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# Diamond detectors response to intense high-energy electron pulses

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Diamond crystals are characterised by wide band gap and high binding energy, making them suitable as solid-state particle detectors, beam-loss monitors and dosimeters in high-radiation environments, such as particle colliders. In order to use them as radiation and beam-loss monitors, our diamond detectors are calibrated in steady conditions with different radiation sources, comparing the measurement results with dedicated simulations. However large radiation bursts may lead to a non-linear signal response. For this purpose we studied their transient response to collimated, sub-picosecond, ~ 1 GeV electron beam bunches, with a bunch charge of tens of pC, provided by the FERMI electron linac in Trieste. In these experimental conditions the ionisation generates large charge carrier density in the diamond bulk. This high charge causes a transient modification of diamond electrical properties, which affects the output signal shape. The observed signal evolution in the time domain shows fair agreement with a two-step numerical simulation of the diamond time response to these intense high-energy pulses.

## Footnotes

## Funding Agency

## I have read and accept the Privacy Policy Statement

Yes

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