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Title: Few-carrier quantum dots in bilayer graphene

Abstract:

Applying a vertical displacement field to bilayer graphene opens a bandgap at the K and K' points. This property can be exploited for electrostatically defining electronic nanostructures like in ordinary semiconductors. Here we demonstrate the realization of high-quality quantum dots in bilayer graphene with the option of bipolar operation in the few-carrier regime. We identify experimentally the ground state for the one- and two-hole quantum dot and find it strongly influenced by spin- and valley-physics, as well as by interactions. We further demonstrate superb tunability of these quantum dots leading to a valley g-factor tunability by a factor of 4.5. This property could be of great interest for selectively addressing future valley-qubits.