Eric R. Switzer

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Updated: November 6, 2020

Employment and education

Astrophysicist, NASA GSFC, Observational Cosmology Laboratory, 2013-

Senior Research Associate, CITA, University of Toronto, 2011-2013.
Postdoctoral Fellow, Kavli Institute for Cosmological Physics, University of Chicago, 2008-2011.
Ph.D. Physics, Princeton University, 2008.
B.A. Physics (with honors), University of Chicago, 2003.
US citizen.

Past and present research areas: instrumentation and data analysis for cosmic microwave background (CMB) experiments, cosmological helium recombination and reionization, mapping diffuse 21 cm emission at $z \sim 1$. Dissertation adviser: Lyman Page. Title: *Small-scale anisotropies of the cosmic microwave background: Experimental and theoretical perspectives*.

Honors and awards

2020 NASA Special Act Award: Mentorship (students lead roles in 7 EXCLAIM reviews)
2019 NASA Special Act Award: In recognition of EXCLAIM APRA success
2017 NASA Special Act Award (Team): PIPER mission engineering flight
2015 NASA Special Act Award: LAMBDA contributions to HEASARC Senior Review
2015 APS, ACT Recognized among 32 most influential papers in General Relativity Centennial
2014 NASA Special Act Award: Lead contributions to PIPER detector readout and flight software
CITA Senior Research Associate, 2011-2013.
Compton Lecture Series, "The Physics of Energy Devices," University of Chicago, fall 2009. →
KICP Postdoctoral Fellowship, University of Chicago, 2008-2011.
Centennial Fellowship, Princeton University Graduate School, 2003-2008.
Joseph Henry Merit Prize, Princeton University Graduate School, 2003.
Member of Phi Beta Kappa, University of Chicago.
DESY-Zeuthen Summer Student Research Fellowship, 2002.

Professional Activities and Collaborations

2019- PI: Experiment for Cryogenic Large-Aperture Intenisty Mapping (EXCLAIM)
2015- Science Lead: Legacy Archive for Microwave Background Data (LAMBDA)
2013- Deputy PI: Primordial Inflation Polarization Explorer (PIPER)
2011- Lead: Green Bank Telescope 21 cm Intensity Mapping, analysis
2011- Atacama Cosmology Telescope (ACTPol)
2008-2011 South Pole Telescope (SPT, Temperature)
2005-2011 Atacama Cosmology Telescope (ACT, Temperature)

Refereed Publications

1. W. Everett, SPT collaboration "Millimeter-wave Point Sources from the 2500-square-degree SPT-SZ Survey: Catalog and Population Statistics" *ApJ*(1) (Sept. 2020). →

2. H. Sugai, LiteBIRD collaboration "Updated design of the CMB polarization experiment satellite

LiteBIRD" *JLTP* (Jan. 2020). →

3. **E. R. Switzer**, EXCLAIM Collaboration "The Experiment for Cryogenic Large-aperture Intensity Mapping (EXCLAIM)," *JLTP* (Jan. 2020). →
4. N. Gupta, C. L. Reichardt, SPTPol collaboration, "Fractional Polarisation of Extragalactic Sources in the 500-square-degree SPTpol Survey," *MNRAS* **490** (2019). →
5. S. Yang, A. R. Pullen, **E. R. Switzer**, "Evidence for CII diffuse line emission at redshift $z \sim 2.6$," *MNRASL* **slz126** (2019). →
6. **E. R. Switzer**, PIPER Collaboration, "Sub-kelvin cooling for two kilopixel bolometer arrays in the PIPER receiver," *Rev. Sci. Inst.* **90**(9), Editor's pick/SciLight, *cover image* (2019).
7. G. Cataldo, E. M. Barrentine, B. T. Bulcha, N. Ehsan, L. A. Hess, O. Noroozian, T. R. Stevenson, E. J. Wollack, S. H. Moseley, **E. R. Switzer**, "Second-generation Micro-Spec: a compact spectrometer for far-infrared and submillimeter space missions," IAC-18-A7.3.8 (2019).
8. R. Datta, ACTPol Collaboration, ""The Atacama Cosmology Telescope: Two-season ACTPol Extragalactic Point Sources and their Polarization Properties," *MNRAS* **486** (2018). →
9. N. Odegard, J. L. Weiland, D. J. Fixsen, D. T. Chuss, E. Dwek, A. Kogut, **E. R. Switzer**, "Determination of the Cosmic Infrared Background from COBE/FIRAS and Planck HFI Observations," *ApJ* **877**(1) (2019). →
10. **E. R. Switzer**, C. J. Anderson, A. Pullen, S. Yang, "Intensity mapping in the presence of foregrounds and correlated continuum emission," *ApJ* **872**(1) (2019). →
11. C. J. Anderson, N. J. Luciw, Y.-C. Li, C. Y. Yuo, J. Yadav, Parkes Collaboration, "Lack of clustering in low-redshift 21-cm intensity maps cross-correlated with 2dF galaxy densities," *MNRAS* **476**:3 (2018). →
12. K. Tauscher, D. Rapetti, J. O. Burns, **E. R. Switzer**, "Global 21-cm signal extraction from foreground and instrumental effects I: Pattern recognition framework for separation using training sets," *ApJ* **853**(2) (2018). →
13. J. O. Burns, DARE collaboration, "A Space-Based Observational Strategy for Characterizing the First Stars and Galaxies Using the Redshifted 21-cm Global Spectrum," *ApJ* **844**(1) (2017). →
14. T. Louis, M. Hasselfield, M. Lungu, L. Maurin, ACTPol collaboration, "The Atacama Cosmology Telescope: Two-Season ACTPol Spectra and Parameters," *JCAP* **6**:31, (2017). →
15. **E. R. Switzer**, "Tracing the cosmological evolution of stars and cold gas with CMB spectral surveys," *ApJ* **838**:82, (2017). →
16. L. Wolz, C. Blake, F. B. Abdalla, C. M. Anderson, T.-C. Chang, Y.-C. Li, K. W. Masui, **E. R. Switzer**, U.-L. Pen, T. C. Voytek, J. Yadav, "Erasing the Milky Way: new cleaning technique applied to GBT intensity mapping data," *MNRAS* **464**(4) 2017. →
17. **E. R. Switzer**, D. J. Watts, "Robust Likelihoods for Inflationary Gravitational Waves from Maps of Cosmic Microwave Background Polarization," *PRD* **94** 063526 (2016). →
18. N. J. Miller, D. T. Chuss, T. A. Marriage, E. J. Wollack, J. W. Appel, C. L. Bennett, J. Eimer, T. Essinger-Hileman, D. J. Fixsen, K. Harrington, S. H. Moseley, K. Rostem, **E. R. Switzer**, D. J. Watts, "Recovery of Large Angular Scale CMB Polarization for Instruments Employing Variable-delay Polarization Modulators," *ApJ* **818**(2) (2016). →

19. **E. R. Switzer**, T.-C. Chang, K. W. Masui, U.-L. Pen, T. C. Voytek, "Interpreting the unresolved intensity of cosmologically redshifted line radiation," *ApJ* **815**(1), (2015). →

20. A. Engelen, B. D. Sherwin, N. Sehgal, ACTPol Collaboration, "The Atacama Cosmology Telescope: Lensing of CMB Temperature and Polarization Derived from Cosmic Infrared Background Cross-correlation," *ApJ* **808**(1) (2015). →

21. N. Hand, A. Leauthaud, S. Das, B. D. Sherwin, ACT Collaboration, "First Measurement of the Cross-Correlation of CMB Lensing and Galaxy Lensing," *PRD* **91**(6) 062001 (2015). →

22. **E. R. Switzer**, A. Liu, "Erasing the variable: Empirical foreground discovery for global 21 cm spectrum experiments," *ApJ* **793**(2) 102 (2014). →

23. M. B. Gralla, D. Crichton, T. A. Marriage, W. Mo, ACT Collaboration, "A Measurement of the Millimeter Emission and the Sunyaev-Zel'dovich Effect Associated with Low-Frequency Radio Sources," *MNRAS* **445**(1) 460 (2014). →

24. S. Naess, M. Hasselfield, J. McMahon, M. Niemack, ACTPol Collaboration, "The Atacama Cosmology Telescope: CMB Polarization at $200 < \ell < 9000$," *JCAP* **10**(007) (2014). →

25. E. Calabrese, R. Hlozek, N. Battaglia, J. R. Bond, F. de Bernardis, M. J. Devlin, A. Hajian, S. Henderson, J. C. Hill, A. Kosowsky, T. Louis, J. McMahon, K. Moodley, L. Newburgh, M. D. Niemack, L. A. Page, B. Partridge, N. Sehgal, J. L. Sievers, D. N. Spergel, S. T. Staggs, **E. R. Switzer**, H. Trac, E. J. Wollack, "Precision Epoch of Reionization studies with next-generation CMB experiments," *JCAP* **08**(010) (2014). →

26. D. T. Chuss, J. R. Eimer, D. J. Fixsen, J. Hinderks, A. J. Kogut, J. Lazear, P. Mirel, **E. R. Switzer**, G. M. Voellmer, E. J. Wollack, "Variable-delay Polarization Modulators for Cryogenic Millimeter-wave Applications," *Rev. Sci. Inst.* **85**(6) (2014). →

27. S. Das, T. Louis, M. R. Nolta, ACT Collaboration, "The Atacama Cosmology Telescope: Temperature and Gravitational Lensing Power Spectrum Measurements from Three Seasons of Data," *JCAP* **4** 14, (2014). →

28. D. Marsden, M. Gralla, T. A. Marriage, **E. R. Switzer**, B. Partridge, M. Massardi, G. Morales, ACT Collaboration, "The Atacama Cosmology Telescope: Dusty Star-Forming Galaxies and Active Galactic Nuclei in the Southern Survey," *MNRAS* **439**(2) 1556 (2014). →

29. L. M. Mocanu, T. M. Crawford, J. D. Vieira, SPT Collaboration, "Extragalactic millimeter-wave point source catalog, number counts and statistics from 771 square degrees of the SPT-SZ Survey," *ApJ* **779**(1) 61 (2013). →

30. J. L. Sievers, R. A. Hlozek, M. R. Nolta, ACT Collaboration, "The Atacama Cosmology Telescope: cosmological parameters from three seasons of data," *JCAP* **10**(60), (2013). →

31. M. Hasselfield, K. Moodley, ACT Collaboration, "The Atacama Cosmology Telescope: Beam Measurements and the Microwave Brightness Temperatures of Uranus and Saturn," *ApJS* **209**(1) 17 (2013). →

32. M. Hasselfield, M. Hilton, T. A. Marriage, ACT Collaboration, "The Atacama Cosmology Telescope: Sunyaev-Zel'dovich selected galaxy clusters at 148 GHz from three seasons of data," *JCAP* **7**(8), (2013). →

33. J. Dunkley, E. Calabrese, J. Sievers, ACT Collaboration, "The Atacama Cosmology Telescope: likelihood for small-scale CMB data," *JCAP* **7**(25), (2013). →

34. **E. R. Switzer**, K. W. Masui, K. Bandura, L.-M. Calin, T.-C. Chang, X.-L. Chen, Y.-C. Li, Y.-W. Liao, A. Natarajan, U.-L. Pen, J. B. Peterson, J. R. Shaw, T. C. Voytek, "Determination of $z \sim 0.8$ neutral hydrogen fluctuations using the 21 cm intensity mapping auto-correlation," *MNRASL* 10.1093/slt074 (2013). →

35. E. Calabrese, R. Hlozek, ACT Collaboration, "Cosmological parameters from pre-Planck cosmic microwave background measurements," *PRD* **87**(10), 103012 (2013). →

36. J. Chluba, **E. R. Switzer**, D. Nagai, K. Nelson, "Sunyaev-Zeldovich signal processing and temperature-velocity moment method for individual clusters," *MNRAS* **430**(4) 3054 (2013). →

37. N. Sehgal, ACT Collaboration, "The Atacama Cosmology Telescope: Relation between Galaxy Cluster Optical Richness and Sunyaev-Zel'dovich Effect," *ApJ* **767**(1) 38 (2013). →

38. F. Menanteau, C. Sifón, ACT Collaboration, "The Atacama Cosmology Telescope: Physical Properties of Sunyaev-Zel'dovich Effect Clusters on the Celestial Equator," *ApJ* **765**(1) 67, (2013). →

39. M. Farhang, J. R. Bond, J. Chluba, **E. R. Switzer**, "Constraints on Perturbations to the Recombination History from Measurements of the Cosmic Microwave Background Damping Tail," *ApJ* **764**(2) 137 (2013). →

40. K. W. Masui, **E. R. Switzer**, N. Banavar, K. Bandura, C. Blake, L.-M. Calin, T.-C. Chang, X. Chen, Y.-C. Li, Y.-W. Liao, A. Natarajan, U.-L. Pen, J. B. Peterson, J. R. Shaw, T. C. Voytek, "Measurement of 21 cm brightness fluctuations at $z \sim 0.8$ in cross-correlation," *ApJL* **763**(1) L20 (2013). →

41. R. Dünner, M. Hasselfield, T. A. Marriage, J. Sievers, ACT Collaboration, "The Atacama Cosmology Telescope: Data Characterization and Mapmaking," *ApJ* **762**(1) 10 (2013). →

42. M. J. Wilson, B. D. Sherwin, J. C. Hill, ACT Collaboration, "Atacama Cosmology Telescope: A measurement of the thermal Sunyaev-Zel'dovich effect using the skewness of the CMB temperature distribution," *PRD* **86**(12) 122005 (2012). →

43. B. D. Sherwin, S. Das, A. Hajian, ACT Collaboration, "The Atacama Cosmology Telescope: Cross-Correlation of CMB Lensing and Quasars," *PRD* **86**(8) 083006 (2012). →

44. N. Hand, ACT Collaboration, "Detection of Galaxy Cluster Motions with the Kinematic Sunyaev-Zel'dovich Effect," *PRL* **109**(4) 041101 (2012). →

45. J. Chluba, J. Fung, **E. R. Switzer**, "Radiative transfer effects during primordial helium recombination," *MNRAS* **423**(4) 3227 (2012). →

46. E. D. Reese, T. Mroczkowski, F. Menanteau, M. Hilton, J. Sievers, ACT Collaboration, "The Atacama Cosmology Telescope: High-Resolution Sunyaev-Zel'dovich Array Observations of ACT SZE-selected Clusters from the Equatorial Strip" *ApJ* **751**(1) 12 (2012). →

47. R. Hlozek, J. Dunkley, ACT Collaboration, "The Atacama Cosmology Telescope: a measurement of the primordial power spectrum," *ApJ* **749**(1) 90 (2012). →

48. A. Hajian, M. P. Viero, ACT Collaboration, "Correlations in the (Sub)millimeter background from ACTxBLAST," *ApJ* **744**(1) 40 (2012). →

49. A. Hajian, ACT Collaboration, "The Atacama Cosmology Telescope: Calibration with WMAP Using Cross-Correlations," *ApJ* **740** 86 (2011). →

50. J. Dunkley, R. Hlozek, J. Sievers, ACT Collaboration, "The Atacama Cosmology Telescope: Cosmological Parameters from the 2008 Power Spectrum," *ApJ* **739**(1) 52 (2011). →

51. T. A. Marriage, ACT Collaboration, "The Atacama Cosmology Telescope: Sunyaev-Zel'dovich-Selected Galaxy Clusters at 148 GHz in the 2008 Survey," *ApJ* **737**(2) 61 (2011). →

52. B. Sherwin, J. Dunkley, S. Das, ACT Collaboration, "Evidence for Dark Energy from the Cosmic Microwave Background Alone Using the Atacama Cosmology Telescope Lensing Measurements," *PRL* **107**(2) 021302 (2011). →

53. S. Das, B. Sherwin, ACT Collaboration, "Detection of the Power Spectrum of Cosmic Microwave Background Lensing by the Atacama Cosmology Telescope," *PRL* **107**(2) 021301 (2011). →

54. N. Hand, ACT Collaboration, "The Atacama Cosmology Telescope: Detection of Sunyaev-Zel'Dovich Decrement in Groups and Clusters Associated with Luminous Red Galaxies," *ApJ* **736**(1) 39 (2011). →

55. D. S. Abbot, **E. R. Switzer**, "The Steppenwolf: A Proposal for a Habitable Planet in Interstellar Space," *ApJL* **735**(2) L27 (2011). →

56. D. S. Swetz, ACT Collaboration, "Overview of the Atacama Cosmology Telescope: Receiver, Instrumentation, and Telescope Systems," *ApJS* **194**(2) 41 (2011). →

57. N. Sehgal, H. Trac, ACT Collaboration, "The Atacama Cosmology Telescope: Cosmology from Galaxy Clusters Detected via the Sunyaev-Zel'dovich Effect," *ApJ* **732**(1) 44 (2011). →

58. T. A. Marriage, J. B. Juin, Y.-T. Lin, D. Marsden, M. R. Nolta, B. Partridge, ACT Collaboration, "Atacama Cosmology Telescope: Extragalactic Sources at 148 GHz in the 2008 Survey," *ApJ* **731**(2) 100 (2011). →

59. S. Das, T. A. Marriage, ACT Collaboration, "The Atacama Cosmology Telescope: A Measurement of the Cosmic Microwave Background Power Spectrum at 148 and 218 GHz from the 2008 Southern Survey," *ApJ* **729**(1) 62-78 (2011). →

60. A. D. Hincks, ACT Collaboration, "The Atacama Cosmology Telescope (ACT): Beam Profiles and First SZ Cluster Maps," *ApJS* **191**(2) 423-438 (2010). →

61. F. Menanteau, J. González, J. B. Juin, T. A. Marriage, E. D. Reese, ACT Collaboration, "The Atacama Cosmology Telescope: Physical Properties and Purity of a Galaxy Cluster Sample Selected via the Sunyaev-Zel'dovich Effect," *ApJ* **723**(2) 1523-1541 (2010). →

62. M. McQuinn, **E. R. Switzer**, "The He I 584 Å Forest as a Diagnostic of Helium Reionization," MNRAS **408**(3) 1945-1955 (2010). →

63. J. W. Fowler, ACT Collaboration, "The Atacama Cosmology Telescope: A Measurement of the $600 < \ell < 8000$ Cosmic Microwave Background Power Spectrum at 148 GHz," *ApJ* **722**(2) 1148-1161 (2010). →

64. N. R. Hall, R. Keisler, L. Knox, C. L. Reichardt, SPT Collaboration, "Angular Power Spectra of the Millimeter Wavelength Background Light from Dusty Star-forming Galaxies with the South Pole Telescope," *ApJ* **718**(2) 632-646 (2010). →

65. T. M. Crawford, **E. R. Switzer**, W. L. Holzapfel, C. L. Reichardt, D. P. Marrone, J. D. Vieira, "A Method for Individual Source Brightness Estimation in Single- and Multi-band Data," *ApJ* **718**(1) 513-521 (2010). →

66. J. D. Vieira, T. M. Crawford, **E. R. Switzer**, SPT Collaboration, "Extragalactic Millimeter-wave Sources in South Pole Telescope Survey Data: Source Counts, Catalog, and Statistics for an 87 Square-degree Field," *ApJ* **719**(1) 763-783 (2010). →

67. M. McQuinn, **E. R. Switzer**, "Redshifted intergalactic $^3\mathrm{He}+$ 8.7 GHz hyperfine absorption," *PRD* **80**(6) 063010 (2009). →

68. **E. R. Switzer**, "Small-scale anisotropies of the cosmic microwave background: Experimental and theoretical perspectives," *Princeton Ph.D. Thesis* (2008). →

69. **E. R. Switzer**, C. M. Hirata, "Primordial helium recombination III: Thomson scattering, isotope shifts, and cumulative results," *PRD* **77**(8) 083008 (2008). →

70. C. M. Hirata, **E. R. Switzer**, "Primordial helium recombination II: two-photon processes," *PRD* **77**(8) 083007 (2008). →

71. **E. R. Switzer**, C. M. Hirata, "Primordial helium recombination I: feedback, line transfer, and continuum opacity," *PRD* **77**(8) 083006 (2008). →

72. J. W. Fowler, M. D. Niemack, S. R. Dicker, ACT Collaboration, "Optical design of the Atacama Cosmology Telescope and the Millimeter Bolometric Array Camera," *Applied Optics* **46**(17) 3444-3454 (2007). →

73. **E. R. Switzer**, C. M. Hirata, "Ionizing radiation from hydrogen recombination strongly suppresses the lithium scattering signature in the CMB," *PRD* **72**(8) 083002 (2005). →

74. K. Abazajian, **E. R. Switzer**, S. Dodelson, K. Heitmann, S. Habib, "Nonlinear cosmological matter power spectrum with massive neutrinos: The halo model," *PRD* **71**(4) 043507 (2005). →

75. J. A. Switzer, C.-J. Hung, L.-Y. Huang, **E. R. Switzer**, T. D. Golden, and E. W. Bohannan, "Electrochemical Self-Assembly of Copper/Cuprous Oxide Layered Nanostructures," *J. Am. Chem. Soc.* **120** 3530-3531 (1998). →

Submitted Publications

1. S. Aiola, E. Calabrese, L. Maurin, S. Naess, B. L. Schmitt, ACT Collaboration, "The Atacama Cosmology Telescope: DR4 Maps and Cosmological Parameters" *ApJ submitted* (Jul. 2020). →

2. S. K. Choi, M. Hasselfield, S. P. Ho, B. Koopman, M. Lungu, ACT Collaboration, "The Atacama Cosmology Telescope: A Measurement of the Cosmic Microwave Background Power Spectra at 98 and 150 GHz" *ApJ submitted* (Jul. 2020). →

3. R. Datta, PIPER collaboration, "Anti-reflection-coated vacuum window for the PIPER balloon-borne instrument" *RSI submitted* (Sept. 2020).

Proceedings, Reports

1. J. Chluba lead, "New Horizons in Cosmology with Spectral Distortions of the Cosmic Microwave Background" Submitted to ESA Voyage 2050 call for White Papers (2019). →

2. G. E. Addison, E. R. Switzer, M. R. Greason, T. B. Griswold, T. Jaffe, N. Miller, N. P. Odegard, U. Prasad, J. L. Weiland, "Legacy Archive for Microwave Background Data Analysis (LAMBDA): An Overview" (2019). →

3. Co-signer or contributor to 15 Decadal White Papers and 2 ESA Voyage 2050 White Papers (2019).

4. E. D. Kovetz, P. C. Breysse, A. Lidz, J. Bock, C. M. Bradford, T.-C. Chang, S. Foreman, H. Padmanabhan, A. Pullen, D. Riechers, M. B. Silva, **E. R. Switzer**, "Astrophysics and Cosmology with Line-Intensity Mapping," *Contribution to the 2020 Decadal Survey*, March 2019.→

5. D. Rapetti, K. Tauscher, J. O. Burns, E. Switzer, J. Mirocha, S. Furlanetto, R. Monsalve, "Hydrogen Cosmology from the Deep Space Gateway: Data Analysis Pipeline for Low-Frequency Radio Telescopes" Deep Space Gateway Concept Science Workshop, proceeedings (2018). →
6. S. Pawlyk, PIPER Collaboration, "The primordial inflation polarization explorer (PIPER): current status and performance of the first flight," *Proc. SPIE* **10708** (2018). →
7. Giuseppe Cataldo et al., "Second-generation Micro-Spec: a compact spectrometer for far-infrared and submillimeter space missions," *Proc. IAC*(69th congress), 2018.→
8. E. D. Kovetz, M. P. Viero, A. Lidz, L. Newburgh, M. Rahman, **E. R. Switzer**, Marc Kamionkowski, et al., "Line-Intensity Mapping: 2017 Status Report," 1709.09066 (2017). →
9. J. Tuttle, E. Canavan, H. DeLee, M. DiPirro, A. Jahromi, B. James, M. Kimball, P, Shirron, D. Sullivan, **E. Switzer**, "Development of a space-flight ADR providing continuous cooling at 50 mK with heat rejection at 10 K," Proceedings of Materials Science and Engineering, Volume 278, Issue 1, pp. 012009 (2017). →
10. CMB-S4 Technology Contributors, "CMB-S4 Technology Book, First Edition," 1706.02464 (2017). →
11. N. Gandilo, PIPER Collaboration, "The Primordial Inflation Polarization Explorer (PIPER)," *Proc. SPIE* **9914** (2016). →
12. J. Lazear, PIPER Collaboration, "The Primordial Inflation Polarization Explorer (PIPER)," *Proc. SPIE* **9153** (2014). →
13. E. R. Switzer, T. M. Crawford, C. L. Reichardt, "Bayesian flux reconstruction in one and two bands," Statistical Challenges in Modern Astronomy V, Feigelson and Babu (Eds.), Springer 2012. →
14. E. S. Battistelli, ACT collaboration, "Automated SQUID tuning procedure for kilo-pixel arrays of TES bolometers on the Atacama Cosmology Telescope," *Proc. SPIE*, **7020** 702028-702028-12 (2008). →
15. A. D. Hincks, ACT collaboration, "The effects of the mechanical performance and alignment of the Atacama Cosmology Telescope on the sensitivity of microwave observations," *Proc. SPIE*, **7020** 70201P-70201P-10 (2008). →
16. D. S. Swetz, ACT collaboration, "Instrument design and characterization of the Millimeter Bolometer Array Camera on the Atacama Cosmology Telescope," *Proc. SPIE*, **7020** 702008-702008-12 (2008). →
17. **E. R. Switzer**, ACT collaboration, "Systems and control software for the Atacama Cosmology Telescope," *Proc. SPIE*, **7019** 70192L-70192L-12 (2008). →
18. R. J. Thornton, ACT collaboration, "Opto-mechanical design and performance of a compact three-frequency camera for the MBAC receiver on the Atacama Cosmology Telescope," *Proc. SPIE*, **7020** 70201R-70201R-10 (2008). →
19. Y. Zhao, ACT collaboration, "Characterization of Transition Edge Sensors for the Millimeter Bolometer Array Camera on the Atacama Cosmology Telescope," *Proc. SPIE*, **7020**, 70200O-70200O-11 (2008). →
20. M. Niemack, ACT collaboration, "A kilopixel array of TES bolometers for ACT: development, testing, and first light," *J. Low Temp. Phys.*, **151**(3-4) 690-696 (2008). →

21. E. R. Switzer, "Physics AI Guide: Princeton University," *Guide for graduate assistant instructorships*, Sept. 2006.
22. E. R. Switzer, "Graduate Student Life – Home on the Range," *Princeton physics departmental newsletter*, Sept. 2006.
23. A. Kosowsky, the ACT collaboration, "The Atacama Cosmology Telescope: A progress report," *New Astronomy Reviews* **50**(11-12) 969-976 (2006); Switzer: *preliminary beam maps appearing therein*. $\rightarrow$
24. M. Niemack, the ACT collaboration, "Measuring two-millimeter radiation with a prototype multiplexed TES receiver for ACT," *Proc. SPIE* **6275** 62750C (2006).
25. "Numerical radiative transport for recombination physics," *Princeton advanced project under C. M. Hirata*, Apr. 2005.
26. "Variance estimates in the SDSS spectrographic data," *Sloan Digital Sky Survey internal report*, Sep. 2004.
27. **E. R. Switzer**, K. Abazajian, S. Dodelson, S. Habib, and K. Heitmann, "Massive neutrinos and the halo model of large scale structure," *Nuc. Phys. B, Proceedings from Neutrino 2004* **143**, 571 (2005). $\rightarrow$
28. E. R. Switzer, "OPAL/LEP II measurements of τ polarization at ≈ 206 GeV," *Undergraduate thesis under Mark Oreglia, University of Chicago* (2003).
29. E. R. Switzer, "Measurements of electron energy deposition in the HERMES silicon recoil detector," *DESY HERMES Recoil Group internal report*, Aug. 2002.

Teaching, Service and Outreach

Apr. 2020	Service: UMD 2nd year project committee member (external): Carrie Volpert
Apr. 2020	Service: Deutsche Forschungsgemeinschaft proposal reviewer
Jan. 2020	Service: Letters of reference for 5 former students
Jan. 2020	Service: CETUS decadal response review
Jun. 2019	Service: Far-IR staff hiring committee
Apr. 2019	Review: STFC proposal
Mar. 2019	Review: APRA (mm-wave optics) Red Team (GSFC)
July 2018	Service: JHU thesis defense committee (external): Duncan Watts
May 2018	Service: GUSTO SRB
Feb. 2018	Review: APRA (BETTII 2) Red Team (GSFC)
Jan. 2017-Dec 2018	Service: Astrophysics Division Colloquium (Chair)
Apr. 2017	Review: XARM detector and readout review
Mar. 2017	Service: JHU thesis defense committee (external): Patrick Breysse
2015-2017	Service: Astrophysics Division Colloquium (Observational Cosmology)
Dec. 2016	Service: CMB staff hiring committee
Aug 2016	Review: Internal R&D Step 2
May 2016	Review: SSERVI Red Team (GSFC)
Feb. 2016	Review: APRA (BETTII) Red Team (GSFC)
Oct. 2015	Service: JHU thesis defense committee (external): Justin Lazear
July 2015	Review: WFIRST SIT Red Team (GSFC)
July 2014	Review: DARE Blue Team (Ames)
May 2012	Organizer: "21 cm intensity mapping analysis" workshop, CITA.
Nov. 2012	CITA Postdoc hiring committee
Mar. 2011	Interviews in popular press for "The Steppenwolf: A proposal for a habitable planet in interstellar space."
Mar. 2010	Early-stage textbook review, "The Physics of Energy" Jaffe and Taylor, Cambridge University Press.
2009–2010 year	KICP Friday seminar committee.
Oct. 2009 – Dec. 2009	"The Physics of Energy Devices," Compton Lecture Series, University of Chicago (10 public lectures).
May 2009 issue	Interview: George Musser, "Spectral Sensation," *Scientific American*.
2008–2010	Founder and organizer of the energy technology student group within the University of Chicago physics department.
2007–	Referee: *The Astrophysical Journal*, MNRAS, JOAA, Class. Quantum Grav.
May 2006 – Sep. 2006	Developed physics teaching guide for the McGraw Center for Teaching and Learning at Princeton.
Sep. 2005 – Dec. 2005	Introductory Integrated Engineering/Math/Physics, Problem session (Teaching Assistantship), Princeton.
Feb. 2005 – May 2005	Introductory Engineering Physics, Supplemental problem sessions (Teaching Assistantship), Princeton.
Sep. 2004 – May 2005	Introductory General Physics, Labs (Teaching Assistantship), Princeton.

Advising

Fall 2020	NASA interns (EXCLAIM): Justin Trenkamp (T. Essinger-Hileman joint), Nina Ong (E. Barrentine primary), Trevian Jenkins (G. Cataldo joint), UMBC Mechanical Engineering capstone, team of 6 (G. Cataldo joint).
Summer 2020	NASA interns (EXCLAIM): Ethan Bennett, Chace Cho (E. Barrentine joint), Joaquin Matticoli, Florian Roselli (G. Cataldo primary), Jared Termini (E. Barrentine, T. Essinger-Hileman primary)
Spring 2020	NASA interns (EXCLAIM): Lee Roger Chevres Fernandez, Gedalia Koehler (E. Barrentine joint), Konrad Shire, Akhil Singareddy
2019-2020	NASA/UMD intern (gap year, EXCLAIM): Jonas Mugge-Durum
Fall 2019-	UW Madison Graduate Student, EXCLAIM (UMD Faculty Advisor: P. Timbie): Trevor Oxholm
Summer 2019	NASA interns (EXCLAIM): Alex Lamb (E. Barrentine, joint), Henry Grant (T. Essinger-Hileman joint)
Spring 2019-	UMD Graduate Student, EXCLAIM (UMD Faculty Advisor: A. Bolatto): Carrie Volpert
Spring 2018-	JHU Postdoc, Intensity Mapping: Chris Anderson
Fall 2016-	NSTR fellow, FTS technology (Primary advisor: J. McMahon): Taylor Baildon (UMich)
2015–2018	JHU Postdoc, PIPER software (Co-advisor, PIPER): Natalie Gandilo
2016–2018	NPP Postdoc, PIPER hardware: Rahul Datta
2015–2018	UMD Graduate student (Co-advisor, PIPER): Sam Pawlyk
2013–2015	JHU Graduate student (Co-advisor, PIPER): Justin Lazear
Fall 2014	OSSI, Undergraduate (PIPER): Mitesh Amin
Summer 2014	USNA-GSFC Exchange, Undergraduate (analysis): Tyler Dickenson
Summer 2013	CITA Undergraduate: Valentin Goblot
2012–2013	CITA Undergraduate, research course/summer: Marat Mufteev
2011–2012	CITA Masters project: Adam Lewis

Grants

Sept. 2018 (2 yr), PI	GSFC Internal R&D (IRAD), *Microwave multiplexing*
Aug. 2018 (5 yr), PI	NASA Astrophysics Research and Analysis Program (APRA) *Experiment for Cryogenic Large-aperture Intensity Mapping* (EXCLAIM)
Jun. 2018 (1.5 yr), PI	GSFC Internal R&D (IRAD), *Balloon concept development (CUBIST)*
Oct. 2017 (1 yr), PI	GSFC Internal R&D (IRAD), *Concept development (LIME)*
Oct. 2017 (3 yr), Co-I	GSFC Internal R&D (IRAD), *Balloon concept demonstrator (BOBCAT)* (PI: Alan Kogut)
Jan. 2017 (3 yr) Co-I	NASA Strategic Astrophysics Technology (SAT), *High-Efficiency Continuous Cooling for Cryogenic Instruments and sub-Kelvin Detectors*
Jan. 2017 (2.5 yr) PI	NASA Astrophysics Data Analysis Program (ADAP), *Constraining star formation through redshifted CO and CII emission in archival CMB data*
Oct. 2016 (1 yr), PI	GSFC Internal R&D (IRAD), *Concept development*
Oct. 2016 (1 yr) Co-I	GSFC Internal R&D (IRAD), *PIXIE Technology Test Bed* (PI: Alan Kogut)
Jan. 2016 (2.5 yr) Co-I	NASA Astrophysics Data Analysis Program (ADAP), *Predicting the sky from 30 MHz to 800 GHz: the extended Global Sky Model* (PI: Adrian Liu)
Oct. 2015 (5 yr) Co-I	NASA Astrophysics Research and Analysis Program (APRA) *Primordial Inflation Polarization Explorer (PIPER) – Phase 2* (PI: Alan Kogut)
Oct. 2015 (1 yr) Co-I	GSFC Internal R&D (IRAD), *PIXIE Instrument Maturation* (PI: Alan Kogut)
Oct. 2015 (1 yr), PI	NASA Strategic Innovation Fund (SIF), *Mapping the history of the universe with unresolved cosmologically redshifted line radiation*.
Oct. 2015 (4 yr), Co-I	NASA Archives Review, *Legacy Archive for Microwave Background Data Analysis (LAMBDA)* (PI: Smale, HEASARC)
Oct. 2014 (1 yr), PI	GSFC Internal R&D (IRAD), *Architectures and Assessment of Next-Generation CMB Polarization Instruments*
Oct. 2014 (1 yr), PI	GSFC Internal R&D (IRAD), *Achieving High Stability and Efficiency in the Next Generation of Adiabatic Demagnetization Refrigerators*.
July 2011 (1 yr)	GBT Large program (100 hr/semester) *Baryon Acoustic Oscillations with 21cm Intensity Mapping*.
Sept. 2011 (2 yr)	CITA Senior Research Associate, University of Toronto (5 year)
Oct. 2009 (3 yr)	KICP Postdoctoral Fellow, University of Chicago

Training

Sept. 2020	Flight Projects Development Program, Leadership Workshop (NASA)
Nov. 2019	History of NASA Missions (NASA GSFC)
June 2019	Requirements Development and Management (NASA APPEL)
Aug. 2018	Leadership and Management Skills for non-Managers
Aug. 2018	Speed of Trust – Foundations (FranklinCovey)
July 2018	Mission Design Workshop (NASA GSFC)
July 2018	Presentation Skills for Technical Professionals (NASA APPEL)
Oct. 2017	Resilience in Leadership (Brookings)
Dec. 2016	Cost and Schedule (NASA Goddard)
Oct. 2015	Capture Planning (NASA Goddard)
Aug. 2015	Leading Through Influence (NASA Goddard)
Nov. 2014	Road to Mission Success (NASA Goddard)
Apr. 2014	Team Leadership (NASA APPEL)
Dec. 2013	NASA Goddard Orientation

Invited Talks

1. "EXCLAIM: a new balloon mission to map the cosmological history of galaxies," *UW-Madison Astronomy Colloquium*, Nov. 2020.
2. "EXCLAIM: a new balloon mission to map the cosmological history of galaxies," *Science and Exploration Directorate Director's Seminar (GSFC)*, Oct. 2020.
3. "EXCLAIM and the APRA program" *PI Workshop*, NASA GSFC, February 2020.
4. "The Experiment for Cryogenic Large-Aperture Intensity Mapping (EXCLAIM)," *PI Workshop, in absentia by Emily Barrentine*, NASA HQ, October 2019.
5. "EXCLAIM: a new balloon mission to map the cosmological history of galaxies," *Seminar*, Canadian Institute for Theoretical Astrophysics, University of Toronto, May 2019.
6. "The Experiment for Cryogenic Large-Aperture Intensity Mapping (EXCLAIM)," *Intensity Mapping Workshop*, Center for Computational Astrophysics, Simons Institute, February 2019.
7. "Challenges in Analysis of Intensity Mapping Data," *Analytics, Inference, and Computation in Cosmology*, Institut Henri Poincaré, Paris, October 2018.
8. "Measurements, prospects and challenges for line tomography after reionization," *Radio Astronomy Lab Seminar*, Berkeley, August 2017.
9. "The Primordial Inflation Explorer (PIXIE)," *CMB spectral distortions from cosmic baryon evolution*, Raman Research Institute, July 2016.
10. "Global foregrounds and intensity mapping," *CMB spectral distortions from cosmic baryon evolution*, Raman Research Institute, July 2016.
11. "Cosmic tomography with the Green Bank Telescope," *Opportunities and Challenges in Intensity Mapping*, SLAC Workshop, Mar. 2016.
12. "PIPER's Continuous Adiabatic Demagnetization Refrigerator," *B-modes from Space*, IMPU Workshop, Dec. 2015.
13. "Cosmic tomography with the GBT and status of the Primordial Inflation Polarization ExploreR (PIPER)," *JHU seminar*, Nov. 2015.
14. "Seeking signs of cosmological inflation in the CMB polarization: BICEP2 and efforts at GSFC," *GWU DC/MD/VA Astrophysics Summer 2014 meeting*, July 2014.
15. "The Primordial Inflation Polarization Explorer (PIPER)," *Science and Exploration Directorate Director's Seminar (GSFC)*, Nov. 2013.
16. "Results from the Green Bank Telescope 21 cm intensity survey," *Observations and Theoretical Challenges in Primordial Cosmology (KITP)*, Apr. 2013.
17. "Results from the Green Bank Telescope 21 cm intensity survey: Methods," *Innovative Techniques in 21 cm Analysis (Ohio)*, Apr. 2013.
18. "A history of the universe through its atoms," *NASA GSFC, cosmology division seminar*, Jan. 2013.
19. "A history of the universe through its atoms," *CMU, physics colloquium*, Jan. 2013.
20. "21 cm Intensity Mapping with the Green Bank Telescope," *UPenn, astrophysics seminar*, Dec. 2012.
21. "21 cm Intensity Mapping with the Green Bank Telescope," *University of Waterloo, astrophysics seminar*, Jan. 2012.

22. "Bayesian flux reconstruction in one and two bands," *Statistical Challenges in Modern Astronomy V (Penn State University)*, June 2011. →
23. "Removing foregrounds and characterizing residuals in $z \sim 1$ 21 cm surveys," *21-cm Cosmology: Advanced data analysis (CITA)*, June 2011.
24. "Some Aspects of Cosmological Helium," *CITA, astrophysics seminar*, Jan. 2011. →
25. "Some Aspects of Cosmological Helium," *Fermilab Center for Particle Astrophysics, seminar*, Dec. 2010. →
26. "Statistics of the source population observed at millimeter wavelengths by the South Pole Telescope," *Berkeley, astrophysics seminar*, Mar. 2010. →
27. "A physicist's outlook on energy," *Environmental Protection Agency Region 5 office, seminar*, Feb. 2010. →
28. "The Physics of Energy Devices," Compton Lectures, University of Chicago, Fall 2009: →

    Lecture 1: Introduction and motors
    Lecture 2: Motors and generators
    Lecture 3: Power transmission
    Lecture 4: Power from the wind
    Lecture 5: Basic thermodynamics
    Lecture 6: Heat engines and transportation
    Lecture 7: Nuclear fission
    Lecture 8: Solar energy
    Lecture 9: Special guest lecture – Dorian Abbot
    Lecture 10: Summary; future

29. "Wandering in the hyperfine forest," *KICP seminar, University of Chicago*, Apr. 2009.
30. "Prospects for observing the spectral distortion from recombination," *The Physics of Cosmological Recombination (MPA),* July 2008.
31. "Cosmological helium recombination," *The Physics of Cosmological Recombination (MPA),* July 2008.
32. "Small-scale CMB Anisotropies and the Atacama Cosmology Telescope: Perspectives and Progress," *Berkeley, cosmology group seminar*, Oct. 2007.
33. "Small-scale CMB Anisotropies and the Atacama Cosmology Telescope: Perspectives and Progress," *KICP, seminar*, Oct. 2007.

Contributed Talks, Posters

1. A. Kogut for PIPER Collaboration, "The Primordial Inflation Polarization ExploreR (PIPER): Science Goals," *AAS 236*, June 2020. →
2. T. Essinger-Hileman for PIPER Collaboration, "The Primordial Inflation Polarization ExploreR (PIPER): 2019 Flight and Telescope Performance," *AAS 236*, June 2020. →
3. R. Datta for PIPER Collaboration, "The Primordial Inflation Polarization ExploreR (PIPER): Preflight Characterization of the Detector Arrays," *AAS 236*, June 2020. →

4. E. Switzer for PIPER Collaboration, "The Primordial Inflation Polarization ExploreR (PIPER): Receiver Design and Performance," *AAS 236*, June 2020. →
5. T. Oxholm for EXCLAIM Collaboration, "The Experiment for Cryogenic Large-Aperture Intensity Mapping," *AAS 236*, June 2020. →
6. "Interpreting intensity mapping data in the presence of foregrounds," *Cosmological Signals from Cosmic Dawn to the Present*, Aspen, February 2018.
7. "BICEP2: detection of B-mode polarization at degree angular scales," *presentation for GSFC Fermi group*, Mar. 2014.
8. "The Primordial Inflation Polarization ExploreR: Science from Circular Polarization Measurements," *AAS 223*, Jan. 2014.
9. "21 cm Intensity Mapping with the Green Bank Telescope," *Workshop on Recent Developments in Astronuclear and Astroparticle Physics (ICTP)*, Nov. 2012.
10. "21 cm Intensity Mapping with the Green Bank Telescope," *Cosmology on the Beach, Cancun*, Jan. 2012.
11. "21 cm Intensity Mapping with the Green Bank Telescope," *G2000, University of Toronto*, Nov. 2011.
12. "Prospects for cosmology at $z \sim 1$ with 21 cm radiation," *KICP Postdoctoral Symposium*, Mar. 2011.
13. "Statistics of the source population observed at millimeter wavelengths by the South Pole Telescope," *KICP Postdoctoral Symposium*, Feb. 2010.
14. "Radiative transport through the hyperfine transitions," *KICP, theory group talk*, Dec. 2009. →
15. Several informal presentations for the energy technology study group, University of Chicago, 2009. →
16. "Small-Scale Anisotropies of the CMB: Experimental and Theoretical Perspectives," *Ph.D. Final Public Oral, Princeton*, Oct. 2008.
17. "Millimeter-wave emission of the planets," *Princeton Gravity Group*, Feb., 2008.
18. "Cosmological helium recombination," *Princeton Gravity Group*, Feb., 2007.
19. "Corrections to cosmological recombination," *Princeton Gravity Group*, Apr. 2006.
20. "Weren't we done with recombination?" *Princeton Gravity Group*, Mar. 2005.

Field work

Field work for commissioning and flights (1-2 months typical)
2006- ACT telescope commissioning: Port Coquitlam, British Columbia
2007- ACT receiver commissioning, first light: San Pedro de Atacama, Chile
2008- ACT MBAC receiver commissioning: San Pedro de Atacama, Chile
2016- PIPER flight attempt 1: Ft. Sumner, NM
2017- PIPER flight attempt 2: Palestine, TX
2017- PIPER engineering flight 1: Ft. Sumner, NM 2017
2018- PIPER flight attempt 2: Ft. Sumner, NM 2018
2019- PIPER engineering flight 2: Ft. Sumner, NM 2019