Quantum phase transitions in the pseudogap Anderson Holstein model\textsuperscript{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 $\lambda$ of the impurity-boson coupling. For small $\lambda$, 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 $\lambda$, 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 $\lambda$) or electric potential (for large $\lambda$) 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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