

## Latest results from development of n<sup>+</sup>-in-p planar pixel sensors and LGAD devices by KEK/HPK

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In this report, we present two topics: one is on the n<sup>+</sup>-in-p planar pixels sensors with 50x50 or 25x100  $\mu\text{m}^2$  pixels, and the other on the first trial of low-gain avalanche device (LGAD). The 50x50 or 25x100  $\mu\text{m}^2$  pixels are laid out in a pattern of (50x50 or 25x100) + 50x450  $\mu\text{m}^2$  pixels for the 2x (50x250)  $\mu\text{m}^2$  pixels of the FE-I4 ASIC. A number of patterns of biasing networks, including without, are implemented. The bias resistor with Polysilicon is made into a shape of vortex in an area of 50x50  $\mu\text{m}^2$ . These pixel sensors were flip-chipped and were gone through irradiation with protons of a fluence of  $3 \times 10^{15}$  neq/cm<sup>2</sup> and test beams at CERN. The detection efficiency for the passing charged particles are evaluated and reported. LGAD devices (diodes and miniature strip sensors) were fabricated. The LGAD diodes were gone through the irradiation of gammas or neutrons. The responses were measured with LED lights. The first results are presented.

Work done by ATLAS-Japan Silicon Collaboration.

### TRACK

Planar Sensors

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