

## **The silicon photo-multiplier physics and technology: a review**

*Wednesday, June 13, 2012 10:30 AM (45 minutes)*

The physics of the device, the main technological issues and the related solutions adopted by the various manufacturers together with the most recent advances and open issues will be discussed.

The device working principles will be covered in detail, by focusing on the phenomena related to avalanches development and to carrier generation and transport in silicon, which are relevant to explain the device intrinsic characteristics like gain, dark noise, after-pulsing, cross-talk, photo-detection efficiency and timing properties.

The most relevant characterization measurements related to various types of SiPM devices will be summarized, by focusing on the understanding of the device properties under the influence of various environmental factors (eg. low temperature performances, radiation hardness, light intensity regime etc...)

Relationships (in terms of the underlying physics) among the above mentioned intrinsic characteristics will be shown and the resultant tradeoffs (eg timing vs detection efficiency) in actual devices will be discussed. The impact on front-end electronics and on selected application performances will be briefly covered. Finally, possible improvements and future trends will be illustrated and eventually suggested.

**Primary author:** Dr COLLAZUOL, Gianmaria (Dipartimento di Fisica e Astronomia, Universita' di Padova, Italy)

**Presenter:** Dr COLLAZUOL, Gianmaria (Dipartimento di Fisica e Astronomia, Universita' di Padova, Italy)