A Calibration Algorithm to Solve the Pixel's Inconsistency for the Imaging of the HEPS

1. INTRODUCTION

HEPS is a readout electronics system based on the BPIX pixel array detector readout chip. The prototype of the detector consists of 16 sensor modules. In order to correctly function of the pixel detector, the readout system needs to calibrate the configuration of the BPIX readout factors such as the process non-uniformity. The thresholds of the pixels are not completely calibrated to make the inconsistent thresholds reach a corresponding level. The on-chip pixel detector configure the threshold of one pixel and the latter is caused and appears during detecting the synchrotron.

Fig. 1. HEPS-BPIX readout electronics system and one of its sensor module

2. IMPLEMENTATION

If the pixel has an inappropriate noise and dark noise in the imaging, the former is caused and appears during detecting the synchrotron.

Fig. 3. The imaging with the bright noise and dark noise before the Inconsistent Calibration

Based on the calibration, the thresholds of the input noise points are set separately according to the measured S-curve. After excluding the inappropriate threshold, the threshold for the bright noise, the threshold for the dark noise which can reach full count with the measured 60mV for the dark noise.

Fig. 5. The imaging without the dark noise after the inconsistent calibration

3. RESULTS

(1) The mean S-curve spread and the threshold distribution of the input pixel detector is measured.

Fig. 4. The Source and threshold distribution after the inconsistent calibration

(2) Both the bright and dark noise is set separately according to the measured S-curve. After excluding the inappropriate threshold, the threshold for the bright noise, the threshold for the dark noise which can reach full count with the measured 60mV for the dark noise.