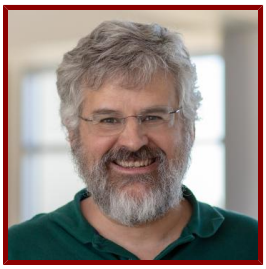
Stanford



Kent Irwin

Director, Hansen Experimental Physics Laboratory (HEPL), Professor of Physics, of Particle Physics and Astrophysics and of Photon Science

CONTACT INFORMATION

- **Administrative Contact**

  Sha Zhang

  Email shazhang@stanford.edu

Bio

BIO

Irwin Group web page:

https://irwinlab.stanford.edu/

ACADEMIC APPOINTMENTS

- Professor, Physics
- Professor, Particle Physics and Astrophysics
- Professor, Photon Science Directorate

ADMINISTRATIVE APPOINTMENTS

- Faculty Director, Hansen Experimental Physics Laboratory, (2020- present)
- Professor of Physics and of Particle Physics and Astrophysics and Photon Science, Stanford and SLAC, (2013- present)
- Fellow, National Institute of Standards and Technology (NIST), (2007-2013)
- Professor Adjoint, Astrophysics and Planetary Sciences, University of Colorado, (2006-2013)
- Supervisory Physicist, National Institute of Standards and Technology (NIST), (2002-2007)
- Physicist, National Institute of Standards and Technology (NIST), (1996-2002)
- Postdoctoral Researcher, National Institute of Standards and Technology (NIST), (1995-1996)

HONORS AND AWARDS

- Department of Commerce Gold Medal, United States Department of Commerce (DOC) (2012)
- Fellow, American Physical Society (2007)
- Joseph F. Keithley Award, American Physical Society (2007)
- Arthur S. Flemming Award, George Washington University (2006)

PROFESSIONAL EDUCATION

- Ph.D., Stanford University (1995)
- M.S., Stanford University (1995)

- B.S., California Institute of Technology (1988)

LINKS

- Irwin Group: https://irwinlab.stanford.edu/

Teaching

COURSES

2023-24

- Modern Physics: PHYSICS 25 (Spr)

2022-23

- Modern Physics: PHYSICS 25 (Spr)

2021-22

- Modern Physics: PHYSICS 25 (Spr)

2020-21

- Modern Physics: PHYSICS 25 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Taj Dyson, Rachel Gruenke, Yuka Nakato

Postdoctoral Faculty Sponsor

Chiara Salemi, Maria Simanovskaia

Doctoral Dissertation Advisor (AC)

Jason Corbin, Nicholas Rapidis, Jyotirmai Singh, Cady van Assendelft

Publications

PUBLICATIONS

- **The Atacama Cosmology Telescope: A Measurement of the DR6 CMB Lensing Power Spectrum and Its Implications for Structure Growth** *ASTROPHYSICAL JOURNAL*
  Qu, F., Sherwin, B. D., Madhavacheril, M. S., Han, D., Crowley, K. T., Abril-Cabezas, I., Ade, P. R., Aiola, S., Alford, T., Amiri, M., Amodeo, S., An, R., Atkins, et al
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- **Quantum Diamonds at the Beach: Chemical Insights into Silica Growth on Nanoscale Diamond using Multimodal Characterization and Simulation.** *ACS nanoscience Au*
  Sandoval, P. J., Lopez, K., Arreola, A., Len, A., Basravi, N., Yamaguchi, P., Kawamura, R., Stokes, C. X., Melendrez, C., Simpson, D., Lee, S. J., Titus, C. J., Altoe, et al
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- **Measurement of gravitational lensing of the cosmic microwave background using SPT-3G 2018 data** *PHYSICAL REVIEW D*
  Pan, Z., Bianchini, F., Wu, W. K., Ade, P. R., Ahmed, Z., Anderes, E., Anderson, A. J., Ansarinejad, B., Archipley, M., Aylor, K., Balkenhol, L., Barry, P. S., Thakur, et al
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- **BICEP Array: 150 GHz Detector Module Development** *JOURNAL OF LOW TEMPERATURE PHYSICS*
  Schillaci, A., Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Beck, D., Bock, J. J., Buza, V., Cheshire, J., Connors, J., Cornelison, et al
  2023; 213 (5-6): 317-326

- **Quantum Diamonds at the Beach: Chemical Insights into Silica Growth on Nanoscale Diamond using Multimodal Characterization and Simulation** *ACS NANOSCIENCE AU*
  Sandoval, P. J., Lopez, K., Arreola, A., Len, A., Basravi, N., Yamaguchi, P., Kawamura, R., Stokes, C. X., Melendrez, C., Simpson, D., Lee, S., Titus, C., Altoe, et al
  2023

- **Measurements of DC SQUID Damping Effects on Superconducting Resonant Circuits** *IEEE TRANSACTIONS ON APPLIED SUPERCONDUCTIVITY*
  van Assendelft, E. C., Cho, H., Corbin, J., Kuenstner, S., Li, D., Phipps, A., Rapidis, N. M., Singh, J., Wells, K., Irwin, K. D.
  2023; 33 (5)

- **BICEP/Keck. XVII. Line-of-sight Distortion Analysis: Estimates of Gravitational Lensing, Anisotropic Cosmic Birefringence, Patchy Reionization, and Systematic Errors** *ASTROPHYSICAL JOURNAL*
  Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Beck, D., Bock, J. J., Boenish, H., Bullock, E., Buza, V., Cheshire, J. R., Connors, et al
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- **Plastic Laminate Antireflective Coatings for Millimeter-Wave Optics in BICEP Array** *JOURNAL OF LOW TEMPERATURE PHYSICS*
  Dierickx, M., Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Beck, D., Bock, J. J., Buza, V., Cheshire, J., Connors, J., Cornelison, et al
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- **BICEP/Keck. XVI. Characterizing Dust Polarization through Correlations with Neutral Hydrogen** *ASTROPHYSICAL JOURNAL*
  Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Beck, D., Bock, J. J., Boenish, H., Bullock, E., Buza, V., Cheshire, J. R., Clark, et al
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- **Simultaneous Millimeter-wave, Gamma-Ray, and Optical Monitoring of the Blazar PKS 2326-502 during a Flaring State** *ASTROPHYSICAL JOURNAL LETTERS*
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- **The Athena X-ray Integral Field Unit: a consolidated design for the system requirement review of the preliminary definition phase** *EXPERIMENTAL ASTRONOMY*
  Barret, D., Albouys, V., den Herder, J., Piro, L., Cappi, M., Huovelin, J., Kelley, R., Miguel Mas-Hesse, J., Paltani, S., Rauw, G., Rozanska, A., Svoboda, J., Wilms, et al
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- **SLAC microresonator RF (SMuRF) electronics: A tone-tracking readout system for superconducting microwave resonator arrays.** *The Review of scientific instruments*
  Yu, C., Ahmed, Z., Frisch, J. C., Henderson, S. W., Silva-Feaver, M., Arnold, K., Brown, D., Connors, J., Cukierman, A. J., D'Ewart, J. M., Dober, B. J., Dusatko, J. E., Haller, et al
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- **Proposal for a definitive search for GUT-scale QCD axions** *PHYSICAL REVIEW D*
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  2022; 106 (11)

- **Projected sensitivity of DMRadio-m3: A search for the QCD axion below 1 mu eV** *PHYSICAL REVIEW D*
  Brouwer, L., Chaudhuri, S., Cho, H., Corbin, J., Craddock, W., Dawson, C. S., Droster, A., Foster, J. W., Fry, J. T., Graham, P. W., Henning, R., Irwin, K. D., Kadribasic, et al
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- **Asteroid Measurements at Millimeter Wavelengths with the South Pole Telescope** *ASTROPHYSICAL JOURNAL*
  Chichura, P. M., Foster, A., Patel, C., Ossa-Jaen, N., Ade, P. R., Ahmed, Z., Anderson, A. J., Archipley, M., Austermann, J. E., Avva, J. S., Balkenhol, L., Barry, P. S., Thakur, et al
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- **In-Flight Gain Monitoring of SPIDER's Transition-Edge Sensor Arrays** *JOURNAL OF LOW TEMPERATURE PHYSICS*

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- **A Simulation-based Method for Correcting Mode Coupling in CMB Angular Power Spectra** *ASTROPHYSICAL JOURNAL*

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- **A Constraint on Primordial B-modes from the First Flight of the Spider Balloon-borne Telescope** *ASTROPHYSICAL JOURNAL*

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- **BICEP/Keck XV: The BICEP3 Cosmic Microwave Background Polarimeter and the First Three-year Data Set** *ASTROPHYSICAL JOURNAL*

  Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Beck, D., Bock, J. J., Boenish, H., Bullock, E., Buza, Cheshire, J. R., Connors, J., et al

  2022; 927 (1)

- **The Design and Integrated Performance of SPT-3G** *ASTROPHYSICAL JOURNAL SUPPLEMENT SERIES*

  Sobrin, J. A., Anderson, A. J., Bender, A. N., Benson, B. A., Dutcher, D., Foster, A., Goeckner-Wald, N., Montgomery, J., Nadolski, A., Rahlin, A., Ade, P. R., Ahmed, Z., Anderes, et al

  2022; 258 (2)

- **CMB-S4: Forecasting Constraints on Primordial Gravitational Waves** *ASTROPHYSICAL JOURNAL*

  Abazajian, K., Addison, G. E., Adshead, P., Ahmed, Z., Akerib, D., Ali, A., Allen, S. W., Alonso, D., Alvarez, M., Amin, M. A., Anderson, A., Arnold, K. S., Ashton, et al

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- **BICEP/Keck XIV: Improved constraints on axionlike polarization oscillations in the cosmic microwave background** *PHYSICAL REVIEW D*

  Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Beck, D., Bock, J. J., Boenish, H., Bullock, E., Buza, Cheshire, J. R., Connors, J., et al

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- **Metastable Brominated Nanodiamond Surface Enables Room Temperature and Catalysis-Free Amine Chemistry.** *The journal of physical chemistry letters*

  Melendrez, C., Lopez-Rosas, J. A., Stokes, C. X., Cheung, T. C., Lee, S., Titus, C. J., Valenzuela, J., Jeanpierre, G., Muhammad, H., Tran, P., Sandoval, P. J., Supreme, T., Altoe, et al

  1800: 1147-1158

- **Performance and characterization of the SPT-3G digital frequency-domain multiplexed readout system using an improved noise and crosstalk model** *JOURNAL OF ASTRONOMICAL TELESCOPES INSTRUMENTS AND SYSTEMS*

  Montgomery, J., Ade, P. R., Ahmed, Z., Anderes, E., Anderson, A. J., Archipley, M. A., Avva, J. S., Aylor, K., Balkenhol, L., Barry, P. S., Thakur, R. B., Benabed, K., Bender, et al

  2022; 8 (1)

- **Improved Polarization Calibration of the BICEP3 CMB Polarimeter at the South Pole**

  Cornelison, J., Verges, C., Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Beck, D., Bischoff, C. A., Bock, J. J., Buza, Cheshire, J. R., Connors, J., et al

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- **2022 Upgrade and Improved Low Frequency Camera Sensitivity for CMB Observation at the South Pole**

  Soliman, A., Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Beck, D., Bock, J. J., Buza, Cheshire, J., Connors, J., Cornelison, J., et al

  SPIE-INT SOC OPTICAL ENGINEERING.2022

- **Thermal Testing for Cryogenic CMB Instrument Optical Design**

  Goldfinger, D. C., Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Beck, D., Bischoff, C. A., Bock, J. J., Buza, Cheshire, J., Connors, J., Cornelison, J., et al

  SPIE-INT SOC OPTICAL ENGINEERING.2022

- **Optimal Cosmic Microwave Background Lensing Reconstruction and Parameter Estimation with SPTpol Data** *ASTROPHYSICAL JOURNAL*

  Millea, M., Daley, C. M., Chou, T., Anderes, E., Ade, P. R., Anderson, A. J., Austermann, J. E., Avva, J. S., Beall, J. A., Bender, A. N., Benson, B. A., Bianchini, F., Bleem, et al

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- **The XFaster Power Spectrum and Likelihood Estimator for the Analysis of Cosmic Microwave Background Maps** *ASTROPHYSICAL JOURNAL*
  Gambrel, A. E., Rahlin, A. S., Song, X., Contaldi, C. R., Ade, P. R., Amiri, M., Benton, S. J., Bergman, A. S., Bihary, R., Bock, J. J., Bond, J. R., Bonetti, J. A., Bryan, et al
  2021; 922 (2)

- **Constraints on Lambda CDM extensions from the SPT-3G 2018 EE and TE power spectra** *PHYSICAL REVIEW D*
  Balkenhol, L., Dutcher, D., Ade, P. R., Ahmed, Z., Anderes, E., Anderson, A. J., Archipley, M., Avva, J. S., Aylor, K., Barry, P. S., Thakur, R., Benabed, K., Bender, et al
  2021; 104 (8)

- **Mitigation of Finite Bandwidth Effects in Time-Division-Multiplexed SQUID Readout of TES Arrays** *IEEE TRANSACTIONS ON APPLIED SUPERCONDUCTIVITY*
  Durkin, M., Adams, J. S., Bandler, S. R., Chervenak, J. A., Denison, E., Doriese, W. B., Duff, S. M., Finkbeiner, F. M., Fowler, J. W., Gard, J. D., Hilton, G. C., Hummatov, R., Irwin, et al
  2021; 31 (5)

- **Detection of Galactic and Extragalactic Millimeter-wavelength Transient Sources with SPT-3G** *ASTROPHYSICAL JOURNAL*
  Guns, S., Foster, A., Daley, C., Rahlin, A., Whitehorn, N., Ade, P. R., Ahmed, Z., Anderes, E., Anderson, A. J., Archipley, M., Avva, J. S., Aylor, K., Balkenhol, et al
  2021; 916 (2)

- **Performance of a Broad-Band, High-Resolution, Transition-Edge Sensor Spectrometer for X-ray Astrophysics** *IEEE TRANSACTIONS ON APPLIED SUPERCONDUCTIVITY*
  Smith, S. J., Adams, J. S., Bandler, S. R., Beaumont, S., Chervenak, J. A., Denison, E. V., Doriese, W. B., Durkin, M., Finkbeiner, F. M., Fowler, J. W., Hilton, G. C., Hummatov, R., Irwin, et al
  2021; 31 (5)

- **Search for dark photon dark matter: Dark E field radio pilot experiment** *PHYSICAL REVIEW D*
  Godfrey, B., Tyson, J., Hillbrand, S., Balajthy, J., Polin, D., Tripathi, S., Klomp, S., Levine, J., MacFadden, N., Kolner, B. H., Smith, M. R., Stucky, P., Phipps, et al
  2021; 104 (1)

- **Measurements of the E-mode polarization and temperature-E-mode correlation of the CMB from SPT-3G 2018 data** *PHYSICAL REVIEW D*
  Dutcher, D., Balkenhol, L., Ade, P. R., Ahmed, Z., Anderes, E., Anderson, A. J., Archipley, M., Avva, J. S., Aylor, K., Barry, P. S., Thakur, R., Benabed, K., Bender, et al
  2021; 104 (2)

- **BICEP/Keck XII: Constraints on axionlike polarization oscillations in the cosmic microwave background** *PHYSICAL REVIEW D*
  Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Bock, J. J., Boenish, H., Bullock, E., Buza, Cheshire, J. R., Connors, J., Cornelison, J., et al
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- **An Improved Measurement of the Secondary Cosmic Microwave Background Anisotropies from the SPT-SZ plus SPTpol Surveys** *ASTROPHYSICAL JOURNAL*
  Reichardt, C. L., Patil, S., Ade, P. R., Anderson, A. J., Austermann, J. E., Avva, J. S., Baxter, E., Beall, J. A., Bender, A. N., Benson, B. A., Bianchini, F., Bleem, L. E., Carlstrom, et al
  2021; 908 (2)

- **A demonstration of improved constraints on primordial gravitational waves with delensing** *PHYSICAL REVIEW D*
  Ade, P. R., Ahmed, Z., Amiri, M., Anderson, A. J., Austermann, J. E., Avva, J. S., Barkats, D., Thakur, R., Beall, J. A., Bender, A. N., Benson, B. A., Bianchini, F., Bischoff, et al
  2021; 103 (2)

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  Ade, P. A., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R. B., Bischoff, C. A., Beck, D., Bock, J. J., Boenish, H., Bullock, E., Buza, V., Cheshire, J. R., Connors, et al
  2021; 127 (15): 151301

- **Depth-dependent valence stratification driven by oxygen redox in lithium-rich layered oxide.** *Nature communications*
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- **The Atacama Cosmology Telescope: a measurement of the Cosmic Microwave Background power spectra at 98 and 150 GHz** *JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS*

  Choi, S. K., Hasselfield, M., Ho, S., Koopman, B., Lungu, M., Abitbol, M. H., Addison, G. E., Ade, P. R., Aiola, S., Alonso, D., Amiri, M., Amodeo, S., Angile, et al

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- **The Atacama Cosmology Telescope: DR4 maps and cosmological parameters** *JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS*

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  2020

- **SQUIDs and Transition-Edge Sensors** *JOURNAL OF SUPERCONDUCTIVITY AND NOVEL MAGNETISM*

  Irwin, K. D.

  2020

- **Searching for anisotropic cosmic birefringence with polarization data from SPTpol** *PHYSICAL REVIEW D*

  Bianchini, F., Wu, W. K., Ade, P. R., Anderson, A. J., Austermann, J. E., Avva, J. S., Balkenhol, L., Baxter, E., Beall, J. A., Bender, A. N., Benson, B. A., Bleem, L. E., Carlstrom, et al

  2020; 102 (8)

- **Measurements of B-mode polarization of the cosmic microwave background from 500 square degrees of SPTpol data** *PHYSICAL REVIEW D*

  Sayre, J. T., Reichardt, C. L., Henning, J. W., Ade, P. R., Anderson, A. J., Austermann, J. E., Avva, J. S., Beall, J. A., Bender, A. N., Benson, B. A., Bianchini, F., Bleem, L. E., Carlstrom, et al

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- **Chemical control of competing electron transfer pathways in iron tetracyano-polypyridyl photosensitizers** *CHEMICAL SCIENCE*

  Kunnus, K., Li, L., Titus, C., Lee, S., Reinhard, M. E., Koroidov, S., Kjaer, K. S., Hong, K., Ledbetter, K., Doriese, W. B., O'Neil, G. C., Swetz, D. S., Ullom, et al

  2020; 11 (17): 4360–73

- **Particle Response of Antenna-Coupled TES Arrays: Results from SPIDER and the Laboratory** *JOURNAL OF LOW TEMPERATURE PHYSICS*

  Osherson, B., Filippini, J. P., Fu, J., Gramillano, R., Gualtieri, R., Shaw, E. C., Ade, P. R., Amiri, M., Benton, S. J., Bock, J. J., Bond, J. R., Bryan, S. A., Chiang, et al

  2020; 199 (3-4): 1127–36

- **Microwave Multiplexing on the Keck Array** *JOURNAL OF LOW TEMPERATURE PHYSICS*

  Cukierman, A., Ahmed, Z., Henderson, S., Young, E., Yu, C., Barkats, D., Brown, D., Chaudhuri, S., Cornelison, J., D'Ewart, J. M., Dierickx, M., Dober, B. J., Dusatko, et al

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- **Chemical control of competing electron transfer pathways in iron tetracyano-polypyridyl photosensitizers.** *Chemical science*

  Kunnus, K., Li, L., Titus, C. J., Lee, S. J., Reinhard, M. E., Koroidov, S., Kjær, K. S., Hong, K., Ledbetter, K., Doriese, W. B., O'Neil, G. C., Swetz, D. S., Ullom, et al

  2020; 11 (17): 4360-4373

- **Performance of Al-Mn Transition-Edge Sensor Bolometers in SPT-3G**

  Anderson, A. J., Ade, P. R., Ahmed, Z., Avva, J. S., Barry, P. S., Thakur, R., Bender, A. N., Benson, B. A., Bryant, L., Byrum, K., Carlstrom, J. E., Carter, F. W., Cecil, et al

  SPRINGER/PLENUM PUBLISHERS.2020: 320–29

- **Broadband, millimeter-wave antireflection coatings for large-format, cryogenic aluminum oxide optics** *APPLIED OPTICS*

  Nadolski, A., Vieira, J. D., Sobrin, J. A., Kofman, A. M., Ade, P. R., Ahmed, Z., Anderson, A. J., Avva, J. S., Thakur, R., Bender, A. N., Benson, B. A., Bryant, L., Carlstrom, et al

  2020; 59 (10): 3285–95

- **On-Sky Performance of the SPT-3G Frequency-Domain Multiplexed Readout**

  Bender, A. N., Anderson, A. J., Avva, J. S., Ade, P. R., Ahmed, Z., Barry, P. S., Thakur, R., Benson, B. A., Bryant, L., Byrum, K., Carlstrom, J. E., Carter, F. W., Cecil, et al

  SPRINGER/PLENUM PUBLISHERS.2020: 182–91

- **Planar Self-similar Antennas for Broadband Millimeter-Wave Measurements** *JOURNAL OF LOW TEMPERATURE PHYSICS*
  Meinke, J., Mauskopf, P., Johnson, B. R., Flanigan, D., Irwin, K., Li, D., Cho, H., Day, P., McMahon, J., Doyle, S., Ade, P. R.
  2020

- **Galaxy Clusters Selected via the Sunyaev-Zel'dovich Effect in the SPTpol 100-square-degree Survey** *ASTRONOMICAL JOURNAL*
  Huang, N., Bleem, L. E., Stalder, B., Ade, P. R., Allen, S. W., Anderson, A. J., Austermann, J. E., Avva, J. S., Beall, J. A., Bender, A. N., Benson, B. A., Bianchini, F., Bocquet, et al
  2020; 159 (3)

- **The SPTpol Extended Cluster Survey** *ASTROPHYSICAL JOURNAL SUPPLEMENT SERIES*
  Bleem, L. E., Bocquet, S., Stalder, B., Gladders, M. D., Ade, P. R., Allen, S. W., Anderson, A. J., Annis, J., Ashby, M. N., Austermann, J. E., Avila, S., Avva, J. S., Bayliss, et al
  2020; 247 (1)

- **Characterizing the Sensitivity of 40 GHz TES Bolometers for BICEP Array** *JOURNAL OF LOW TEMPERATURE PHYSICS*
  Zhang, C., Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Bock, J. J., Boenish, H., Bullock, E., Buza, Cheshire, J., Connors, J., et al
  2020

- **Optical Design and Characterization of 40-GHz Detector and Module for the BICEP Array** *JOURNAL OF LOW TEMPERATURE PHYSICS*
  Soliman, A., Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Bock, J. J., Boenish, H., Bullock, E., Buza, Cheshire, J., Connors, J., et al
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- **Optical Characterization of the Keck Array and BICEP3 CMB Polarimeters from 2016 to 2019** *JOURNAL OF LOW TEMPERATURE PHYSICS*
  St Germaine, T., Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Bock, J. J., Boenish, H., Bullock, E., Buza, Cheshire, J., Connors, J., et al
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