Contribution ID: **356** Type: **Oral Presentation**

Optical performance of the antenna-coupled lumped-element kinetic inductance detector

Monday, 22 July 2019 15:25 (15 minutes)

The kinetic inductance detector (KID) offers an elegant and convenient solution to building large-format arrays operating at mm-wavelengths. Scaling alternative technology to the large detector counts required for future experiments requires auxiliary multiplexing components that can significantly increase the complexity and cost. Arrays of KIDs require no additional cryogenic multiplexing hardware, only needing a single commercially available low-noise amplifier. A number of experiments are set to serve as the first major demonstrations of KID technology. Of these, the KID design is based on direct free-space absorbing lumped-element KIDs. While effective for single-colour observations, these designs are not directly compatible with the multi-colour on-chip transmission line filtering techniques that have been shown to offer improved focal plane efficiency for wide-band imaging applications. In this presentation we will discuss the recent developments and performance of the antenna-coupled lumped-element KID; a simple KID implementation that permits efficient radiation coupling through a mm-wave microstrip feed. We discuss progress on the design and characterisation of our first prototype lens-coupled twin-slot antenna arrays. We will present results from recent lab-based full optical characterisation and discuss improvements for subsequent design iterations. We will also present preliminary designs and performance of a horn-coupled variant that offers wider bandwidth, reduced parasitic loading, and improved beam systematics. We will present results of initial measurements, and details of our current efforts toward scaling to a full wafer-scale demonstration array operating at 280 GHz.

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

Y

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

N

Primary author: Dr BARRY, Pete (Argonne National Laboratory)

Co-authors: HORNSBY, Amber (Cardiff University); BENDER, Amy (Argonne National Laboratory); Dr CHANG, Clarence (High Energy Physics Division, Argonne National Laboratory); SHIROKOFF, Erik (University of Chicago); WANG, Gensheng (ANL); KARKARE, Kirit (University of Chicago); TANG, Qing Yang (University of Chicago); Dr DOYLE, Simon (Cardiff University); KUHLMANN, Stephen (Argonne National Laboratory); Dr PADIN, Stephen (High Energy Physics Division); Dr CECIL, Thomas W. (Argonne National Laboratory); Dr NOVOSAD, Valentine (Materials Science Division,Physics Division, Argonne National Laboratory); YEFREMENKO, Volodymyr

Presenter: Dr BARRY, Pete (Argonne National Laboratory)

Session Classification: Orals LM 001

Track Classification: Low Temperature Detector Development and Physics