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P84 - IBIC mapping of anomalous polarity pulses in a multi-electrode diamond detector

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In multi-electrode detectors, the evolution of charge carrier densities generated by ionizing radiation induces a charge at all the surrounding electrodes. As the intensity and the polarity of the charge pulses depend on the geometrical, electrostatic and carrier transport properties of the device, the occurring of charge sharing effects may lead to bipolar currents and anomalous polarity pulses affecting the response of the device to ionizing radiation.
In this work, we report on the investigation in the formation of anomalous polarity pulses in a multi-electrode diamond detector with buried graphitic electrodes fabricated by a 2 MeV He microbeam.
The detector was investigated by the Ion Beam Induced Charge (IBIC) microscopy, using a 4 MeV He beam. The IBIC signals were recorded with both polarity configurations; the acquired charge collection efficiency maps evidenced the height and the position of ion incidence associated with the occurring of anomalous polarity pulses [1].
The experiment was interpreted according to a purely electrostatic model based on the Shockley-Ramo-Gunn theory [1], suitable for a general application in multi-electrode devices and detectors, providing a deeper insight in charge sharing phenomena and in the description of the observed anomalous polarity pulses.

[1] J. Forneris et al., "Measurement and modelling of anomalous polarity pulses in a multi-electrode diamond detector" EPL, 104 (2013) 28005

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