TOCO Experiments for Measuring Anisotropy in the Cosmic Microwave Background" *ApJS*, 140:115-141, 2002 (astro-ph/0108030).
  - Y. Xu, M. Tegmark, A. de Oliveira-Costa, M. J. Devlin, T. Herbig, A. D. Miller, C. B. Netterfield, L. Page, "Comparing and combining the Saskatoon, QMAP and COBE CMB maps", *Phys. Rev. D*, 63, 103002, 2001 (astro-ph/0010522).
  - A. de Oliveira-Costa, M. Tegmark, M. J. Devlin, L. M. Haffner, T. Herbig, A. D. Miller, L. A. Page, R. J. Reynolds, & S. L. Tufte, "Galactic contamination in the QMAP experiment", *ApJ*, 542:L5-L8, 2000 (astro-ph/0003090).
  - A. D. Miller, R. Caldwell, M. J. Devlin, W. B. Dorwart, T. Herbig, M. Nolta, L. A. Page, J. Puchalla, E. Tobet, and H. T. Tran, "A Measurement of the Angular Power Spectrum of the CMB from l-100 to 400.", *ApJ*, 524:L1-4, 1999 (astro-ph/9906421).

- E. Torbet, M. J. Devlin, W. B. Dorwart, A. D. Miller, L. A. Page, and H. T. Tran, “A Measurement of the Angular Power Spectrum of the Microwave Background Made from the High Chilean Andes.” *ApJ*, 521:L79, 1999 (astro-ph/9905100).
- A. de Oliveira-Costa, M. J. Devlin, T. Herbig, A. D. Miller, L. A. Page, and M. Tegmark, “Mapping the Cosmic Microwave Background Anisotropy: Combined Analysis of QMAP Flights.” *ApJ*. 509:L77, 1998 (astro-ph/9808045).
- T. Herbig, A. de Oliveira-Costa, M. J. Devlin, A. D. Miller, L. A. Page, and M. Tegmark, “Mapping the Cosmic Microwave Background Anisotropy: The Second Flight of the QMAP Experiment.” *ApJ*, 509:L73, 1998 (astro-ph/9808044).
- M. J. Devlin, A. de Oliveira-Costa, T. Herbig, A. D. Miller, C. B. Netterfield, L. A. Page, and M. Tegmark, “Mapping the Cosmic Microwave Background Anisotropy: The First Flight of the QMAP Experiment.” *ApJ*, 509:L69, 1998 (astro-ph/9808043).
- M. Davis, A. D. Miller, and S. White, “A Galaxy-Weighted Measure of the Relative Peculiar Velocity Dispersion.” *ApJ*, 490:63-71, 1997 (astro-ph/9705224).