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Development of a low noise highly pixelated electrode array for high energy physics

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We have developed a highly pixelated electrode array named Topmetal-II-. It contains a 72×72 pixel array of $83.2 \mu\text{m}$ pitch size. The key feature of TopMetal-II- is that it can directly collect charge via metal nodes of each pixel to form two-dimensional images of charge cloud distribution. Topmetal-II- sensor is designed with a low power consumption of 104 mW and low ENC value of 30 e-. From our measurement by injecting pulse signal into the top metal of each pixel, we got the ENC value of 13 e-, which is even better than the design value. Furthermore, the noise distribution of the sensor is almost uniform among pixel matrix. With such a low noise, we can measure charge particle track without any gas amplification, achieving high energy and spatial resolution. Thus making Topmetal-II- a competitive candidate for next generation of TPC readout node in high energy physics.

On behalf of collaboration:

NONE

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