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Suppression of synchrotron radiation

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Abstract

It is demonstrated that the synchrotron radiation, generated by a train of relativistic micro-bunches circling around a metallic cylinder, may be suppressed by several orders of magnitude if the distance (ΔR) of the charges from the wall is significantly smaller than the radius of curvature (R) of the trajectory divided by the square of the relativistic energy factor (γ) namely, $\Delta R \ll R/\gamma^2$. In addition, we establish the threshold for coherent synchrotron radiation to be dominant: assuming a given bending magnetic field, the micro-bunch length must be proportional to $1/\gamma^2$, whereas its transverse dimension has to scale like $1/\gamma$.