Contribution ID: **620** Type: **Invited Speaker / Conférencier invité**

Evaluation of SiPM Arrays and Use for Radioactivity Detection and Monitoring

Monday 15 June 2015 13:45 (30 minutes)

Silicon photomultipliers (SiPMs) are novel photo sensorss that are needed for many applications in a broad range of
fields. The advantages of such detectors are that they feature low bias
(<100V) operation, high gain (10^5 to 10^6), insensitivity to magnetic fields, excellent photon detection efficiency (PDE), and the ability to operate in field conditions over a range of temperatures; they are compact, easy to use, require simple electronics and can be produced commercially in various formats.
To evaluate and operate SiPM Arrays, we developed novel techniques
of measurement of the PDE, the cross-talk probability and the breakdown voltage for the SiPM-arrays with summed
output, which is most popular type of SiPMs on the market; these techniques allow one to make the required measurements when the separation of individual photopeaks in the output spectrum (that was crucial for the "conventional" techniques used before) is not available.
I will also present our study of prototypes of gross counting gamma and neutron detectors for first responders that use SiPMs coupled to appropriate scintillators.

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Session Classification: M1-5 Nuclear Techniques in Medicine and Safety (DNP-DIAP) / Techniques nucléaires en médecine et en sécurité (DPN-DPIA)

Track Classification: Nuclear Physics / Physique nucléaire (DNP-DPN)