Stanford

Zeeshan Ahmed

Associate Professor of Particle Physics and Astrophysics

Bio

BIO

I am an observational cosmologist, and an experimental physicist. I build ultra-low-noise detectors using superconducting and quantum sensing techniques, and use them in experiments and instrumentation for cosmology. I currently spend most of my time investigating the inflation paradigm of standard cosmology, using the cosmic microwave background (CMB). Recently, I've become interested in using the weak lensing of the CMB in conjunction with galaxy surveys to study the growth of large-scale structure in the universe.

I received my PhD in particle astrophysics from Caltech in 2012, working on direct detection of WIMP dark matter with the CDMS-II experiment. I then shifted my effort to searching for inflation with the CMB. I was a postdoctoral scholar at Stanford through 2015 before being appointed as a Wolfgang Panofsky Fellow at SLAC National Accelerator Laboratory. In 2017, I won a DOE Office of Science Early Career Award to work on new signal transduction and superconducting multiplexing techniques for next-generation CMB cameras. In 2020, I was appointed as a Lead Scientist at SLAC, and in 2023, I was appointed Associate Professor of Particle Physics and Astrophysics at Stanford and SLAC. I serve as CMB department head in the Fundamental Physics Directorate at SLAC. I also serve as scientific project manager for the bring up of SLAC's Detector Microfabrication Facility for the development of superconducting and quantum sensors and devices.

ACADEMIC APPOINTMENTS

- Associate Professor, Particle Physics and Astrophysics

LINKS

- Research website: https://slac.stanford.edu/~zeesh

Publications

PUBLICATIONS

- **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

- **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)

- **Advanced RFSoC readout for space-based superconducting sensor arrays**

  Henderson, S. W., Ahmed, Z., D'Ewart, J. M., Frisch, J. C., Herbst, R., Liu, C., Ma, L., Ruckman, L., Van Winkle, D. D., Yu, C., Zmuidzinas, J., Gao

SPIE-INT SOC OPTICAL ENGINEERING.2022

- **A simulation suite for readout with SMuRF tone-tracking electronics**
  Yu, C., Ahmed, Z., D'Ewart, J. M., Frisch, J. C., Henderson, S. W., Silva-Feaver, M., Zmuidzinas, J., Gao
  SPIE-INT SOC OPTICAL ENGINEERING.2022

- **Phase Drift Monitoring for Tone Tracking Readout of Superconducting Microwave Resonators**
  Silva-Feaver, M., Ahmed, Z., Arnold, K. S., Frisch, J. C., Groh, J., Henderson, S. W., Vasquez, J., Yu, C., Zmuidzinas, J., Gao
  SPIE-INT SOC OPTICAL ENGINEERING.2022

- **The Simons Observatory Microwave SQUID Multiplexing Detector Module Design** *ASTROPHYSICAL JOURNAL*
  McCarrick, H., Healy, E., Ahmed, Z., Arnold, K., Atkins, Z., Austermann, J. E., Bhandarkar, T., Beall, J. A., Bruno, S., Choi, S. K., Connors, J., Cothard, N. F., Crowley, et al
  2021; 922 (1)

- **The Simons Observatory: science goals and forecasts** *JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS*
  Ade, P., Aguirre, J., Ahmed, Z., Aiola, S., Ali, A., Alonso, D., Alvarez, M. A., Arnold, K., Ashton, P., Austermann, J., Awan, H., Baccigalupi, C., Baildon, et al
  2019

- **Next-generation small CMB telescopes**
  Thompson, K. L., Kuo, C., Yoon, K., Ahmed, Z., Marshall, H. K., Spyromilio, J.
  SPIE-INT SOC OPTICAL ENGINEERING.2018

- **Highly-multiplexed microwave SQUID readout using the SLAC Microresonator Radio Frequency (SMuRF) Electronics for Future CMB and Sub-millimeter Surveys**
  Henderson, S. W., Ahmed, Z., Austermann, J., Becker, D., Bennett, D. A., Brown, D., Chaudhuri, S., Cho, H., D'Ewart, J. M., Dober, B., Duff, S. M., Dusatko, J. E., Fatigoni, et al
  SPIE-INT SOC OPTICAL ENGINEERING.2018