

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The Role of the Kondo and Phonon Correlations in the Cerium Volume Collapse¹ PETER REIS, PENG ZHANG, KA MING TAM, JUANA MORENO, MARK JARRELL, Louisiana State University, FAKHER ASSAAD, University of Wuerzburg, ANDY MCMAHAN, Lawrence Livermore National Lab, KONDO VOLUME COLLAPSE COLLABORATION — We review the most recent experimental and theoretical progress of the $\alpha \leftrightarrow \gamma$ volume collapse occurring in the element cerium. We discuss the experimental results which have been important in differentiating the various electronic and phononic properties of the volume collapse of cerium, these experiments illustrate that drastically different electronic and phononic properties exist between the small volume phase α and large volume phase γ of cerium. After interpreting the physical data and realizing that the volume collapse in cerium is primarily the result of different electronic and vibronic correlations in the α and γ phases we set up a Hamiltonian which encompasses the physical properties of the collapse. To model the electronic and phononic properties of the $\alpha \leftrightarrow \gamma$ transition of cerium we use the Periodic Anderson Model (PAM) + Holstein Model, with the aim that the Kondo like electronic correlations of the α phase is encoded in the PAM where the large vibronic physics of the γ phase is encompassed in the Holstein Model which incorporates a conduction electron-phonon mediated interaction.

¹This work was supported by NSF through OISE-0952300 and DMR-0548011.

Peter Reis
Louisiana State University

Date submitted: 10 Nov 2011

Electronic form version 1.4