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Angular Momentum of Radiation from Relativistic Electrons Channeled in Si and W Crystals

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Recently, the effect of mirroring of sub-GeV electrons by a thin Si half-wave crystal (HWC) was experimentally observed and explained by computer simulations [1]. The features of corresponding radiation spectra [2] at HWC channeling are described using the code BCM-1 [3]. This code was also used earlier in calculations of positrons yield using channeling radiation [4].

The first estimation of the orbital angular momentum (OAM) of the radiation from 350 MeV positrons at planar channeling in the thin HWC Si crystal is carried out in [5].

Here, using the developed code BCM-1, the dependence of OAM of the radiation from 155-255 MeV electrons from initial beam energy, angle of incidence and the type of the trajectory is described in detail. The energies of electron beams are chosen according to experimental setup of INFN-LNF (Italy) and SAGA-LS (Japan). The proposed scheme of the production of the radiation carrying OAM allows to generate the twisted photons with much higher energies compared to scheme using the undulator radiation [6].

References

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