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Calculation of the Orbital Angular Momentum of Axial Channeling Radiation from Relativistic Electrons in Thin Si Crystal

The twisted photon is a state of a free electromagnetic field with the certain energy, longitudinal projection of the momentum, projection of the total angular momentum and helicity. Various schemes of production of the twisted photons have been proposed recently. The undulators [1-5] and free electron lasers [6-8] are used in these schemes. High energy twisted photons can also be generated by particles channeled in aligned crystals [9-11].
Channeling radiation of plane wave photons is well studied and finds various applications. The photon energy of the radiation lies in MeV spectral range. Planar channeling radiation has several ad-vantages over other types of radiation such as the narrow spectrum and focus. In [9] we calculated the OAM per one photon generated by planar and axial channeled electrons as function of the angle between momen-tum of the incidence electron and the plane or axis of the channeling. In the work [11] we described planar channeling radiation from electrons in terms of twisted photons. The energy spectrum of twisted photons and the projection of the total angular momentum per photon were calculated. We revealed the oscillations of the projection versus the photon energy. The distance between the maxima was about 25-30 keV.
In this work, we plan to continue the calculation of the OAM in the case of axial channeling and check whether the periodical dependence remains intact or disappears

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