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Twenty Years of Microwave Kinetic Inductance Detectors: A Technical Review

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Microwave Kinetic Inductance Detectors (MKIDs) were invented in 1999 at Caltech and JPL with the promise of both high detector sensitivity and an easy solution to scale into large arrays. Over 20 years of significant development, MKIDs have fulfilled this promise with their sensitivity approaching the fundamental limit and the pixel count reaching 10^5 . The technical maturity of MKIDs have brought them broad applications in astronomical instruments from mm-wave, IR/visible to X-ray for ground-based, sub-orbital and space missions, as well as non-astronomical applications such as dark matter search and quantum information science. In this talk, I will review the technical progress in the understanding of device physics, the techniques invented for improving the sensitivity, the implementation of various optical coupling schemes, the study of materials, and the development of fabrication process for large arrays, made over the past 20 years.

Less than 5 years of experience since completion of Ph.D

N

Student (Ph.D., M.Sc. or B.Sc.)

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