ID de Contribution: **39** Type: **Contributed talk**

A hybrid photodetector using the TIMEPIX pixel semiconductor for photoelectron detection

mercredi 23 avril 2008 12:00 (30 minutes)

A new concept of a hybrid photodetector is presented. It consists of a standard photocathode combined with the TIMEPIX semiconductor detector. The photoelectron is accelerated in a field of 10 to 20 keV to the silicon sensor of the TIMEPIX. The photoelectron generates electron-hole pairs in the silicon which are directed to the pixel electronics of the TIMEPIX ASIC. This charge signal is compared to a threshold and accordingly starts the counting of clock pulses until the end of a frame time. The TIMEPIX contains 65000 parallel working pixels of 55 microns pixel pitch. This hybrid photodetector enables the time measurements of each single photoelectron and gives a direct digital output of this information.

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Classification de Session: Parallel session on Photodetection

Classification de thématique: Parallel Session on Photodetection