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Basics: avalanching theory, SPAD fundamentals, analog vs. digital SiPMs, readout architectures

Wednesday 22 May 2013 09:00 (1h 30m)

Advanced manufacturing technologies for modern image sensors have advanced to the point where uncooled single-photon image can be considered a consumer product. Single-photon imaging brings its own challenges, and has developed a number of niche applications, but the nature of building detectors at these extreme performance levels means performance developments that can filter down through more mainstream sensor technologies and applications.

This lecture has two segments: the first is devoted to avalanche theory, SPAD fundamentals, and silicon photomultipliers (SiPMs), both analog and digital; the second is focusing on timing estimation and processing in multi-channel digital SiPMs, including a discussion of the expected and measured statistical behavior of the device and its application in many fields of science and medical imaging.

Brief biography of the speaker

Edoardo Charbon (SM'10) received the Diploma from ETH Zurich in 1988, the M.S. degree from UCSD in 1991, and the Ph.D. degree from UC-Berkeley in 1995, all in Electrical Engineering and EECS. In 2000, he joined Canesta Inc. as its Chief Architect, leading the development of wireless 3-D CMOS image sensors. Canesta was sold to Microsoft in 2010. Since November 2002, he has been a member of the Faculty of EPFL in Lausanne, Switzerland, working in the field of CMOS sensors, biophotonics, and ultra low-power wireless embedded systems. In Fall 2008 he has joined the Faculty of TU Delft, as full professor in VLSI design, succeeding Patrick Dewilde. His current research includes medical and space based image sensing, single-photon technology, and picosecond electronics.

Presenter: CHARBON, Edoardo (TU Delft)

Session Classification: Silicon Photomultipliers and Applications (1st Module)