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## **The compact Timepix2 based radiation detector for radiation tracking and imaging in space and industry**

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The new miniaturized particle tracking and imaging detector MiniPIX TPX2 has been developed as a new member of a very versatile MiniPIX family. It uses the Timepix2 CMOS ASIC developed by CERN based Medipix2 collaboration. The Timepix2 read-out chip can be combined with various types of pixelized semiconductor sensors with matrix of 256 x 256 square pixels with pitch of 55  $\mu\text{m}$ .

The previous versions of MiniPIX detector with Timepix and Timepix3 chips are widely used in various applications: space radiation monitors (eight pieces running on board of ISS), electron microscopy, X-ray diffraction, X-ray radiography, science and education of physics (many secondary schools), gamma and Compton cameras etc. The compactness of these devices as well as its performance and versatility play a key role for their broad applicability.

The new device with Timepix2 chip has these main features: configuration with positive and negative semiconductor sensors (Si, CdTe, CZT, GaAs), single energy threshold, four multipurpose digital counters per pixel, many modes of operation including particle counting, per-pixel energy and time measurement, continuous read/write of frames. The MiniPIX TPX2 detector is connected to the controlling computer via micro USB2.0 connector enabling transfer speeds of about 100 frames per second. The whole device is vacuum compatible and eligible for space applications (same construction as MiniPIX TPX3).

In this contribution the evaluation of the detector properties will be presented. The energy resolution of about 1.4 keV (at 60 keV), minimal threshold of 2.5 keV and excellent imaging stability are the highlights (all of them routinely and relatedly reached with 300  $\mu\text{m}$  thick Si sensors of either polarity). Especially the outstanding device stability allows for reaching the exceptional signal-to-noise-ratio of 2000 or even more. The examples of detector performance in several practical applications will be shown as well.

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