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Emulation of neutron induced signals in detectors using lasers

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Neutrons interacting in silicon detectors generate ionization signals due to nuclear reactions. Nuclear ejectiles are typically ions and alpha particles that are absorbed in the detector volume, depositing all their energy. Lasers focused into the detectors can also generate similar ionization signals. Here we present a cross-calibration of neutron and pulsed laser signals from detectors. The detectors used are commercial Silicon photodiodes, easily accessible. The neutron irradiation was made in the n_TOF facility at CERN. The n_TOF neutron beam has a wide energy fast spectrum so we could record signals generated by high neutron energy nuclear reactions in silicon. In an associated laser laboratory we reproduce the same signals with pulsed lasers (1040 and 1500 nm). The result is a determination of the laser pulse energy needed to emulate the signals generated by high energy neutrons interaction in the silicon detector bulk.

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