Contribution ID: **53** Type: **Oral Presentation**

3D digital SiPM development for large area photodetectors

Tuesday, 11 December 2018 11:30 (30 minutes)

Over the last years, we have worked on the concept of 3D digital SiPM and demonstrated critical steps towards there realization from CMOS design to fabrication process. We will review the main building blocks of the 3D digital SiPM, the development we have led and the forecasted and needed R&D. This will include CMOS design for arrays of ultra-low single photon timing resolution time-to-digital converter for time-of-flight experiments and for low power large area photodetector for noble liquid low background experiments (liquid xenon and argon).
We will make the case that 3D digital SiPM has the potential to have superior performance over the 2D digital SiPM and its analog counterpart. We will discuss how this next generation detector can be disruptive in the field of radiation instrumentation and how it opens the door to new sciences.

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Session Classification: Parallel Session: Photodetectors

Track Classification: Photodetectors