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**One-particle reducible contribution to the one-loop scalar propagator in a constant field.**

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Summary: Recently, Gies and Karbstein showed that the two-loop Euler-Heisenberg Lagrangian receives a finite one-particle reducible contribution in addition to the well-known one-particle irreducible one. Here, we demonstrate that a similar contribution exists for the propagator in a constant field already at the one-loop level, and we calculate this contribution for the scalar QED case. We also present an independent derivation of the Gies-Karbstein result using the worldline formalism, treating the scalar and spinor QED cases in a unified manner.

**MSC:**

[81V10](#) Electromagnetic interaction; quantum electrodynamics

[78A25](#) Electromagnetic theory, general

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**Full Text:** [DOI](#)

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