

One-Loop Vertex Correction in a Plane Wave

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We compute the general expression of the one-loop vertex correction in an arbitrary plane-wave background field for the case of two on-shell external electrons and an off-shell external photon. The properties of the vertex corrections under gauge transformations of the plane-wave background field and the radiation field are studied. Concerning the divergences of the vertex correction, the infrared one is cured by assigning a finite mass to the photon, whereas the ultraviolet one is shown to be renormalized exactly as in a vacuum. Finally, the corresponding expression of the vertex correction within the locally constant crossed field approximation is also derived, and the high-field asymptotic is shown to scale according to the Ritus-Narozhny conjecture, although the terms featuring the leading-order dependence on the field are found not to contribute to physical transition amplitudes.