Contribution ID : **310** Type : **Oral talk**

Cornwall-Jackiw-Tomboulis effective action in (2+1)-dimensional models

Wednesday, 30 November 2022 20:00 (15)

Using a nonperturbative approach based on the Cornwall-Jackiw-Tomboulis effective action Γ(S) for composite operators (S is the full fermion propagator), the phase structure of the (2 + 1)-dimensional Gross-Neveu (GN) and Thirring models is investigated. We have calculated Γ(S) and its stationary (or Dyson-Schwinger) equation for GN model and have shown that it has three different solutions for fermion propagator S corresponding to possible dynamical appearance of three different mass terms in the model. One is a Hermitian, but two others are non-Hermitian and PT even or odd. It means that two phases with spontaneous non-Hermiticity can be emerged in the system. Moreover, mass spectrum of quasiparticles is real in these non-Hermitian and PT even/odd phases. Also the (2+1)-dimensional generalized Thirring model has been investigated by the Hartree-Fock method. The Lagrangian of this model is constructed from two different four-fermion structures, one of them takes into account the vector×vector channel with coupling constant Gv, the other - the scalar×scalar channel with coupling Gs. At some relation between bare couplings Gs and Gv dynamical generation of the Dirac and Haldane fermion masses is possible. As a result, phase portrait of the model consists of two non-trivial phases. In the first one the chiral symmetry is spontaneously broken due to dynamical appearing of the Dirac mass term, while in the second phase a spontaneous breaking of the spatial parity P is induced by Haldane mass term. It is shown that in the particular case of pure Thirring model, i.e. at Gs=0, the ground state of the system is indeed a mixture of these phases. Moreover, it was found that dynamical generation of fermion masses is possible for any finite number of Fermi-fields. These methods could be interesting in studies of phase structure of different theories including QCD.

Based on Phys.Rev.D 106 (2022) 8, 085002 Phys.Rev.D 105 (2022) 2, 025014 Int.J.Mod.Phys.A 36 (2021) 31n32, 2150231 Composite operator approach to

Primary author(s) : ZHOKHOV, Roman (IHEP Protvino, IZMIRAN Troitsk)

Presenter(s) : ZHOKHOV, Roman (IHEP Protvino, IZMIRAN Troitsk)

Session Classification : High Energy Physics: Theory

Track Classification : High energy physics: theory