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Optimization of spectroscopic response of Timepix detector

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The so called Time over Threshold mode of the semiconductor pixel detector Timepix allows direct measurement of the deposited energy in each pixel. The Timepix is thus well suited for measurements where the precise position and energetic information are required. The Time over Threshold measurements requires energetic calibration of each pixel. The energetic calibration procedure of the pixels for a given threshold value is well known and published. The wide dynamic range (in energy from keV to MeV) which can be registered in each pixel in different applications puts high demands on the preamplifiers and analog circuits of the detector chip. The preamplifier and analog circuit characteristic of the Timepix are controlled and can be adjusted by a set of detector parameters. This systematic response of the detector with respect to the large number of parameters was not properly studied before. In this contribution we presents the optimalization of the spectroscopic performance of Timepix detector by finding the best settings of detector parameters with respect to very different application areas, such as X-ray imaging, X-ray fluorescence or heavy ion measurements, respectively.

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