

GFA & SwissFEL Accelerator Seminar

Sensing Photons in Coincidence: Digital Silicon Photomultipliers for Medical Imaging and HEP

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Until recently, photomultiplier tubes have been the detector of choice for sensing low photon emission in many scientific applications. The rise of silicon photomultiplier technology has changed the *status quo* creating a true revolution in single-photon sensing and time-resolved imaging. While analog silicon photomultipliers (a-SiPMs) have appeared first and are still dominating the scene, digital silicon photomultipliers (d-SiPMs) are making headways in many scientific disciplines due to their different approach to photon detection. However, doubts still exist on the real advantages of d-SiPMs.

In this talk I will address what we believe to be the true advantages of d-SiPMs in the context of specific applications, such as time-of-flight positron emission tomography (PET), time-resolved Raman spectroscopy and time-resolved X ray imaging. I will discuss the emergence of deep-submicron CMOS single-photon avalanche diodes, and how they can enable the design of better d-SiPMs. Time-of-arrival single-photon detection can now be implemented on chip or even on-pixel, thus the dream of a completely standalone d-SiPM on a pinhead is getting near.

