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PS1-23: Coherent Radiation from Bunch Sequences: Theory Background

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Nowadays the electron micro-train beams are useful for different applications such as multibunch resonant plasma wakefield acceleration [1], particle acceleration by stimulated emission of radiation [2], generation of intense coherent electromagnetic radiation [3, 4] and etc. Therefore bunch-to-bunch interaction investigation becomes essential. In the general case micro-train is from 2 up to a few tens bunch sequences with gaps between them. Recently the possibility to diagnose the micro-train electron beam using the double diffraction radiation target interferometry was discovered [5, 6]. However there is no common theoretical approach describing such a micro-train. In most theoretical studies the single-particle calculations are performed where the bunch-to-bunch interactions are not taken into account. Following this need, we offer quite simple technique which can be useful for numerical estimations of the processes in the beam physics of above mentioned systems. In this report the bunch interactions within the beam are considered and some generalized expression is proposed. The expression limit transitions for various parameters are also presented. The transition radiation case is discussed as an example.

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