Contribution ID: **17** Type: **Oral presentation**

Polarization Tensor of a Photon in an Electric Field

Tuesday, 27 September 2016 10:15 (15 minutes)

The propagation of a photon is investigating in a constant and uniform electric field at any photon energy. The investigation is based on the polarization operator of a photon in an electromagnetic field [1]. The imaginary part of the polarization tensor eigenvalues gives the partial contribution to the probability of electron-positron pair creation and defines the photon lifetime. The real part describes the dispersive properties of the space region with an electric field. At high energy, the standard quasiclassical approximation is valid. The corrections to this approximation are found. In the region of relatively low photon energies, where these corrections become significant, another approximation is used. This approach is valid at the energy of photon sufficient larger than the "vacuum"energy = eE$\hbar$/mc in electric field.
Note, the exponential factor is present in the expression for the probability at this energy, and the exponent is proportional to the ratio of the photon energy to the vacuum energy. In this case, we can talk about the birth of a pair by laser and electric fields in conjunction. When the photon energy is much less than the vacuum energy, the found probability describes the absorption of a soft photon by electron and positron created by an electric field on the formation length of process . Then, the probability under consideration gives the correction to the probability of pair creation by an electric field only. The crossing process is the radiation of a photon by electron and positron created by an electric field. The integral probability of the last process is connected with radiative corrections to the imaginary part of the vacuum loop in an electric field.

Primary author: Prof. KATKOV, Valeriy (Budker Institute of Nuclear Physics)

Presenter: Prof. KATKOV, Valeriy (Budker Institute of Nuclear Physics)

Session Classification: S2.3: Channeling & Radiations in Various Fields