RELATIVE EFFICIENCY OF THE SPIN CONTRIBUTION ON RADIATION SPECTRUM OF HIGH ENERGY ELECTRONS MOVING IN ORIENTED CRYSTALS AND IN THE FIELD OF INTENSE LASERS

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 The spin contributes the hard part of the radiation spectrum and has been measured two decades ago for above hundred GeV electrons in oriented crystals [1]. The strong field effects for photon emission during channeling of electrons in crystals and that of electrons moving in the field of an intense laser wave manifest themselves at high energies, above several tens of GeV. At such energies, quantum effects in radiation, such as quantum recoil the effect of spin should be taken into account [1]. Accounting for quantum recoil is reduced to the replacement in the classical formulas of the radiation frequency $ω\rightarrow ωE/(E-ℏω)$, where $E $is the energy of an electron, whereas the spin term should be considered separately. We do it within the frame of quasiclassical approach [2] (see also [3,4]) and show that that the spin contribution is stronger in the case of lasers than in the case of crystals. Moreover, spin never appears in the dipole spectrum of crystals, but for lasers a quantum dipole spectrum may happen in which the spin contribution is dominant. The latter case corresponds to inverse Compton scattering.

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