PROSPECTS FOR STUDYING STRONG FIELD EFFECTS IN ORIENTED CRYSTALS AND POWERFUL LASER FIELDS

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Oriented crystals (OC) and powerful lasers are promising tools for studying the QED strong field effects [1]. We demonstrate that in both cases these effects in OC [2] and in the field of powerful lasers [3] can be described by the same formulars depending on two Lorentz-invariant parameters. The corresponding calculations of the radiation spectra are presented. The crucial difference between lasers and crystals is that in the former case both invariants are independent, while in the crystal they are linearly related to each other [4]. This leads to a strong limitation on the range of possible values of these invariants in OC.

Nevertheless, we show that at present the most promising method for experimental study the strong field effects, for which the Schwinger parameter 100, are OC. This is due to the possibility of conducting experiments at electron and gamma quantum energies of more than 7 TeV, as well as the fact that OC allow studying processes in non-uniform strong fields, whereas in laser fields the conditions are close to those with a constant external field, even when the laser pulse consists of one main maximum.

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