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INTERPRETATION OF DLTS DATA FOR SILICON DETECTORS IRRADIATED WITH NEUTRONS

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It is expected the formation of defect clusters when high-energy Si knock-on atoms are created and cluster effects are likely to be quite important for radiation damage of silicon detectors in LHC experiments. However the understanding of these effects in Si detectors irradiated with different particles is insufficient as compared to the knowledge on the role of isolated point defects.
DLTS is one of the main methods of defect characterization in semiconductor structures. At present two characteristic features of clustered defects are well established. First, it is temperature dependence of DLTS peak amplitude Smax(T) and closely related to this feature the inequivalent heights of divacancy peaks [1-4]. And second, the stretched kinetics for filling of clustered traps [4, 5].
This work focuses on studies of the first effect. Numerical simulation of cluster effect on DLTS signal has been performed. The results of this simulation have been applied to interpret DLTS data obtained for different detectors irradiated with neutrons.
It has been found that in detectors made on MCZ silicon not only divacancies but also vacancy-oxygen complex are distributed in clustered form.
Results of our studies of bistable defects in irradiated and annealed silicon detectors are also presented.

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