Kenny King LAU

Contact Information

Physics and Nanotechnology Building,
115 Union St SE, Minneapolis, MN 55455
Email: kennylau@umn.edu
Phone: 612-625-1802
Website: kennykinglau.github.io

Education

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

The Chinese University of Hong Kong, 2011-2013
- MPhil, Physics
- Advisers: 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*
- Travel to South Pole to deploy and calibrate receivers of the *Keck Array* and BICEP3 and BICEP Array telescopes.
- Lead the BICEP/*Keck* weekly data reduction campaign in 2019-2022.
- Lead 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.
- Involve in the development of the new telescope BICEP Array, particularly for the mount and the cryostat.
- Lead the pipeline construction of BICEP Array.
- Lead the "pipeline A" analysis of the BK18+SPT-3G delensing studies.

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

Test Runs & Field Deployment

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

Amundsen-Scott South Pole Station, Antarctica, *Nov 2019-Feb 2020*
- Disassemble the *Keck Array* mount, build the BICEP Array mount and deploy the BICEP Array 30/40 GHz receiver during the entire summer season campaign.

Amundsen-Scott South Pole Station, Antarctica, *Nov 2017-Jan 2018*
- Deploy 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*

- Exhibition of the fully operational BICEP Array telescope, opened to members of the Amundsen-Scott South Pole station.

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

- Demonstration of the scanning of the BICEP Array receivers on its mount, opened to members 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