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Hunting for the ghost signals in Ti-LGADs

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We present the continuation of our research on IP signals in Ti-LGAD (Wafer 11). Our experimental examination on Ti-LGAD, from the wafer 11, revealed exceptionally high signals within the IP region, which was significantly higher than the signals measured in previously conducted experiments [1] on the segmented LGAD sample with two p-stops and a bias ring in the center of the IP region with the IPD=49 microns (from the same wafer: W11).

This time we show results from our extended research on larger pool of Ti-LGAD prototypes: from wafers W16 and W7. All sensors have 2 trenches in IP region, but the depths of trenches are different.

Tree types of signal in IP region: "expected" and "strong", both induced by laser, and a few types of ghosts (wafer type correlated) are discussed. Special attention is given to the study of the rate of ghosts occurrences in all three samples from three different wafers. We studied also the occurrence rate ratio between the "strong" IP and the "normal" IP signal in pulse to pulse analysis in 10 000 single shot run experiment. Results are discussed.

[1] Gordana Laštovička-Medin, Mateusz Rebarz, Jovana Doknic, Ivona Bozovic, Gregor Kramberger, Tomáš Laštovička, and Jakob Andreasson. "Exploring the Interpad Gap Region in Ultra-Fast Silicon Detectors: Insights into Isolation Structure and Electric Field Effects on Charge Multiplication." Sensors 23, no. 15 (2023): 6746.

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