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The Electrons Capture into the Axial Channeling State as the Radiative Recombination Effect

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The capture process of the high energy particle into the axial channeling state in single crystal if considered in the laboratory reference system is a sufficiently relativistic process. The cross-section calculation of this process, especially in case when the electrons capture is accompanied by the emission of a high energy photon in ultra-relativistic case is not trivial and not very clear.
Authors propose to use for considering of this and similar quantum electrodynamics relativistic processes in the so called accompanying reference system (ARS), moving parallel to the channeling axis with the velocity, equal to the longitudinal component of the fast particle velocity. In such an accompanying reference system the transversal motion of a particle, entering the single crystal at the angles, not exceeding the critical Lindhard angle [1], can be considered as non-relativistic up to the really very high total energies of entering particles. Considering of the electron transversal motion with the non-relativistic energies allows employ the familiar standard results from the atomic physics [2]. In particular the cross-section calculation of the radiative recombination of electron with atom, which accompanied by the photon emission is presented.

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