

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**From  $\delta$ -Pu to PuCoGa<sub>5</sub>: Kondo effect investigations of strong electronic correlations in Pu**<sup>1</sup> ERIC D. BAUER, Los Alamos National Laboratory, J. N. MITCHELL, D. S. SCHWARTZ, J. D. THOMPSON, J. L. SARRAO — Within the actinide series, plutonium is located at the itinerant/localized boundary between the strongly hybridized 5 *f* states of U and localized 5 *f* states of Am. The hybridization is intimately connected with the range of interesting behavior found in elemental Pu such as six allotropic phases, the largest effective mass enhancement of any element, and a liquid phase whose density is less than its solid phase, much like ordinary water. Despite decades of research, the strongly correlated electron state of Pu is still not understood. The exciting discovery of superconductivity in PuCoGa<sub>5</sub> with  $T_c = 18.5$  K, offers a possibility of understanding strong electronic correlations in Pu. The 5 *f* electrons in PuCoGa<sub>5</sub> are neither fully localized nor fully itinerant, similar to the cubic delta phase of Pu. Investigations of the Kondo effect, considered to be the hallmark of strong electronic correlations, in dilute intermetallic systems such as ThPu and Lu<sub>1-x</sub>Pu<sub>x</sub>CoGa<sub>5</sub> will yield information about the orbital degeneracy of the Pu 5 *f* electrons, their degree of localization, and a characteristic energy scale of the electronic correlations. Measurements of magnetic susceptibility, electrical resistivity, and specific heat will be presented.

<sup>1</sup>Work at Los Alamos performed under the auspices of the DOE

Eric D. Bauer  
Los Alamos National Laboratory

Date submitted: 19 Nov 2006

Electronic form version 1.4