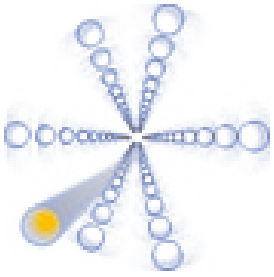

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The Features of Transition and Cherenkov Radiation of Multi-Charged Ions

Monday, 6 October 2014 10:30 (15 minutes)

The influence of the processes electrons capture (or loss) by the high-energy multiply charged ions on the Cherenkov and transition electromagnetic radiation are discussed. Multiply charged ion charge fluctuations in the targets lead to an additional contribution to spectral- angular density of radiation (the correlation effect [1]). If the threshold condition for the occurrence of Cherenkov radiation is not satisfied, as it might be expected, spectral- angular density coincides with the formula of radiation from a charge that begins to suddenly move with constant velocity [2]. Radiation described by distribution function is directed forward in a strongly smeared cone near the Cherenkov angle and exists in a subthreshold region of ion velocities. A similar picture of the angular distribution subthreshold radiation observed in the experiments described in [3]. Spectral-angular density of the radiation does not depend on the initial charge of the ion, its mass and thickness of the target. This can serve as a test for the detection of the effect described subthreshold radiation of high-energy multiply charged ions in targets. If the radiation formation length is much greater than the length of the trajectory on which the electron capture or loss, we can assume that the change in the ion charge is instantaneous. Then to analyze the emerging transition radiation can use the method of crosslinking the normal and tangential component of the ion field at the interface between two media. The generalizations of Ginsburg and Frank formulas [4] to the case of the electron capture or loss by multiply charged ions are obtained. In particular for the backward radiation from entry neutral particles in the target and the loss of one electron the spectral-angular density of the transition radiation has the form:

(Formula)

If the singly charged ion enters a target and as a result of electron capture becomes neutral in the target, then for backward transition radiation we have:

(Formula)

Comparisons of the intensity of the Ginsburg-Frank transition radiation and arising one during the capture and loss of electrons have been done.

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