

Investigation in the Properties of Charge Traps Created in CCD by Neutron and Electron Irradiation

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In our earlier investigations of radiation damage effects in a CCD based detector we observed that some parameters of the radiation damage related processes were very different from the common perception. For example, trapping time of electrons by trapping centers created by irradiation was few orders of magnitude larger than it was believed it should be. Last year we did additional experiments in attempt to understand this. Results of such experiments are puzzling, though we could rule out some of hypothesis about cause of slow trapping. However, they yielded observation of another phenomenon, which though was predicted by the theory of radiation damage, but was not anticipated to show up so clearly at the level of exposure we had. We observed, that irradiation with electrons leads to slow dissolving of charge trap clusters created by neutron irradiation. While charge trap clusters created by neutron irradiation did not change in more than 4 years since they were created in 1999, (looking in 2003 measurements), they changed dramatically (number of traps reduced by almost 90%) in 2 years following high energy (60 MeV) electrons irradiation in 2003.

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