

# Relativistic Yukawa model of Hamiltonian renormalization for bound states and scattering amplitudes

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We present an application of the Renormalization Group Procedure for Effective Particles (RGPEP) to a model of scalar Yukawa interaction. The model is obtained by truncating the Yukawa theory to just two Fock sectors in the Dirac front form of Hamiltonian dynamics, one with one fermion and another one with one fermion and one boson, and by regulating the interaction part of the Hamiltonian. We calculate the family of scale dependent effective Hamiltonians up to fourth order in the coupling constant, find the divergent parts of the counterterms and fix the finite parts of the counterterms by demanding the covariant solution for the bound state with physical mass and Lorentz covariance of the scattering amplitude. The example appears useful in approaching the renormalization problems of quantum field theory including bound states.