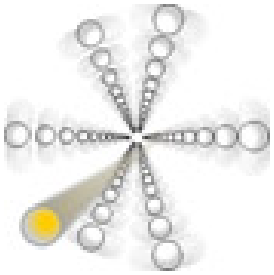

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Spectral and Angular Distributions of Emission from Relativistic Channeled Electrons in a Diamond Crystal in Vicinity of the Cherenkov Angle

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Here, we investigate in detail the influence of channelling in an optically transparent crystal on Cherenkov radiation from relativistic electrons. The obvious break of the Tamm-Frank condition for appearance of the Cherenkov radiation (rectilinear motion with a constant velocity, greater than the phase velocity of light in a crystal) is due to periodic or quasi-periodic motion under channelling or quasi- channelling. In connection with this, one may expect: a) broadening of the Cherenkov cone, connected with periodic deviation of the channelled electron velocity vector from the average one; b) peculiarities of spectral-angular distribution at the fixed emission angle in vicinity of the Cherenkov cone. In addition, at planar channelling one may expect the break of the axial symmetry of angular distribution of Cherenkov radiation and even appearance of new features of linear polarization. The predicted effects strongly depend on electron beam energy. The connections with normal and anomalous Doppler effect are discussed.
The results of this work will be used in developing of new experimental proposal on studies of the ChR angular distributions from moderate energy electron beams, e.g. at SAGA-LS.

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