

Single-photon Annihilation of Planar Channeled Positrons

Yu.Kunashenko^{a,b,1}, K.Korotchenko^a

^a National Research Tomsk Polytechnic University, Tomsk, Russia

^b Tomsk State Pedagogical University, Tomsk, Russia

It is well known that due to conservation laws of momentums and energies free electron and positron can annihilate only into two or more photons [1]. But in the external field the part of annihilate particles momentum can be absorbed by the field and single-photon annihilation becomes possible [1-4].

The conditions for single-photon annihilation are fulfilled when channeling relativistic positrons in a crystal. For the first time, the possibility of this process in a crystal was highlighted in the article [4]. Unfortunately, in this paper a consistent theory of this process was not developed, the authors confined themselves to simple estimates.

Here in the frame of quantum electrodynamics we develop the theory of single-photon annihilation of relativistic positrons channeled in a crystal. It should be notice that Feynman diagram of the process under consideration is similar to Feynman diagram of the secondary electron emission induced by channeled relativistic electrons in a crystal [5]

References

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¹ Corresponding author: kunashenko@tpu.ru