

Bradford A. Benson

Curriculum Vitae

Contact

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Education

2004 Ph.D. Physics, Stanford University

2002 M.S. Physics, Stanford University

1999 B.A. Physics and Mathematics, *Graduated with Honors*, University of Wisconsin-Madison

Doctoral Thesis

Thesis: "Spectral Measurements of the Sunyaev-Zel'dovich Effect"

Advisor: Professor Sarah E. Church

Research Experience

- 2008- **University of Chicago**, *KICP Postdoctoral Research Fellow*, Advisor: Professor John Carlstrom. Combining SZ, X-ray, and optical measurements of clusters of galaxies to calibrate their SZ flux to mass scaling relation, a first step in enabling their use as cosmological probes as part of a SZ cluster survey. Also working on the design and construction of a polarization receiver for SPT.
- 2004-2008 **University of California-Berkeley**, *Postdoctoral Researcher*, Advisor: Professor William Holzapfel. Lead post-doc on the design, construction, integration, and deployment of the receiver for the South Pole Telescope (SPT), which deployed successfully in January 2007. I was responsible for the cryostat design, cryogenics, receiver optics design, and the integration of the cryostat with a 960 element Transition Edge Sensor (TES) bolometer array and SQUID readout electronics.
- 1999-2004 **Stanford University**, *Graduate Research Assistant*, Advisor: Professor Sarah Church. Sole graduate student on the Sunyaev-Zel'dovich Infrared Experiment (SuZIE), a bolometric receiver designed to measure the spectrum of the SZ effect. I lead a total of seven observing runs with SuZIE, while responsible for the instrument and all data analysis. SuZIE was a pioneering SZ instrument that measured the SZ effect in four observing bands between 150 and 355 GHz. With SuZIE, I placed some of the first limits on galaxy cluster peculiar velocities via the SZ effect, and published one of the first measurements of a SZ scaling relation.
- 1998-1999 **University of Wisconsin-Madison**, *Senior Honors Thesis*, Advisor: Professor Donald Cox. Hydro-dynamical modeling of shocked interstellar gas.

- 1998 **National Solar Observatory**, *NSF REU Researcher*, Advisor: Dr. Thomas Rimmele. I analyzed the performance of a Fabry-Perot Interferometer, and observed the FeI 557.6 nm line in the solar photosphere to study the origins of the solar 5-minute p-mode oscillations.
- 1996-1998 **UW-Madison**, *Undergraduate Research Assistant*, Advisor: Professor Dan McCammon. The X-ray Quantum Calorimeter (XQC), a rocket-borne array of Super-conducting Transition Edge Sensor (TES) detectors designed to measure the diffuse X-ray Background.

Teaching Experience

Summer 2003	Teaching Assistant (TA), Physics 50, Observational Astronomy
Winter 2003	TA, Physics 107, Intermediate Laboratory: Lasers & Optics
Fall 2002	TA, Physics 50, Observational Astronomy
Fall 2001	TA, Physics 105, Intermediate Laboratory: Analog Electronics
Spring 2000	TA, Physics 107, Intermediate Laboratory: Lasers & Optics
Fall 1999	TA, Physics 47, Light & Heat

Scholarships and Awards

2003	Graduate Mentor Fellowship
1999	Graduated with Honors and Distinction from the University of Wisconsin-Madison
1999	Wisconsin Space Grant Consortium Scholarship
1998	Peer Mentor Teaching Scholarship

Refereed Publications

- 1) Staniszewski, Z.; Ade, P. A. R.; Aird, K. A.; **Benson, B. A.**; Bleem, L. E.; Carlstrom, J. E.; Chang, C. L.; Cho, H. -M.; Crawford, T. M.; Crites, A. T.; de Haan, T.; Dobbs, M. A.; Halverson, N. W.; Holder, G. P.; Holzappel, W. L.; Hrubes, J. D.; Joy, M.; Keisler, R.; Lanting, T. M.; Lee, A. T.; Leitch, E. M.; Loehr, A.; Lueker, M.; McMahan, J. J.; Mehl, J.; Meyer, S. S.; Mohr, J. J.; Montroy, T. E.; Ngeow, C. -C.; Padin, S.; Plagge, T.; Pryke, C.; Reichardt, C. L.; Ruhl, J. E.; Schaffer, K. K.; Shaw, L.; Shirokoff, E.; Spieler, H. G.; Stalder, B.; Stark, A. A.; Vanderlinde, K.; Vieira, J. D.; Zahn, O.; Zenteno, A., *Galaxy clusters discovered with a Sunyaev-Zel'dovich effect survey*, 2008, Submitted to ApJ
- 2) P. A. R. Ade, K. A. Aird, **B. A. Benson**, L. E. Bleem, S. Busetti, J. E. Carlstrom, C. L. Chang, E. Chauvin, H.-M. Cho, T. M. Crawford, A. T. Crites, M. A. Dobbs, N. W. Halverson, S. Heimsath, R. E. Hills, W. L. Holzappel, M. Joy, R. Keisler, T.M. Lanting, A. T. Lee, E. M. Leitch, J. Leong, W. Lu, M. Lueker, J. J. McMahan, S. S. Meyer, J. J. Mohr, T. E. Montroy, S. Padin, T. Plagge, C. Pryke, J. E. Ruhl, K. K. Schaffer, D. Schwan, E. Shirokoff, H. G. Spieler, Z. Staniszewski, A. A. Stark, and J. D. Vieira, *The South Pole Telescope*, 2008, Submitted to PASP
- 3) Halverson, N. W., Lanting, T., Ade, P. A. R., Basu, K., Bender, A. N., **Benson, B. A.**, Bertoldi, F., Cho, H. -M., Chon, G., Clarke, J., Dobbs, M., Ferrusca, D., Guesten, R., Holzappel, W. L., Kovacs, A., Kennedy, J., Kermish, Z., Kneissl, R., Lee, A. T., Lueker, M., Mehl, J., Menten, K. M., Muders, D., Nord, M., Pacaud, F., Plagge, T., Reichardt, C., Richards, P. L., Schaaf, R., Schilke, P., Schuller, F., Schwan, D., Spieler, H., Tucker, C., Weiss, A., Zahn, O., *Sunyaev-Zel'dovich Effect Observations of the Bullet Cluster (1E 0657-56) with APEX-SZ*, 2008, Submitted to ApJ

- 4) S. Padin, Z. Staniszewski, R. Keisler, M. Joy, A. A. Stark, P. A. R. Ade, K. A. Aird, **B. A. Benson**, L. E. Bleem, J. E. Carlstrom, C. L. Chang, T. M. Crawford, A. T. Crites, M. A. Dobbs, N. W. Halverson, S. Heimsath, R. E. Hills, W. L. Holzapfel, C. Lawrie, A. T. Lee, E. M. Leitch, J. Leong, W. Lu, M. Lueker, J. J. McMahon, S. S. Meyer, J. J. Mohr, T. E. Montroy, T. Plagge, C. Pryke, J. E. Ruhl, K. K. Schaffer, E. Shirokoff, H. G. Spieler, and J. D. Vieira, *South Pole Telescope Optics*, Applied Optics, 47, 24, 4418, 2008
- 5) **Benson, B.A.**, Church, S.E., Ade, P.A.R., Bock, J.J., Ganga, K.M., Henson, C.N., & Thompson, K.L., *Measurements of Sunyaev-Zel'dovich Scaling Relations for Clusters of Galaxies*, The Astrophysical Journal, 617, 829, 2004
- 6) **Benson, B.A.**, Church, S.E., Ade, P.A.R., Bock, J.J., Ganga, K.M., Hinderks, J.R., Mauskopf, P.D., Philhour, B., Runyan, M.C., & Thompson, K.L., *Peculiar Velocity Limits from Measurements of the Spectrum of the Sunyaev-Zeldovich Effect in Six Clusters of Galaxies*, The Astrophysical Journal, 592, 674, 2003
- 7) Robert A. Benjamin, **Bradford A. Benson**, & Donald P. Cox, *A Useful Approximation to the Cooling Coefficient of Trace Elements*, The Astrophysical Journal, 554, L225, 2001

Conference Proceedings and Other Publications

- 1) Martin Lueker, **Bradford A. Benson**, Clarence Chang, Hsiao-Mei Cho, Matt Dobbs, William L. Holzapfel, Trevor Lanting, Adrian T. Lee, Jared Mehl, Thomas Plagge, Erik Shirokoff, Helmuth Spieler, and Joaquin Vieira, *Thermal Design and Characterization of Transition Edge Sensor (TES) Bolometers for Frequency Multiplexing*, ASC 2008, Submitted
- 2) Erik Shirokoff, **Bradford A. Benson**, Lindsey E. Bleem, Clarence L. Chang, Hsiao-Mei Cho, Abigail Crites, Matt Dobbs, William L. Holzapfel, Trevor Lanting, Adrian T. Lee, Martin Lueker, Jared Mehl, Thomas Plagge, Helmuth Spieler, and Joaquin Vieira, *The South Pole Telescope SZ-Receiver Detectors*, ASC 2008, Submitted
- 3) Church, S.E., **Benson, B.A.**, Thompson, K.L., 2005, *Recent Results from the SuZIE Experiment: An Investigation of SZ Scaling Relationships*, ASPC, 339, 157C
- 4) **Bradford A. Benson**, 2004, *Spectral Measurements of the Sunyaev-Zel'dovich Effect*, PhD thesis
- 5) Robert A. Benjamin, **Bradford A. Benson**, Donald P. Cox, 2001, *A Useful Approximation to the Cooling Coefficient of Trace Elements*, 198th AAS Meeting, Bulletin of the American Astronomical Society, Vol. 33, 873
- 6) Robert A. Benjamin, **Bradford A. Benson**, Donald P. Cox, 2001, *An Approximation to the Cooling Coefficient of Trace Elements*, AIP Conference Proceedings, Vol. 565, 222
- 7) **Bradford A. Benson**, 1999, *An Approximation to the Cooling Coefficient of Trace Elements*, undergraduate honors thesis