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Prospects for 3D integration in future pixel detectors and readout chips

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3D integration technologies have generated a wide interest in the pixel sensors and front-end electronics communities. They have the potential to lead to the fabrication of multilayer high performance devices with no dead area, where each layer is optimized for its function (particle sensing, analog signal amplification and filtering, digital memory and readout, silicon photonics,..). Recent developments associated with industrial and scientific applications of CMOS image sensors have reinvigorated the interest of the community, showing the potential of advanced interconnection technologies in the design of high performance detectors. This paper will review the experience that the high energy physics community gained so far, and assess the current status of R&D work on 3D integration applied to particle detection systems. Finally, the prospects of 3D integration for the future generation of pixel detectors (either hybrid or monolithic) will be discussed, along with the critical features of the technology in view of different applications.

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