



Contribution ID: 87

Type: Poster

On the spin correlations of final leptons generated in the high-energy two-photon processes

$$\gamma\gamma \rightarrow e^+e^-, \mu^+\mu^-, \tau^+\tau^-$$

Wednesday 11 September 2019 14:17 (1 minute)

The theoretical study of spin structure for the processes of lepton pair production by pairs of γ quanta, which may be emitted in various relativistic hadronic reactions and decays (in particular – in the rare two-photon decays of the neutral kaons K_S^0 and K_L^0), is performed. For the two-photon process $\gamma\gamma \rightarrow e^+e^-$, it is shown that in the case of unpolarized photons the final electron and positron remain unpolarized as well, but their spins prove to be strongly correlated. Explicit expressions for the components of the correlation tensor and for

the relative fractions of singlet and triplet states of the final (e^+e^-) system are derived. It is demonstrated that in the process $\gamma\gamma \rightarrow e^+e^-$ at least one of the “classical” incoherence inequalities of the Bell type for the correlation tensor components is always violated (i.e. there is always at least one case when the modulus of sum of two diagonal components exceeds unity), and, thus, spin correlations of the final electron and positron in this process have the strongly pronounced quantum character.

Analogous analysis can be wholly applied also to the two-photon processes with the generation of a muon pair and a tau-lepton pair ($\gamma\gamma \rightarrow \mu^+\mu^-$, $\gamma\gamma \rightarrow \tau^+\tau^-$), which become possible at considerably higher energies.

Primary author: Dr LYUBOSHITZ, Valery (Joint Institute for Nuclear Research, Dubna)

Co-author: Dr LYUBOSHITZ, Vladimir (Joint Institute for Nuclear Research, Dubna)

Presenter: Dr LYUBOSHITZ, Valery (Joint Institute for Nuclear Research, Dubna)

Session Classification: Poster session