

# Sunil Golwala — Curriculum Vitae

Division of Physics, Mathematics, and Astronomy  
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## Research Interests

Observations of the Sunyaev-Zeldovich effect to study dark energy and cluster astrophysics  
Direct searches for dark matter  
Galaxy formation and evolution, especially at sub/millimeter wavelengths  
Measurements of the cosmic microwave background  
Development of cryogenic detectors for particle physics, cosmology, and astrophysics

## Scientific Leadership Roles

Leading the Leighton Chajnantor Telescope (LCT) project, an effort to move the Leighton Telescope of the Caltech Submillimeter Observatory to the Chajnantor Plateau in Chile. Project has a full cost/schedule estimate and is in fundraising phase, with funds in hand from the Science and Technology Commission of the Shanghai Municipality (STCSM) and awaiting a decision on a 2019 NSF MRI proposal.  
Leading the effort to decommission the Caltech Submillimeter Observatory (CSO), one of the first observatories on Maunakea to be decommissioned following the 2010 Comprehensive Management Plan guidelines. The project is currently preparing a Draft Environmental Assessment.  
Chair, Long-Term Planning Committee, SuperCDMS dark matter search collaboration.  
Leading the Chajnantor Sub/millimeter Survey Telescope (CSST), an effort to build a 30-m, submm/mm wide-field survey telescope on the Chajnantor Plateau. Currently in science development phase.

## Education

Ph. D., Physics, University of California, Berkeley, 2000  
Dissertation title: *Exclusion Limits on the WIMP-Nucleon Elastic-Scattering Cross Section from the Cryogenic Dark Matter Search*  
Advisor: Bernard Sadoulet  
M. A., Physics, University of California, Berkeley, 1995  
B. A., Physics, with general and subject honors, University of Chicago, 1993

## Employment

Director, Caltech Submillimeter Observatory, 2013– (operations suspended 2015).  
Professor of Physics, California Institute of Technology, 2010–  
Associate Professor of Physics, California Institute of Technology, 2010  
Assistant Professor of Physics, California Institute of Technology, 2003–  
Millikan Postdoctoral Scholar, Physics, California Institute of Technology, 2000–2003

Graduate Student Research Assistant, Center for Particle Astrophysics and Department of Physics, University of California, Berkeley, 1994–2000  
Graduate Student Instructor, Department of Physics, University of California, Berkeley, 1993

### **Fellowships and Awards**

Department of Energy High Energy Physics Outstanding Junior Investigator, 2006–2009  
Alfred P. Sloan Foundation Research Fellow, September, 2004–September, 2006  
Millikan Postdoctoral Fellowship, Physics, California Institute of Technology, 2000–2003  
Mitsuyoshi Tanaka Dissertation Award in Experimental Particle Physics, American Physical Society, 2001  
Department of Education Graduate Fellowship, University of California, Berkeley, 1993–1994  
Richter Grant for Undergraduate Research, University of Chicago, 1992–1993

### **Professional Memberships**

American Physical Society  
American Astronomical Society  
Society of Photo-Industrial Engineers

### **Teaching**

Physics 1a (Fall 2009, 2011, 2012): freshman mechanics (teaching assistant)  
Physics 1b (Winter 2010): freshman relativity and electrostatics (teaching assistant)  
Physics 1c (Spring 2005, 2011, 2012): freshman electricity and magnetism (teaching assistant, 50% lecturer in 2012)  
Physics 106ab (Fall/Winter 2004-2005, 2005-2006, 2006-2007): junior-level analytical mechanics (lecturer)  
Physics 106bc (Winter-Spring 2013, 2014, 2015, 2016, 2017, 2018, 2019): junior-level electricity and magnetism (lecturer)  
Physics 125ab (Fall/Winter 2007-2008, 2008-2009): junior-level quantum mechanics (lecturer)  
Physics 135c (Spring 2007): seminar course on non-accelerator particle physics (organizer)

## Past and Present Advisees/Supervisees

### Research Faculty:

Dr. Jack Sayers

Research Professor

June 2019– (Research Assistant Professor, June 2016–June 2019)

Bolocam massive cluster Sunyaev-Zeldovich effect analysis, gradient index silicon optics with integral metamaterial antireflection structures, microstrip-coupled titanium nitride kinetic inductance detectors, LCT and CSST Sunyaev-Zeldovich effect science planning

### Research and Engineering Staff:

Dr. Matthew Hollister

Associate and Senior Research Engineer

Sep 2012–Sep 2016

MUSIC mm/submm camera, MAKO submm camera, CCAT LWCam and X-Spec design studies, CAMLS microwave limb sounder (JPL), HAWC+ submm camera for SOFIA (JPL), SuperCDMS SNOLAB cryogenic hardware and wiring design and HEMT screener design, instrumentation for development of gradient index silicon optics with integral metamaterial broadband antireflection structures, instrumentation for development of microstrip-coupled titanium nitride kinetic inductance detectors

Current position: Applications Physicist II, Fermi National Accelerator Laboratory, Group Leader for Sub-Kelvin Cryogenics, L2 manager for Cryogenics for SuperCDMS SNOLAB

### Postdoctoral:

Dr. Philippe Rossinot

June 2004–April 2006

antenna-coupled bolometer arrays, Bolocam instrumentation support

Current position: Deeptech project manager, BPIFrance

Dr. Gensheng Wang

September 2004–August 2007

antenna-coupled bolometer arrays, MKID noise physics, and CDMS data analysis

Current position: Assistant Physicist, High Energy Physics Division, Argonne National Laboratory

Dr. Jack Sayers

January 2008–June 2016

NASA Postdoctoral Program Fellow at JPL with Dr. Hien Nguyen, June 2008–June 2010

Senior Postdoctoral Scholar, June 2010–November 2012 and December 2013–June 2016

Norris-CCAT Senior Postdoctoral Scholar, December 2012–November 2013.

Bolocam massive cluster Sunyaev-Zeldovich effect observations and analysis, atmospheric noise studies, Bolocam observer support, MUSIC mm/submm camera, CCAT LWCam mm/submm camera, CCAT Sunyaev-Zeldovich effect science planning

Current position: Research Professor, Caltech

Dr. R. Walter Ogburn

Moore Postdoctoral Scholar, January 2008–January 2010

BICEP2/Keck Array CMB polarization experiments

Current position: Apple Computer

Dr. Matthew Hollister

February 2009–September 2012

NASA Postdoctoral Program Fellow at JPL with Dr. Peter Day, September 2010–September 2012

MUSIC mm/submm camera, MAKO submm camera, CCAT LWCam and X-Spec design studies

Dr. Thomas Downes

September 2009–June 2011

MUSIC mm/submm camera, Bolocam massive cluster Sunyaev-Zeldovich effect observations

Current position: Associate Scientist, Department of Physics, University of Wisconsin, Milwaukee

Dr. James Schlaerth

January 2011–February 2012

MUSIC mm/submm camera

Current Position: Lieutenant, US Navy

Dr. Fabien Defrance

May 2017–

development of development of gradient index silicon optics with integral metamaterial broadband antireflection structures, microstrip-coupled titanium nitride kinetic inductance detectors, properties of amorphous and crystalline silicon dielectrics for use in KIDs and superconducting microstripline

Dr. Debopam Datta

September 2018–

microstrip-coupled titanium nitride kinetic inductance detectors, properties of amorphous and crystalline silicon dielectrics for use in KIDs and superconducting microstripline

Dr. Junhan Kim

September 2019–, Millikan Prize Postdoctoral Fellow

Simulations of science reach of future Sunyaev-Zeldovich effect measurements

Dr. Shibo Shu

September 2019–

microstrip-coupled titanium nitride kinetic inductance detectors, properties of amorphous and crystalline silicon dielectrics for use in KIDs and superconducting microstripline, development of superconducting parametric amplifier (with Dr. Peter Day, JPL)

Graduate:

Jack Sayers

July 2003–December 2007

Ph.D., physics, 2008

NASA Graduate Student Research Program Fellow, 2004–2007

Bolocam Sunyaev-Zeldovich survey analysis/atmospheric noise studies

Current position: Research Professor, Caltech

Zeeshan Ahmed

September 2005–July 2011

Ph.D., physics, 2011

CDMS II data analysis, development of a multi-wire proportional chamber  
for radioactivity screening

Current position: Panofksy Fellow, SLAC National Accelerator Laboratory

Amy Trangsrud

September 2005–July 2011 (taken over from A. Lange, January 2010)

Ph. D., physics, 2011

NASA Earth and Space Sciences Fellow, 2009–2011

Development of focal plane array for SPIDER balloon-borne CMB polarization receiver

Current position: Systems engineer, JPL

Justus Brevik

April 2006–June 2012 (taken over from A. Lange, January 2010)

Development and commissioning of detector arrays, focal plane hardware,  
and readout system for BICEP2 CMB polarization receiver

Current position: Staff scientist, Superconductive Electronics Group, National Institute of Standards and Technology

David Moore

April 2007–June 2012

Ph.D., physics, 2012

Development of MKID-based dark matter and optical/UV photon detectors, CDMS low-mass WIMP search analysis

APS Mitsuyoshi Tanaki Dissertation Prize in Experimental Particle Physics, 2012

Current position: Assistant Professor, Physics, Yale University

Randol Aikin

September 2007–June 2013

Ph. D., physics, 2013

Receiver design, commissioning, and optics data analysis for BICEP2 CMB polarization receiver

Current position: Systems Engineering Lead, Ike (self-driving vehicles for trucking industry)

Nicole Czakon

July 2008–June 2013

Ph. D., physics, 2013

NASA Graduate Student Research Fellow 2009–2012

MUSIC submm/mm camera, Bolocam massive cluster Sunyaev-Zeldovich

effect observations and analysis.

Current position: Data scientist, Slack

Rebecca Tucker

October 2009–June 2014

Ph. D., physics, 2014

NDSEG Fellow, October 2008–September 2011

NSF Graduate Research Fellow, October 2011–June 2014

SPIDER CMB polarization receiver development

Current position: Senior data scientist, Netflix

Ran Duan

September 2008–June 2015

Ph. D., electrical engineering, 2015

Design of photolithographic bandpass filters for MUSIC, software-defined radio readout of MKIDs, millimeter-wave antenna design

Current position: Staff Scientist, FAST, Radio Division, National Astronomical Observatories of China

Chenguang Ji

April 2012–June 2015

Ph. D., materials science, 2015

microstrip-coupled titanium nitride kinetic inductance detectors

Current position: AutoNavi Software

Seth Siegel

September 2009–October 2015

Ph. D., physics, 2016

Moore Graduate Fellow, October 2009–September 2010

NASA Earth and Space Sciences Fellow, September 2012 – August 2015

PMA Garmire Prize, 2014

MUSIC construction and commissioning, Bolocam massive cluster Sunyaev-Zeldovich effect analysis

Current position: Senior CHIME Scientist, Postdoctoral Fellow, McGill University

Brett Cornell

September 2010–June 2018

Ph. D., physics, 2018

NASA Space Technology Research Fellow, August 2011–July 2015

PMA Neugebauer Prize, 2017

Development of MKID-based dark matter detectors, SuperCDMS WIMP search analysis

Currently not employed

Yen-Yung Chang

October 2015–

Completed written exams, Summer 2016

Completed candidacy exam, Spring 2018

Taiwan Department of Education Graduate Fellowship, 2017–2019

Development of MKID-based dark matter detectors, blackbody radiation mitigation for SuperCDMS SNOLAB experiment

Ted Macioce

October 2015–

Completed written exams, Summer 2017  
Completed candidacy exam, Spring 2018  
NASA Space Technology Research Fellow (up to 4 years), Aug 2018–  
Simulations of astronomical and instrumental sources of statistical and  
systematic noise in observations of the Sunyaev-Zeldovich effects in fu-  
ture instrumentation, development of gradient-index lenses with meta-  
material broadband antireflection structures

Taylor Aralis

June 2016–  
Completed written exams, Summer 2017  
Completed candidacy exam, Spring 2019  
Rose Hills Foundation Graduate Fellow, October 2016–September 2017  
NASA Space Technology Research Fellow (up to 4 years), Aug 2018–  
Screening of HEMT amplifiers for the SuperCDMS SNOLAB experiment  
(development and execution)  
Readout firmware and software and analysis software for MKID-based  
dark matter detectors

Osmond Wen

October 2019–  
Development of MKID-based dark matter detectors  
To-be-determined topic on SuperCDMS SNOLAB data commissioning  
and data analysis

Undergraduate, etc.:

Six post-undergraduate research assistants  
Five undergraduate senior theses  
Eleven SURFs/summer researchers who continued academic-year research  
Eleven summer-only SURFs/researchers,  
Two academic-year undergraduate volunteers  
Seven local high-school student volunteers  
Two local high school teachers working with single or groups of high school  
students

### **Community and Scientific Service**

Member of the Bolocam and MUSIC instrument teams. Bolocam was available as the 1 mm and 2 mm facility camera at the Caltech Submillimeter Observatory 2004–2012. 50% of the Observatory’s time was available to the international astronomical community. Tens of publications have been produced from Bolocam data to date and more are in preparation. The Multiwavelength Sub/millimeter Inductance Camera (MUSIC) replace Bolocam in 2013 and provided simultaneous imaging at 850  $\mu\text{m}$ , 1.1 mm, 1.3 mm, and 2 mm for 2013–2015, though the closing of the CSO. Two papers have been published based on MUSIC data and a number of others are in preparation.

Chair/Co-Chair, Cosmology/CMB/Sunyaev-Zel’dovich science working group and member, instrumentation working group, CCAT, 2004–2014

SuperCDMS Collaboration Board and Council Chair, 2012–2015

Author of *Sub-Kelvin Detectors for Non-Accelerator Particle Physics* section for the Particle Data Group's *Review of Particle Physics*, 2009–2014.

Director, Caltech Submillimeter Observatory, 2013–

Coordinating Panel for Advanced Detectors, APS Division of Particles and Fields, 2016–2018

Participant (invitation only) and coauthor, DOE Workshop on Basic Research Needs for Dark Matter Small Projects New Initiatives, October, 2018.

American Physical Society Division of Particles and Fields Instrumentation Award Committee, 2019–

Chair, SuperCDMS Collaboration Long-Range Planning Committee, 2019–

Journal Reviews:

Applied Physics Letters  
Astrophysical Journal  
Journal of Low Temperature Physics  
Nuclear Instruments and Methods A  
Physical Review Applied  
Physical Review C  
Physical Review Letters  
Review of Scientific Instruments  
Superconducting Science and Technology

Proposal Review Panels:

NSF Astronomical Sciences Division (Extragalactic Astronomy, Astronomical Technologies and Instrumentation, Mid-Scale Innovations Program)  
NSF CAREER (Physics/PNA)  
NSF Physics Division Particle and Nuclear Astrophysics  
NSF Office of Polar Programs Antarctic Aeronomy and Astrophysics  
NSF Major Research Infrastructure  
DOE Basic Energy Sciences  
DOE EPSCoR  
DOE High Energy Physics (HEP Cosmic Frontier, Advanced Detector Research, Early Career)  
NASA Postdoctoral Program  
NASA Space Technology Research Fellowship Program  
NASA Astronomy and Physics Research and Analysis Program  
JPL Director's Research and Development Fund  
W. M. Keck Foundation  
Caltech De Logi Fund  
Assorted national science agencies outside the US (Canada, France, Georgia, Hong Kong, Ireland, Netherlands),



### Caltech Committee Memberships

Keck Institute for Space Studies, member of development committee, 2004–2007  
Cahill Astrophysics Building Committee, 2004–2008  
Physics Graduate Admissions Committee, 2003–2007, 2010–2011  
PMA Division Strategic Planning Committee, 2010–2012  
Faculty Board Educational Outreach Committee, 2007–2013  
Ad Hoc Honor Code Committee, 2013–2015  
Physics Staffing Committee, 2010–2016  
PMA Tombrello/Garmire/Neugebauer Graduate Fellowship Committee, 2015  
PMA Committee on Graduate Fellowships, 2015–2016  
PMA Committee on Graduate Experience, 2015–2016  
Physics Undergraduate Committee, 2014–2016  
PMA Machine Shop Committee, 2015–2018  
PMA Experimental Prize Fellow Committee, 2009–2016, 2019– (Chair, 2008–2010, 2015)  
Physics liaison to Caltech Academics and Research Committee Student-Faculty Conference, 2017  
Faculty representative to Student Health Committee, 2015–  
Physics graduate written exam committee, 2018–, Chair, 2019–

### Outreach Activities

Participant in Caltech Classroom Connection, Fall 2004–. CCC is a program that couples Caltech researchers (faculty, postdocs, and graduate students) with high school science teachers in the local school districts. The Caltech participants aid in development and execution of (math- and physics-related) classroom activities and act as role models for students thinking about career plans. A portion of my research group engages in biweekly in-class activities with 3 physics classes at Gabrielino High School (San Gabriel) led by Kevin McClure.

Participant in Caltech Summer Research Connection, 2008, 2012, 2014, 2016, 2018, 2019. Postdoctoral scholar/research faculty Jack Sayers mentored local high school teachers and a number of high school students on summer research projects. In one case to date, the students received coauthorship on a journal paper.

Assorted public lectures

## Sunil Golwala — Publications

Asterisks indicate refereed publications.

INSPIRE reports a  $h$ -index of 42, reduced to 41 when the Review of Particle Physics is excluded and reduced to 38 when self-citations are excluded.

1. K. Basu, J. Erler, *et al.*, ““SZ spectroscopy” in the coming decade: Galaxy cluster cosmology and astrophysics in the submillimeter,” astro-ph.co/1903.04944, 2019, submission to Astro2020.
2. T. Mroczkowski, D. Nagai, *et al.*, “A High-resolution SZ View of the Warm-Hot Universe,” astro-ph.co/1903.02595, 2019, submission to Astro2020.
3. J. Sayers, A. Montaña, *et al.*, “Imaging the Thermal and Kinematic Sunyaev-Zel’dovich Effect Signals in a Sample of Ten Massive Galaxy Clusters: Constraints on Internal Velocity Structures and Bulk Velocities,” astro-ph.co/1812.06926, 2018, accepted for publication in *Astrophysical Journal*.
4. \*R. Agnese, T. Aralis, *et al.*, “Production rate measurement of Tritium and other cosmogenic isotopes in Germanium with CDMSlite,” *Astroparticle Physics* **104**, 1–12 (2019).
5. \*J. A. Shitanishi, E. Pierpaoli, *et al.*, “Thermodynamic profiles of galaxy clusters from a joint X-ray/SZ analysis,” *Monthly Notices of the Royal Astronomical Society* **481**, 749–792 (2018).
6. \*R. Agnese, A. J. Anderson, *et al.*, “Nuclear-recoil energy scale in CDMS II silicon dark-matter detectors,” *Nuclear Instruments and Methods A* **905**, 71–81 (2018).
7. \*R. Agnese, T. Aralis, *et al.*, “First Dark Matter Constraints from a SuperCDMS Single-Charge Sensitive Detector,” *Physical Review Letters* **121**, 051301/1–7 (2018).
8. \*R. Agnese, T. Aralis, *et al.*, “Energy loss due to defect formation from  $^{206}\text{Pb}$  recoils in SuperCDMS germanium detectors,” *Applied Physics Letters* **113**, 092101/1–5 (2018).
9. \*S. R. Siegel, J. Sayers, *et al.*, “Constraints on the Mass, Concentration, and Nonthermal Pressure Support of Six CLASH Clusters from a Joint Analysis of X-Ray, SZ, and Lensing Data,” *Astrophysical Journal* **861**, 71/1–29 (2018).
10. \*F. Defrance, C. Jung-Kubiak, *et al.*, “1.6:1 bandwidth two-layer antireflection structure for silicon matched to the 190–310 GHz atmospheric window,” *Applied Optics* **57**, 5196–5209 (2018).
11. Y.-Y. Chang, B. Cornell, *et al.*, “Development of a Massive, Highly Multiplexible, Phonon-Mediated Particle Detector Using Kinetic Inductance Detectors,” *Journal of Low Temperature Physics* (2018).
12. \*R. Agnese, T. Aramaki, *et al.*, “Results from the Super Cryogenic Dark Matter Search Experiment at Soudan,” *Physical Review Letters* **120**, 061802/1–7 (2018).
13. \*R. Agnese, A. J. Anderson, *et al.*, “Low-mass dark matter search with CDMSlite,” *Physical Review D* **97**, 022002/1–30 (2018).
14. A. D. Beyer, M. I. Hollister, *et al.*, “Fabricating with crystalline Si to improve superconducting detector performance,” *Journal of Physics Conference Series* **834**, 012006/1–8 (2017).

15. \*R. Agnese, A. J. Anderson, *et al.*, “Projected sensitivity of the SuperCDMS SNOLAB experiment,” *Physical Review D* **95**, 082002/1–17 (2017).
16. \*C. E. Romero, B. S. Mason, *et al.*, “Galaxy Cluster Pressure Profiles as Determined by Sunyaev Zeldovich Effect Observations with MUSTANG and Bolocam. II. Joint Analysis of 14 Clusters,” *Astrophysical Journal* **838**, 86/1–21 (2017).
17. \*J. Sayers, S. R. Golwala, *et al.*, “A Comparison and Joint Analysis of Sunyaev-Zeldovich Effect Measurements from Planck and Bolocam for a Set of 47 Massive Galaxy Clusters,” *Astrophysical Journal* **832**, 26/1–11 (2016).
18. \*V. Asboth, A. Conley, *et al.*, “HerMES: a search for high-redshift dusty galaxies in the HerMES Large Mode Survey - catalogue, number counts and early results,” *Monthly Notices of the Royal Astronomical Society* **462**, 1989–2000 (2016).
19. \*J. Sayers, M. Zemcov, *et al.*, “Peculiar Velocity Constraints from Five-band SZ Effect Measurements toward RX J1347.5-1145 with MUSIC and Bolocam from the CSO,” *Astrophysical Journal* **820**, 101/1–13 (2016).
20. \*M. Donahue, S. Ettori, *et al.*, “The Morphologies and Alignments of Gas, Mass, and the Central Galaxies of CLASH Clusters of Galaxies,” *Astrophysical Journal* **819**, 36/1–18 (2016).
21. \*R. Agnese, A. J. Anderson, *et al.*, “New Results from the Search for Low-Mass Weakly Interacting Massive Particles with the CDMS Low Ionization Threshold Experiment,” *Physical Review Letters* **116**, 071301/1–6 (2016).
22. \*BICEP2 Collaboration, P. A. R. Ade, *et al.*, “BICEP2 III: Instrumental Systematics,” *Astrophysical Journal* **814**, 110/1–28 (2015).
23. \*R. Agnese, A. J. Anderson, *et al.*, “Improved WIMP-search reach of the CDMS II germanium data,” *Physical Review D* **92**, 072003/1–23 (2015).
24. \*BICEP2 Collaboration, Keck Array Collaboration, *et al.*, “Antenna-coupled TES Bolometers Used in BICEP2, Keck Array, and Spider,” *Astrophysical Journal* **812**, 176/1–17 (2015).
25. \*R. L. Schmitt, G. Tatkowski, *et al.*, “Thermal conductance measurements of bolted copper joints for SuperCDMS,” *Cryogenics* **70**, 41–46 (2015).
26. \*BICEP2 and Keck Array Collaborations, P. A. R. Ade, *et al.*, “BICEP2/Keck Array V: Measurements of B-mode Polarization at Degree Angular Scales and 150 GHz by the Keck Array,” *Astrophysical Journal* **811**, 126/1–13 (2015).
27. \*A. H. Young, T. Mroczkowski, *et al.*, “Measurements of the Sunyaev-Zel’dovich Effect in MACS J0647.7+7015 and MACS J1206.2-0847 at High Angular Resolution with MUSTANG,” *Astrophysical Journal* **809**, 185/1–14 (2015).
28. \*C. E. Romero, B. S. Mason, *et al.*, “Galaxy Cluster Pressure Profiles, as Determined by Sunyaev-Zeldovich Effect Observations with MUSTANG and Bolocam. I. Joint Analysis Technique,” *Astrophysical Journal* **807**, 121/1–11 (2015).
29. \*BICEP2 and Keck Array Collaborations, P. A. R. Ade, *et al.*, “BICEP2/Keck Array. IV. Optical Characterization and Performance of the BICEP2 and Keck Array Experiments,” *Astrophysical Journal* **806**, 206/1–23 (2015).

30. \*N. G. Czakon, J. Sayers, *et al.*, “Galaxy Cluster Scaling Relations between Bolocam Sunyaev-Zel’dovich Effect and Chandra X-Ray Measurements,” *Astrophysical Journal* **806**, 18/1–28 (2015).
31. \*K. Schneck, B. Cabrera, *et al.*, “Dark matter effective field theory scattering in direct detection experiments,” *Physical Review D* **91**, 092004/1–13 (2015).
32. \*R. Agnese, A. J. Anderson, *et al.*, “First Direct Limits on Lightly Ionizing Particles with Electric Charge Less than  $e/6$ ,” *Physical Review Letters* **114**, 111302/1–5 (2015).
33. \*BICEP2/Keck and Planck Collaborations, P. A. R. Ade, *et al.*, “Joint Analysis of BICEP2/Keck Array and Planck Data,” *Physical Review Letters* **114**, 101301/1–17 (2015).
34. \*R. Agnese, A. J. Anderson, *et al.*, “Maximum likelihood analysis of low energy CDMS II germanium data,” *Physical Review D* **91**, 052021/1–13 (2015).
35. C. Ji, A. Beyer, *et al.*, “Design of antenna-coupled lumped-element titanium nitride KIDs for long-wavelength multi-band continuum imaging,” in *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series* (SPIE, Bellingham, Washington, 2014), Vol. 9153, pp. 915321/1–15.
36. J. Sayers, C. Bockstiegel, *et al.*, “The status of MUSIC: the multiwavelength sub-millimeter inductance camera,” in *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series* (SPIE, Bellingham, Washington, 2014), Vol. 9153, pp. 915304/1–18.
37. \*P. A. R. Ade, R. W. Aikin, *et al.*, “BICEP2. II. Experiment and three-year Data Set,” *Astrophysical Journal* **792**, 62/1–29 (2014).
38. \*P. A. R. Ade, R. W. Aikin, *et al.*, “Detection of B-Mode Polarization at Degree Angular Scales by BICEP2,” *Physical Review Letters* **112**, 241101/1–25 (2014).
39. N. R. Zobrist, M. Daal, *et al.*, “A Distributed Method for Modeling Effective Cryogenic Flat Cable Heat Sinking,” *Journal of Low Temperature Physics* **176**, 1096–1102 (2014).
40. E. Kramer, N. Kellaris, *et al.*, “Material Selection for Cryogenic Support Structures,” *Journal of Low Temperature Physics* **176**, 1103–1108 (2014).
41. A. E. Lowitz, E. M. Barrentine, *et al.*, “A Comparison of Fundamental Noise in Kinetic Inductance Detectors and Transition Edge Sensors for Millimeter-Wave Applications,” *Journal of Low Temperature Physics* **176**, 504–510 (2014).
42. B. Cornell, D. C. Moore, *et al.*, “Particle Detection Using MKID-Based Athermal-Phonon Mediated Detectors,” *Journal of Low Temperature Physics* **176**, 891–897 (2014).
43. \*R. Agnese, A. J. Anderson, *et al.*, “Search for Low-Mass Weakly Interacting Massive Particles with SuperCDMS,” *Physical Review Letters* **112**, 241302/1–6 (2014).
44. \*R. Agnese, A. J. Anderson, *et al.*, “Search for Low-Mass Weakly Interacting Massive Particles Using Voltage-Assisted Calorimetric Ionization Detection in the SuperCDMS Experiment,” *Physical Review Letters* **112**, 041302/1–6 (2014).
45. \*Z. Ahmed, M. A. Bowles, *et al.*, “A prototype low-background multiwire proportional chamber,” *Journal of Instrumentation* **9**, 1009P (2014).

46. \*J. Sayers, T. Mroczkowski, *et al.*, “A Measurement of the Kinetic Sunyaev-Zel’dovich Signal towards MACS J0717.5+3745,” *Astrophysical Journal* **778**, 52/1–20 (2013).
47. \*R. Agnese, A. J. Anderson, *et al.*, “Demonstration of Surface Electron Rejection with Interleaved Germanium Detectors for Dark Matter Search,” *Applied Physics Letters* **103**, 164105/1–5 (2013).
48. \*R. Agnese, Z. Ahmed, *et al.*, “Silicon Detector Dark Matter Results from the Final Exposure of CDMS II,” *Physical Review Letters* **111**, 251301/1–6 (2013).
49. R. Bunker, Z. Ahmed, *et al.*, “The BetaCage, an ultra-sensitive screener for surface contamination,” in *American Institute of Physics Conference Series*, edited by L. Miramonti and L. Pandola (American Institute of Physics, Melville, New York, 2013), Vol. 1549, pp. 132–135.
50. \*R. Agnese, Z. Ahmed, *et al.*, “Silicon detector results from the first five-tower run of CDMS II,” *Physical Review D* **88**, 031104(R)/1–5 (2013).
51. \*J. Sayers, N. G. Czakon, *et al.*, “Sunyaev-Zel’dovich-measured Pressure Profiles from the Bolocam X-Ray/SZ Galaxy Cluster Sample,” *Astrophysical Journal* **768**, 177/1–15 (2013).
52. \*A. A. Fraisse, P. A. R. Ade, *et al.*, “SPIDER: probing the early Universe with a suborbital polarimeter,” *Journal of Cosmology and Astroparticle Physics* **4**, 47/1–23 (2013).
53. \*J. Sayers, T. Mroczkowski, *et al.*, “The Contribution of Radio Galaxy Contamination to Measurements of the Sunyaev-Zel’dovich Decrement in Massive Galaxy Clusters at 140 GHz with Bolocam,” *Astrophysical Journal* **764**, 152/1–10 (2013).
54. \*T. Mroczkowski, S. Dicker, *et al.*, “A Multi-wavelength Study of the Sunyaev-Zel’dovich Effect in the Triple-Merger Cluster MACS J0717.5+3745 with MUSTANG and Bolocam,” *Astrophysical Journal* **761**, 47/1–15 (2012).
55. A. G. Vieregge, P. A. R. Ade, *et al.*, “Optical characterization of the Keck array polarimeter at the South Pole,” in *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series* (SPIE, Bellingham, Washington, 2012), Vol. 8452, pp. 845226/1–13, astro-ph.IM/1208.0844.
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