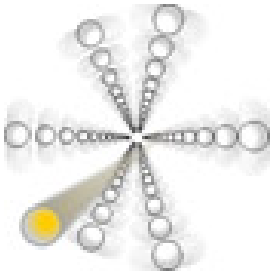

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Polarization Radiation Generated by a Charged Particle on a Rectangular Screen of Finite Permittivityy

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When a charged particle moves in a medium (or close to it), different types of
polarization radiation can arise: Cherenkov, transition, diffraction radiation, etc.
Because the particle's radiation losses are small compared to its total energy, polarization radiation can be used for non-intercepting beam diagnostic in modern accelerators [1]. Therefore, it is of great interest to investigate the characteristics of polarization radiation generated under the conditions close to experimental ones. In particular, it is of primary concern to consider diffraction radiation arising when a charged particle moves obliquely near a target with the finite sizes and permittivity.
To calculate radiation characteristics we use the method developed in the paper [2]; the method essence is that the polarization current induced in the target by the field of the charge moving rectilinearly and uniformly is considered as a radiation source. By means of the method, the characteristics of polarization radiation generated when relativistic charged particle with arbitrary energy moves obliquely near a rectangular screen and through a slit in the screen with the finite size and permittivity are obtained. Diffraction radiation characteristics
from the rectangular screen in the high-frequency approximation, i.e. at the frequencies much greater than the plasma frequency, are also investigated. The obtained results in the limiting cases (ideal conductivity, normal incidence, zero slit width) coincide with the known ones. The influence of multiple reflections in the target as well as the influence of imaginary part of permittivity on radiation characteristics is studied. The dependence of spectral and angular density of diffraction radiation on geometric sizes of the target is analyzed.

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