Kenny King LAU

Contact Information

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Education

University of Minnesota, 2015-Present
- PhD candidate, Physics
- Advisor: Prof. Clem Pryke

The Chinese University of Hong Kong, 2011-2013
- MPhil, Physics
- Advisors: Prof. Ming Chung Chu and Dr. Lap Ming Lin

The Chinese University of Hong Kong, 2008-2011
- BSc, Physics
- with Honours, First Class
- Minor: Mathematics

Research Experience

Searching for Inflation Signals with the Bicep/*Keck* Telescopes, *with* BICEP/*Keck Collaboration, 2015-Present*
- Traveled to South Pole to deploy and calibrate receivers of the *Keck Array* and BICEP3 and BICEP Array telescopes.
- Led the BICEP/*Keck* weekly data reduction campaign in 2019-2022.
- Completed the analysis of CMB data from *Keck Array* and BICEP3 2016-2018 observing seasons for the r constraint. The result is published in the "BK18" paper.
- Developing new subsystems, particularly the mount and the cryostat, for BICEP Array.
- Rewriting the analysis pipeline for BICEP Array.
- Leading the "pipeline A" analysis of the BK18+SPT-3G delensing studies.
- Conducting foreground studies for CMB-S4.

Impacts of Neutrino Degeneracies on Cosmic Microwave Background, *with Shek Yeung and Prof. Ming Chung Chu, 2016-2019*
- Investigated the impacts of neutrino degeneracies in CMB data fitting, particularly for the constraint of the Hubble parameter H_0 and the spectral index n_s.

Test Runs & Field Deployment

California Institute of Technology, *Jul 2021-Sep 2021*
- Conducted test runs on the BICEP Array 150 GHz detector modules and receiver.

Amundsen-Scott South Pole Station, Antarctica, *Nov 2019-Feb 2020*
- Demolished the *Keck Array* mount, built the BICEP Array mount, installed the BICEP Array 30/40 GHz receiver and completed the first light CMB map analysis during the entire summer season campaign.

Amundsen-Scott South Pole Station, Antarctica, *Nov 2017-Jan 2018*
- Deployed and calibrated the *Keck Array* 270 GHz receiver.

Awards & Honors

- **Antarctica Service Medal,** *2021*

Publications

- *BICEP/Keck XV: The BICEP3 Cosmic Microwave Background Polarimeter and the First Three-year Data Set*,
  P.A.R. Ade *et al.* (BICEP/*Keck* Collaboration), Astrophys. J. **927**, 77 (2022)
- *BICEP/Keck XIV: Improved constraints on axionlike polarization oscillations in the cosmic microwave background*,
  P.A.R. Ade *et al.* (BICEP/*Keck* Collaboration), Phys. Rev. D **105**, 022006 (2022)
- *BICEP/Keck XIII: Improved Constraints on Primordial Gravitational Waves using Planck, WMAP, and BICEP/Keck Observations through the 2018 Observing Season*,
  P.A.R. Ade *et al.* (BICEP/*Keck* Collaboration), Phys. Rev. Lett. **127**, 151301 (2021)
- *Relic Neutrino Degeneracies and Their Impact On Cosmological Parameters*,
  S. Yeung, K. Lau and M.-C. Chu, JCAP **04**, 024 (2021)
- *BICEP/Keck XII: Constraints on Axion-like Polarization Oscillations in the Cosmic Microwave Background*,
  P.A.R. Ade *et al.* (BICEP/*Keck* Collaboration), Phys. Rev. D **103**, 042002 (2021)
- *A Demonstration of Improved Constraints on Primordial Gravitational Waves with Delensing*,
  P.A.R. Ade *et al.* (BICEP/*Keck* and SPTpol Collaborations), Phys. Rev. D **103**, 022004 (2021)
- *BICEP2/Keck Array XI: Beam Characterization and Temperature-to-Polarization Leakage in the BK15 Data Set*,
  P.A.R. Ade *et al.* (*Keck Array* and BICEP2 Collaborations), Astrophys. J. **884**, 114 (2019)
- *Constraints on Primordial Gravitational Waves Using Planck, WMAP, and New BICEP2/Keck Observations through the 2015 Season*,
  P.A.R. Ade *et al.* (*Keck Array* and BICEP2 Collaborations), Phys. Rev. Lett. **121**, 221301 (2018)

Preprints

- *Snowmass 2021 CMB-S4 White Paper*,
  Kevork Abazajian *et al.*, arXiv:2203.08024 (2022)
- *Snowmass 2021 Cosmic Frontier: Cosmic Microwave Background Measurements White Paper*,
  Clarence L. Chang *et al.*, arXiv:2203.07638 (2022)

Conference Proceedings

- *The Latest Constraints on Inflationary B-modes from the BICEP/Keck Telescopes*,
  King Lau *et al.*, Proceedings of the 56$^{\text{th}}$ Rencontres de Moriond on Cosmology (2022)
- *Receiver development for BICEP Array, a next-generation CMB polarimeter at the South Pole*,
  Lorenzo Moncelsi *et al.*, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy X; 1145314 (2020)
- *Analysis of Temperature-to-Polarization Leakage in BICEP3 and Keck CMB Data from 2016 to 2018*,
  Tyler St. Germaine *et al.*, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy X; 114532E (2020)

- *Polarization calibration of the BICEP3 CMB polarimeter at the South Pole*, James Cornelison *et al.*, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy X; 1145327 (2020)
- *Observing low elevation sky and the CMB Cold Spot with BICEP3 at the South Pole*, Jae Hwan Kang *et al.*, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy IX; 114532D (2020)
- *Design and Performance of the First BICEP Array Receiver*, Alessandro Schillaci *et al.*, J. Low Temp. Phys. (2020)
- *Characterizing the Sensitivity of 40 GHz TES Bolometers for BICEP Array*, Cheng Zhang *et al.*, J. Low Temp. Phys. (2020)
- *Optical Characterization of the Keck Array and BICEP3 CMB Polarimeters from 2016 to 2019*, Tyler St. Germaine *et al.*, J. Low Temp. Phys. (2020)
- *Optical Design and Characterization of 40-GHz Detector and Module for the BICEP Array*, Ahmed Soliman *et al.*, J. Low Temp. Phys. (2020)
- *Microwave multiplexing on the Keck Array*, Ari Cukierman *et al.*, J. Low Temp. Phys. (2020)
- *Measurements of Degree-Scale B-mode Polarization with the BICEP/Keck Experiments at South Pole*, Benjamin Racine *et al.*, Proceedings of the 53$^{\text{rd}}$ Rencontres de Moriond on Cosmology (2018)
- *Design and performance of wide-band corrugated walls for the BICEP Array detector modules at 30/40 GHz*, Ahmed Soliman *et al.*, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy IX; 107082G (2018)
- *Ultra-Thin Large-Aperture Vacuum Windows for Millimeter Wavelengths Receivers*, Denis Barkats *et al.*, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy IX; 107082K (2018)
- *BICEP Array cryostat and mount design*, Michael Crumrine *et al.*, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy IX; 107082D (2018)
- *BICEP Array: a multi-frequency degree-scale CMB polarimeter*, Howard Hui *et al.*, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy IX; 1070807 (2018)
- *2017 upgrade and performance of BICEP3: a 95GHz refracting telescope for degree-scale CMB polarization*, Jae Hwan Kang *et al.*, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy IX; 107082N (2018)

Talks

BICEP/*Keck* Constraints on Primordial Gravitational Waves, CMB-S4 Summer Collaboration Meeting, Chicago, IL, *Aug 17 2022*

Searching for Inflation Signals with the BICEP/*Keck* Telescopes, 240$^{\text{th}}$ AAS Meeting, Pasadena, CA, *Jun 16 2022*

The Latest Constraints on Inflationary B-modes by the BICEP/*Keck* Telescopes, 56$^{\text{th}}$ Rencontres de Moriond on Cosmology, La Thuile, Italy, *Jan 25 2022*

Community Outreach

BICEP Array Telescope Open House, Martin. A. Pomerantz Observatory, *Feb 2, 2020*

- Exhibited the fully operational BICEP Array telescope to support personnel of the Amundsen-Scott South Pole station.

BICEP Array Mount Open House, University of Minnesota, *May 5, 2019*

- Demonstrated the scanning of the BICEP Array receivers on its mount to people of the School of Physics and Astronomy.

Teaching Experience

Teaching Assistant, School of Physics and Astronomy, **University of Minnesota**, 2015-2017

- Phys 1302: Introductory Physics for Science and Engineering II (Spring 2017)
- Phys 1301: Introductory Physics for Science and Engineering I (Fall 2016)
- Phys 1302: Introductory Physics for Science and Engineering II (Spring 2016)
- Phys 1101: Introductory College Physics I (Fall 2015)

Teaching Assistant, Physics Department, **The Chinese University of Hong Kong**, 2011-2013

- PHYS 3202: Quantum Physics II (Spring 2013)
- PHYS 3011: Mechanics (Fall 2012)
- PHYS 3202: Quantum Physics II (Spring 2012)
- PHYS 2811: Physics Laboratory I (Fall 2011)

Languages

- Native proficiency in Cantonese
- Native proficiency in written Chinese
- Full professional proficiency in English

Programming Languages

Python, MATLAB, HTML, JavaScript, FORTRAN, LaTeX