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Electric Fields in the SiPM Active Volume by Volt-Farad Characteristics Analysis

The aim of this study is to understand a changing of SiPM structure after irradiation. We compared profile of electric field in SiPM (KETEK) active region for ten not-irradiated and irradiated detectors. Standard method of measurement of C-V characteristics was applied using two configurations (serial and parallel circuit) to exclude an influence of the serial resistance. Dependencies of capacitance on frequency was studied in range from 10 to 1000 KHz. For non irradiated detectors we detected in CV characteristics local instability basically connected with accumulation of charge on boundary optical isolator-silicon. Also hysteresis of C-V characteristics was detected. For irradiated detectors also local instability was visible, but hysteresis of C-V characteristics was not detected. The results demonstrate that applied method can be used for relative analysis how SiPM active region properties changed after irradiation.

Primary author: Dr KUSHPIL, Vassily (NPI of ASCR)

Co-authors: Dr KUGLER, Andrej (Nuclear Physics Institute CAS); Dr KUSHPIL, Svetlana (NPI of ASCR)

Presenter: Dr KUSHPIL, Vassily (NPI of ASCR)

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