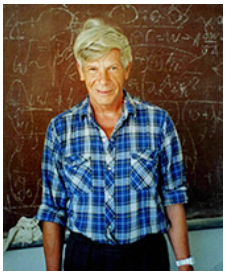

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Vacuum radiation processes in strong electromagnetic fields

Tuesday, 11 October 2022 18:00 (25 minutes)

According to quantum electrodynamics, a strong electromagnetic field can make the vacuum state decay via the production of electron-positron pairs. This process is accompanied by the emission of soft photons and generation of higher-order harmonics. These two radiation channels are described within the leading order by vertex and tadpole Feynman diagrams. Here we evaluate and discuss both of these contributions. The interaction between the quanitzed Dirac field and the external (laser) background is taken into account exactly, i.e., within the Furry picture. To obtain quantitative predictions in the domain of realistic field parameters, we employ the WKB approach. Also, it is shown that the presence of photons in the initial state gives rise to an additional (stimulated) channel of photon emission besides the pure vacuum one. We propose an experimental scenario for measuring this additional signature in order to indirectly probe the pair-production mechanism in the nonperturbative regime.

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