

First-principle simulations of quantum electrodynamics

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I will discuss how quantum electrodynamics (QED) in the low-energy regime can be formulated in a manner similar to quantum mechanics [1, 2]. Such a formulation allows to extend first-principle methods of quantum mechanics to this quantum field theory [3, 4, 5]. I will highlight the basic differences between quantum-mechanical and QED simulations [6], e.g. finite lifetimes of excitations due to the intrinsic openness of the theory [5, 7], and show how such first-principle simulations of QED allow to investigate novel situations of polaritonic chemistry and material science, where photon and matter degrees of freedom strongly mix.

References

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