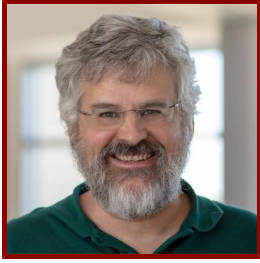


# Stanford

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## Kent Irwin

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

### CONTACT INFORMATION

- **Administrative Contact**

Dana Volponi

**Email** [danav@stanford.edu](mailto:danav@stanford.edu)

### Bio

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#### 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

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### COURSES

#### 2025-26

- Modern Physics: PHYSICS 25 (Spr)

#### 2024-25

- Modern Physics: PHYSICS 25 (Spr)

#### 2023-24

- Modern Physics: PHYSICS 25 (Spr)

#### 2022-23

- Modern Physics: PHYSICS 25 (Spr)

### STANFORD ADVISEES

#### Doctoral Dissertation Reader (AC)

Taj Dyson, Tom Liu, Yuka Nakato

#### Postdoctoral Faculty Sponsor

Alexander Droster, Aya Keller, Maria Simanovskaia

#### Doctoral Dissertation Advisor (AC)

Tori Ankel, Christina Bell, Jason Corbin, Ameya Kunder, Nicholas Rapidis, Jyotirmai Singh, Barkotel Zemenu, Cady van Assendelft

## Publications

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### PUBLICATIONS

- **Description of the Electronic Structure of Oxyhemoglobin Using Fe L-Edge X-ray Absorption Spectroscopy.** *Journal of the American Chemical Society*  
Braun, A., Titus, C. J., Gee, L. B., Baker, M. L., Waters, M. D., Yan, J. J., Lee, S. J., Nordlund, D., Doriese, W. B., O'Neil, G. C., Schmidt, D. R., Swetz, D. S., Ullom, et al  
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- **The X-ray Integral Field Unit at the end of the Athena reformulation phase** *EXPERIMENTAL ASTRONOMY*  
Peille, P., Barret, D., Cucchetti, E., Albuys, V., Piro, L., Simionescu, A., Cappi, M., Bellouard, E., Cenac-Morthe, C., Daniel, C., Pradines, A., Finoguenov, A., Kelley, et al  
2025; 59 (2)
- **Quantum metrology of low-frequency electromagnetic modes with frequency upconverters** *PHYSICAL REVIEW RESEARCH*  
Kuenstner, S. E., van Assendelft, E. C., Chaudhuri, S., Cho, H., Corbin, J., Henderson, S. W., Kadribasic, F., Li, D., Phipps, A., Rapidis, N. M., Simanovskaia, M., Singh, J., Yu, et al  
2025; 7 (1)
- **BICEP/Keck XVIII: Measurement of BICEP3 polarization angles and consequences for constraining cosmic birefringence and inflation** *PHYSICAL REVIEW D*  
Ade, P. R., Ahmed, Z., Amiri, M., Barkats, D., Thakur, R., Bischoff, C. A., Beck, D., Bock, J. J., Boenish, H., Buza, V., Cheshire, J. R., Connors, J., Cornelison, et al  
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- **Analysis of Polarized Dust Emission Using Data from the First Flight of SPIDER** *ASTROPHYSICAL JOURNAL*  
Ade, P. R., Amiri, M., Benton, S. J., Bergman, A. S., Bihary, R., Bock, J. J., Bond, J. R., Bonetti, J. A., Bryan, S. A., Chiang, H. C., Contaldi, C. R., Dore, O., Duivenvoorden, et al  
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- **SPT clusters with DES and HST weak lensing. II. Cosmological constraints from the abundance of massive halos** *PHYSICAL REVIEW D*  
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2024; 110 (8)
- **In-flight performance of Spider's 280-GHz receivers** *JOURNAL OF ASTRONOMICAL TELESCOPES INSTRUMENTS AND SYSTEMS*  
Shaw, E. C., Ade, P. A. R., Akers, S., Amiri, M., Austermann, J., Beall, J., Becker, D. T., Benton, S. J., Bergman, A. S., Bock, J. J., Bond, J. R., Bryan, S. A., Chiang, et al  
2024; 10 (4)
- **First Constraints on the Epoch of Reionization Using the Non-Gaussianity of the Kinematic Sunyaev-Zel'dovich Effect from the South Pole Telescope and Herschel-SPIRE Observations.** *Physical review letters*  
Raghunathan, S., Ade, P. A., Anderson, A. J., Ansarinejad, B., Archipley, M., Austermann, J. E., Balkenhol, L., Beall, J. A., Benabed, K., Bender, A. N., Benson, B. A., Bianchini, F., Bleem, et al  
2024; 133 (12): 121004
- **Results and Limits of Time-Division Multiplexing for the BICEP Array High-Frequency Receivers** *JOURNAL OF LOW TEMPERATURE PHYSICS*  
Fatigoni, S., 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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- **End-to-End Modeling of the TDM Readout System for CMB-S4** *JOURNAL OF LOW TEMPERATURE PHYSICS*  
Goldfinger, D. C., Ahmed, Z., Barron, D. R., Doriese, W. B., Durkin, M., Filippini, J. P., Haller, G., Henderson, S. W., Herbst, R., Hubmayr, J., Irwin, K., Reese, B., Sapozhnikov, et al  
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- **Atacama Cosmology Telescope: High-resolution component-separated maps across one third of the sky** *PHYSICAL REVIEW D*  
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- **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. A. R., Aiola, S., Alford, T., Amiri, M., Amodeo, S., An, R., Atkins, et al  
2024; 962 (2)
- **The Atacama Cosmology Telescope: DR6 Gravitational Lensing Map and Cosmological Parameters** *ASTROPHYSICAL JOURNAL*  
Madhavacheril, M. S., Qu, F. J., Sherwin, B. D., Maccrann, N., Li, Y., Abril-Cabezas, I., Ade, P. A. R., Aiola, S., Alford, T., Amiri, M., Amodeo, S., An, R., Atkins, et al  
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SPIE-INT SOC OPTICAL ENGINEERING.2024
- **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  
2023; 3 (6): 462-474
- **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*  
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  - **BICEP/Keck. XVII. Line-of-sight Distortion Analysis: Estimates of Gravitational Lensing, Anisotropic Cosmic Birefringence, Patchy Reionization, and Systematic Errors** *ASTROPHYSICAL JOURNAL*  
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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*  
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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*  
Hood II, J. C., Simpson, A., McDaniel, A., Foster, A., Ade, P. R., Ajello, M., Anderson, A. J., Ausermann, J. E., Beall, J. A., Bender, A. N., Benson, B. A., Bianchini, F., Bleem, et al  
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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*  
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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  
2023; 94 (1): 014712
  - **Proposal for a definitive search for GUT-scale QCD axions** *PHYSICAL REVIEW D*  
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  - **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., Ausermann, 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*  
Filippini, J. P., Gambrel, A. E., Rahlin, A. S., Young, E. Y., 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  
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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*  
Ade, P. R., Amiri, M., Benton, S. J., Bergman, A. S., Bihary, R., Bock, J. J., Bond, J. R., Bonetti, J. A., Bryan, S. A., Chiang, H. C., Contaldi, C. R., Dore, O., Duivenvoorden, et al  
2022; 927 (2)
- **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*  
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- **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  
2022; 926 (1)
- **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  
2022; 105 (2)
- **Metastable Brominated Nanodiamond Surface Enables Room Temperature and Catalysis-Free Amine Chemistry.** *The journal of physical chemistry letters*  
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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. A. 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  
edited by Zmuidzinas, J., Gao  
SPIE-INT SOC OPTICAL ENGINEERING.2022
- **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  
edited by Zmuidzinas, J., Gao  
SPIE-INT SOC OPTICAL ENGINEERING.2022
- **Thermal Testing for Cryogenic CMB Instrument Optical Design**  
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SPIE-INT SOC OPTICAL ENGINEERING.2022
  - **Optimal Cosmic Microwave Background Lensing Reconstruction and Parameter Estimation with SPTpol Data** *ASTROPHYSICAL JOURNAL*  
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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  
2021; 103 (4)
  - **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  
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- **A demonstration of improved constraints on primordial gravitational waves with delensing** *PHYSICAL REVIEW D*  
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  - **Improved Constraints on Primordial Gravitational Waves using Planck, WMAP, and BICEP/Keck Observations through the 2018 Observing Season.** *Physical review letters*  
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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. A. R., Aiola, S., Alonso, D., Amiri, M., Amodeo, S., Angile, et al  
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  - **SQUIDS and Transition-Edge Sensors** *JOURNAL OF SUPERCONDUCTIVITY AND NOVEL MAGNETISM*  
Irwin, K. D.  
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  - **Searching for anisotropic cosmic birefringence with polarization data from SPTpol** *PHYSICAL REVIEW D*  
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  - **Measurements of B-mode polarization of the cosmic microwave background from 500 square degrees of SPTpol data** *PHYSICAL REVIEW D*  
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