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The edge transient-current technique (E-TCT) with high energy hadron beam

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We propose a novel method to investigate the properties of silicon and CVD diamond detectors for High Energy Physics experiments. The method is similar to the already well established E-TCT technique using laser beam. In the proposed method the beam of high energy hadrons (MIPs) is used instead of laser beam. MIPs incident on the detector in the direction parallel to the readout electrode plane and perpendicular to the edge of the detector. Such experiment could prove very useful to study CVD diamond detectors which are almost inaccessible for the E-TCT measurements with laser due to large band-gap as well as to verify and complement the E-TCT measurements of silicon.

In our current setup the DUT is connected to a Particulars high bandwidth current amplifier and recorded by a PSI developed DRS oscilloscope. The readout is triggered by a passage of the MIP through 2 scinitllators coupled to PMTs. The trajectory of each MIP is accurately measured by a reference telescope so the waveforms can be associated with track that released charge at known depth of the DUT. Since the MIP is traversing the detector parallel to the electrodes it releases by an order of magnitude larger charge then in the normal incidence therefore providing large signals. Noise can be further suppressed by averaging waveforms associated to tracks traversing the selected part of the DUT.

The method proposed is being tested at CERN in a beam of 120GeV hadrons using a Kartel telescope based on Mimosa 26 sensors with track resolution at the DUT of few μm. MIPs passing trough 6 planes of the reference telescope with the DUT detector in the middle are triggered by 2 scintillators. The preliminary results of the measurements will be presented.

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