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Fermi polaron in doped 2D semiconductors

The Fermi polaron, a particle dressed by excitations of a fermionic medium, has been extensively studied in ultracold atomic gases. Recently, it was realised that the optical response of doped atomically thin semiconductors also corresponds to a quantum impurity problem, where excitons are introduced into an electronic medium. I will discuss three scenarios where we have recently used cold-atom-inspired Fermi polaron theories to explain results in doped semiconductors. The first scenario involves applying the quantum virial expansion to describe photoluminescence. The second scenario focuses on the observation that the relaxation from the repulsive to the attractive branch can be enhanced in doped semiconductors. Finally, we will investigate how interactions between impurities may be probed using multidimensional spectroscopy. These examples in turn have the potential to shed new light on the cold atom polaron problem.

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