TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

INSTITUT FÜR FESTKÖRPERPHYSIK
Institute of Solid State Physics

Wiedner Hauptstraße 8-10/138, 1040 Wien, AUSTRIA – T: +43-1-5880113801 / F: +43-1-5880113899 – E: sekretariat@ifp.tuwien.ac.at

EINLADUNG zum IFP-SEMINAR

Thema:	**Generic ambiguity of the description of strongly correlated electron systems**
Vortragender:	**Václav Janiš** Institute of Physics, the Czech Academy of Sciences, Prague
Host:	Karsten Held
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Understanding the impact of electron correlations on the low-temperature behavior of metals demands a reliable microscopic theory. The best candidate for it is the many-body theory with Green functions. The one-particle Green functions are needed to control the Fermi statistics of electrons while the two-particle ones are decisive for collective and critical phenomena. The necessity to control both types of Green functions leads to an ambiguity in the definition of fundamental objects.

The standard construction of conserving approximations determines uniquely the self-energy from the Luttinger-Ward functional. There are, however, two ways to determine the two-particle vertex. One is the Schwinger-Dyson equation. The other way is the functional Ward identity. The two vertex function are never the same in approximate theories. Consequently, the critical behavior of the two-particle vertex is not uniquely defined.

We propose another description of correlated electrons in quantum criticality. We start with a uniquely defined vertex function from which we determine two self-energies. The thermodynamic one is obtained from an integrated Ward identity and is used to renormalize the one-electron functions in the many-body theory. The spectral self-energy is defined from the Schwinger-Dyson equation with thermodynamic propagators. In this way the uniquely defined critical behavior of the vertex function induces the same corresponding symmetry breaking in both self-energies. We demonstrate this construction on the Kondo asymptotics of the single-impurity Anderson model.

[1] V. Janiš, A. Kauch, and V. Pokorný, Phys. Rev B **95** 165113 (2017)
[2] V. Janiš, V. Pokorný, and A. Kauch, Phys. Rev B **95** 045108 (2017)

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