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Quantum phase transitions in the pseudogap Anderson Holstein model[1] MENGXING CHENG, KEVIN INGERSENT, U. Florida — We study a pseudogap Anderson-Holstein model of a magnetic impurity level that (1) hybridizes with a conduction band whose density of states vanishes in power-law fashion at the Fermi energy, and (2) couples, via its charge, to a nondispersive bosonic mode (e.g., an optical phonon). The model exhibits quantum phase transitions (QPTs) of different types depending on the strength λ of the impurity-boson coupling. For small λ, the suppression of the density of states near the Fermi energy leads to QPTs between strong-coupling (Kondo) and local-moment phases. A sufficiently large λ, however, transforms the bare Coulomb repulsion between a pair of electrons in the impurity level into an effective attraction, leading to QPTs between strong-coupling (charge-Kondo) and local-charge phases. Critical exponents characterizing the response to a local magnetic field (for small λ) or electric potential (for large λ) suggest that the QPTs belong to the same universality class as the QPT of the previously studied pseudogap Anderson model. One specific case of the pseudogap Anderson-Holstein model may be realized in a double-quantum-dot device, where the QPTs manifest themselves in the finite- temperature linear electrical conductance.

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