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The study of calibration process for the hybrid pixel array detector of HEPS-BPIX

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The calibration process for the hybrid array pixel detector designed for High Energy Photon Source in China, we called HEPS-BPIX, is presented in this paper. Based on the S-curve scanning, the relationship between the energy and threshold is quantified. For the threshold trimming, the precise algorithm and fast algorithm are proposed to study the performance of the threshold DACs which will be applied to the pixel. The fast algorithm could get the applicable threshold distribution for a silicon pixel module and take a shorter time, while the precise algorithm could get better threshold distribution, but time consuming. The ENC and threshold spread of the precise algorithm is better than the fast algorithm. The threshold spread has been reduced from 26.924mV without algorithm to 3.991mV with the precise algorithm, while it's 4.659mV with fast algorithm. The temperature dependence of the silicon pixel module is also studied. With the increasing of temperature, the equivalent noise threshold and the noise pixel increased. And the minimum detection energy can be reduced 1keV with a lower temperature. The calibrated silicon pixel module has been already applied to the X-ray diffraction.

Minioral

Yes

IEEE Member

No

Are you a student?

Yes

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