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The thermal stress at short electron bunches passage through a thin target

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The thin target could be used for beam diagnostics by means the radiation that is induced by interaction of beam particles with target matter [1-3]. The electron beams used in modern applications (as, for example, modern FEL-s) have very large brightness, small emittance as well as very short bunch length. For example, the bunch length of XFEL is about of 25 μm at bunch charge 1 nC and with electrons energy of 17 GeV [4]. The passage of this powerful short bunches could damage the target or even completely destroy it. In the presented work both the heating when the train of such bunches passages through the target and the corresponding thermal stress are investigated. It is shown the target works in extreme regime close to phase transition temperatures and stress limits. The model to investigate these extreme regimes is developed.

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