ID: 1763 - TUPSO77 Analytical and Numerical Analysis of Electron Trajectories in a 3-D Undulator Magnetic Field

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Abstract In this contribution we present an analysis of electron trajectories in the three dimensional magnetic field from a planar undulator. The electron trajectory is influenced by the focusing properties of the undulator field. These focusing properties should be taken into account in simulations of spontaneous radiation, which constitutes the background signal of the FEL. The ideal magnetic field of an undulator can be described, in agreement with Maxwell equations, by a sinusoidal vertical magnetic field on the undulator axis, and by horizontal and longitudinal field components that appear out of axis. Exploiting this description for the ideal case, the differential equations of motion were solved by means of a perturbation theory approach, and the corresponding expressions for the electrons velocities and trajectories are derived. A computer code was also written, which relies on the Runge-Kutta algorithm. The analytical and numerical methods could then be compared, showing a good agreement.

Type of Presentation Poster

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