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Periodic Anderson model with Holstein phonons for the description of the Cerium volume collapse ENZHI LI, KA-MING TAM, JUANA MORENO, MARK JARRELL, Department of Physics and Astronomy, Louisiana State University — The volume collapse transition of Cerium has intrigued physicists since its discovery several decades ago. Various models and mechanisms have been proposed, the most prominent scenarios are based on the Mott transition and the Kondo volume collapse transition. In this study, we explore the volume collapse by a dynamical mean field theory (DMFT) study of the periodic Anderson model with phonons in the conduction band. This allows us to study the effect of the electron-phonon interaction on the volume collapse. In order to faithfully account for the volume collapse, we also include the effects due to the volume and temperature dependent bulk modulus. We find that as the electron-phonon interaction strength increases, the volume collapse effect is enhanced, which is consistent with the suggestion that the phonons have an important contribution in the volume collapse transition. Although we start with the canonical model for the Kondo volume collapse scenario, our results have some of the characteristics of the Mott scenario.

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