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100µPET: an ultra-high-resolution silicon-pixel-based PET scanner

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The 100µPET project is developing a pre-clinical medical scanner for positron-emission tomography (PET) with ultra-high-resolution molecular imaging capabilities. The scanner is composed of multiple layers of monolithic active pixel sensors (MAPS) connected to flexible printed circuits (FPC). With pixels of 150 µm pitch and a thickness of 280 µm + 300 µm (MAPS + FPC), the scanner achieves unprecedented volumetric spatial resolution of 0.02 mm^3, one order of magnitude better than the best current PET scanners, and offers uniform resolution along the scanner's field-of-view (parallax free). The MAPS and its design features will be presented, along with the pixel read-out architecture. The construction and quality control of the scanner and its multiple detection modules, prototyped with pre-production chips and FPCs, will be showcased, and the latest imaging reconstruction with simulated high-definition mouse phantoms will be presented.

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