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Raman Scattering of Photons by the Channeling Electrons

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Abstract. The motion of channeling particles in the accompanying coordinate system can be considered as a two-dimensional atom in the case of axial channeling. The transversal motion of the channeling particles is characterized by discrete spectrum. The occupation probability of the transversal motion levels depends on the entrance angle of charged particle relative to the crystallographic axis [1-3]. In the scattering of a photon by the “quasi-bound” charged particle in the axial channeling mode, the frequencies which are a combination of the incident photon frequency ω_0 and the frequency ω_{if} (ω_{if} is the transition frequency in transverse quantized motion of the channeling electron: $\omega = \omega_0 \pm \omega_{if}$, where $\omega_{if} = 2\Delta\epsilon_{if} \gamma^2$; where $\gamma = E/(mc^2)$ is the Lorentz-factor of the channeling electron) would make appearance. In the report the criteria for choosing an adequate continuous potential of the crystallographic axis are discussed [4]. The dependence of the occupation probability of the transversal motion levels of the channeling particles (electron) upon the single crystal thickness is investigated [1-2]. The peculiarities of the Raman scattering spectrum of photons by electrons in the axial channeling regime are analyzed. The possibility of anti-Stokes lines in the Raman spectrum is considered.

References

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