

# Single-photon imaging detector based on MCP with integrated CMOS pixelated anode

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We present the development of a single-photon detector based on a vacuum tube equipped with transmission photocathode, microchannel plate and a CMOS pixelated active read-out anode. The Timepix4 ASIC, developed by the Medipix4 Collaboration, is used as anode, and consists in an array of 512x448 pixels, 55 $\mu$ m x 55 $\mu$ m each. The ASIC features 70e<sup>-</sup> equivalent noise charge, a maximum rate of 2.5Ghits/s, and allows time-stamping with a resolution better than 100ps. The very low noise of the electronics allows to operate the MCP at low gain, leading to a longer detector lifetime. An ASIC encapsulated inside the vacuum tube allows for on-detector signal processing and digitization with a very-high channel density (about 230 thousand channels) reducing the number of external interconnections (about 200). The detector uses a data-driven architecture and produces up to 160 Gb/s data that will be handled by a high-throughput FPGA-based external electronics with flexible design.

## Requested length

10 minutes

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