Three-body correlations in nonlinear response of correlated quantum liquid

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Understanding the properties of correlated quantum liquids is a fundamental issue of condensed matter physics. Even in such a correlated case, fascinatingly, we can tell that the equilibrium fluctuations of the system govern its linear response to an external field, relying on the fluctuation dissipation relations based on the two-body correlations. To go beyond this well-established regime, the three-body correlations come into the game as we see in various physical systems.

Here, we investigate a quantum dot in the Kondo regime, which is a controllable realization of such a correlated quantum liquid [1]. We achieve the Kondo effect in the unitary limit and quantitatively measure the three-body correlations and their role in the non-equilibrium regime, which perfectly validates recent results of the Fermi liquid theory [2-5]. We demonstrate its importance when time-reversal symmetry is broken, solving a long-standing puzzle of the Kondo systems under the magnetic field [3].

The demonstrated method to relate three-body correlation and non-equilibrium transport opens a way for further investigation of the dynamics of quantum many-body systems.

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