

Seminar: Hard Condensed Matter Theory

Room: Galilei Room (Staudinger Weg 9, 01-128)

Time: Tuesday, 2. Juni 2015

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Non-analytic corrections in Fermi liquids and multi-channel scattering

Landau's Fermi liquid theory has been the main tool for investigating interactions in condensed matter systems at low energies for several decades. It describes the excitations of the interacting system through long-lived quasi-particles which have the same, albeit renormalized, properties as the excitations of the non-interacting system. As such it would be natural to expect that various quantities such as the susceptibility and heat capacity follow analytic series in temperature or external magnetic field. Recently, however, situations where this does not remain true have attracted much attention. In this talk I will discuss these non-analyticities, which appear due to effective long-range interactions between the quasi-particles, and show that they also appear in quasi-particle properties such as the Lande g-factor, and in experimentally accessible quantities such as the conductivity and tunnelling density of states. I will also show that they are determined fully by low-energy scattering processes and discuss how to classify these. Finally I will discuss a new approach, based on the functional renormalization group, to deal with systems where scattering is dominated by processes in multiple scattering channels. As an illustration of the method I will consider the so-called X-ray problem.

[1] C. Drukier, P. Lange, and P. Kopietz, Eur. Phys. J. B 88, 41 (2015)

[2] P. Lange, C. Drukier, A. Sharma, and P. Kopietz, ArXiv:1502.06625

All interested are cordially welcome!