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On the Non-Relativistic Limit of Quantum Electrodynamics

We consider the model of a massless bosonic photon field interacting with a fermionic Dirac field of mass M in the charge $Q = 1$ sector, described by the self-adjoint Hamilton operator H. The non-relativistic limit $M \to \infty$ of the resolvent $(H-z)^{-1}$ for appropriate choice of spectral parameter $z \in \mathbb{C} \setminus \mathbb{R}$ is studied.

We discuss the rise of the one-particle Pauli-Fierz operator, known from the model of non-relativistic quantum electrodynamics, as the effective Hamilton operator in this limit. The emerging error terms and their physical interpretation are sketched. The idea of proof for the main theorems will also be presented.