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R&D status of SOI based pixel detector with 3D stacking readout

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We have been developing pixel detectors based on the silicon-on-insulator (SOI) technology for the particle tracking. SOI sensor technology provides ideal monolithic pixel detector thanks of fully-depleted sensor wafer integrated with high performance CMOS readout circuit. The "Sofist1" pixel sensor with 20μm$\times 20\mu$m pixel size has been tested successfully. One remaining issue is to improve the read out circuit tolerable for the high-luminosity collider environment. Recently, we introduced a new 3D stacking method to the SOI sensor, Sofist4, where a comparator and 3-stage charge and time memory cells are integrated in individual 25μm$\times 25\mu$m pixel. In this presentation, the design and expected performance as well as the future plans will be presented.

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