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Direct interpretation of coherent synchrotron radiation modeling from the Lienard-Wiechert equation with shielding

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Coherent Synchrotron Radiation (CSR) plays a critical role in beam dynamics, significantly influencing beam shape and energy characteristics in particle accelerators. This study investigates the CSR effect through a comprehensive numerical approach, starting from the fundamental Lienard-Wiechert equation and utilizing an explicit, non-approximated methodology to explore beam energy dynamics. This paper focuses on simulating CSR effects in conjunction with the shielding effect from parallel plates, which are crucial in mitigating potential beam energy loss.*By benchmarking results against Saldin's established work*,* the study examines wakefield characteristics, particularly the high-peak behavior at small particle separations.

Footnotes

D. Sagan, S. G. Biedron, & J. Bennet (1999), "Extended One-Dimensional Method for Coherent Synchrotron Radiation Including Shielding", Physical Review Special Topics - Accelerators and Beams, 2(8), 084701.*E. L. Saldin, E. A. Schneidmiller, & M. V. Yurkov (1999), On the Coherent Radiation of an Electro.

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Author: HUANG, Chia-Heng (National Central Univeristy)

Co-authors: QIANG, Ji (Lawrence Berkeley National Laboratory); Dr LAU, Wai-Keung (National Synchrotron Radiation Research Center); TENG, Shan-You (National Central Univeristy); Dr CHIANG, Wei-Yuan (National Synchrotron Radiation Research Center); CHEN, Shih-Hung (National Central Univeristy)

Presenter: HUANG, Chia-Heng (National Central Univeristy)

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