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Observing light-in-flight and MIPs with a 7.5-ps resolution

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Single-photon avalanche diodes (SPADs), also known as Geiger-mode APDs, have emerged as the detector of choice in many photon-counting and high-performance imaging applications. Recently, CMOS-compatible SPADs and SPAD image sensors have reached unprecedented counting-rate ($> 1\text{Gcps}$) and timing-resolution ($< 7.5\text{ps}$ FWHM) capability, while demonstrating high sensitivity to photons in the 400-nm to 950-nm and also to minimum ionizing particles (MIPs), such as 80 GeV/c momentum pions.

CMOS SPADs are scalable and thus suitable for large-format image sensors, where massively-parallel, complex functionality is sought, thanks to their digital nature and low power consumption. In this talk we will look at existing and new applications in many fields of science and engineering, often pushing performance to new heights.

Primary author: CHARBON, Edoardo (EPFL)

Presenter: CHARBON, Edoardo (EPFL)

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