In the present thesis we study light-light scattering, which is a nonlinear effect occurring in quantum electrodynamics. The goal of this thesis is to study the low-energy effective theory (Lagrangians of Euler-Heisenberg type).

The first part of the work is devoted to the derivation of the effective Lagrangian in spinor, scalar and vector QED using the amplitude matching of one-loop diagrams. The calculation for the case of vector QED is performed using the unitary gauge, which probably has not been done yet so far by other authors.

In the second part, the effective Lagrangian for spinor QED is derived using functional methods. The essential point of the derivation is to calculate the determinant of the Dirac operator in constant background electromagnetic field.