

Seminar on Condensed Matter Theory

Group of Theoretical Physics at the Department of Condensed Matter Physics
of Charles University has a pleasure to invite you to attend the seminar

on 28 March 2019 at 13:00

at Faculty of Mathematics and Physics of Charles University, Ke Karlovu 5, 121 16 Praha 2

Seminar room F052



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Mean-field theories for many-body systems II: Reduced parquet equations in quantum criticality

working version

Mean-field theory was introduced to reproduce qualitatively critical behavior of many-body systems. Its virtue should be a relatively simple and analytically controllable self-consistent theory. I will use the Hubbard model to demonstrate peculiarities of the construction of consistent approximations in quantum criticality. I will show that the standard Baym and Kadanoff self-consistent scheme with the Luttinger-Ward generating functional cannot guarantee consistency between the order parameter and the response functions in quantum criticality.

The way out of this trouble is to use a two-particle irreducible vertex as a generating functional and to make direct diagrammatic approximations for it. I will introduce an alternative construction of thermodynamic and spectral properties from the two-particle irreducible vertex with an unambiguous critical behavior.

The key element missed in the standard mean-field theories is a two-particle self-consistency. This will be introduced via the parquet approach combining self-consistently different Bethe-Salpeter equations. One has, however, to resort to a decoupling of frequency and momentum convolutions in the Bethe-Salpeter equations to reach analytically controllable theory. I will propose a simplification scheme in the parquet equations leading to local, mean-field-like approximations free of unphysical behavior.



For more information follow: theory.kfkl.cz/seminars.php

If you wish to receive regular updates on forthcoming seminars, contact T. Novotný (tno@karlov.mff.cuni.cz).