Supplementary Materials for "Cryogenic LED pixel-to-frequency mapper for kinetic inductance detector arrays"

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Wiring scheme of the 126-LED MKID wafer mapper

We divide the LED hexagonal array into two halves (not symmetric). LEDs in one half are grouped into 9 rows and 7 columns. Therefore we have $9 \times 7 = 63$ available positions in total to hold LEDs which requires a total of $9 + 7 = 16$ wires going from room temperature to the PCB mounted on the cold stage. Taking advantage of the LED polarity, we reuse the 16 wires to bias the LEDs in the other half with opposite bias polarity. This effectively doubles the number of LEDs that can be individually addressed, to a total of 126 LEDs. The center position is left unconnected in this scheme.

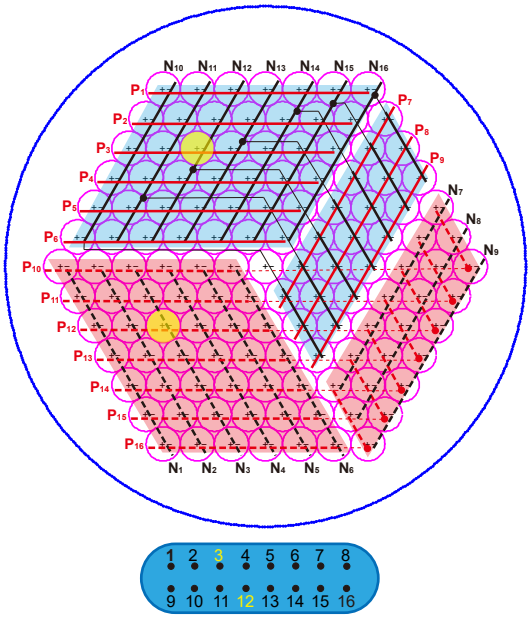

FIG. S1: The wiring scheme of our PCB. The pink circles represent the LEDs. The whole LED array is divided into two regions: red shaded region and blue shaded region. Address lines going to the blue and red regions are indicated by solid and dashed lines, respectively. The wires labled as P_i, N_i connect to the pin numbered with i ($i = 1, 2, 3, \cdots, 16$) on the connector. In particular, the red address lines (P_i) are positive bias wires connecting to the "+" poles of the LEDs while the black lines (N_i) are negative bias wires connecting to the "-" poles. For instance, if we want the yellow LED (in the blue shaded region) to shine, we need to apply a bias voltage/current through two wires: P_3 and N_{12}. By switching bias polarity of pin 3 and pin 12, we can illuminate the yellow LED (in the red shaded region) through wires N_3 and P_{12}.