

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**Pressure Dependence Transport Studies of the Possible Charge Kondo Effect in Tl-doped PbTe** YOSUKE KUROSAKI, JUN SHINAGAWA, Dept. Physics and Astronomy, UCLA, YANA MATSUSHITA, Dept. Materials Science and Engineering, Stanford Univ., TED GEBALLE, IAN FISHER, Dept. Applied Physics, Stanford Univ., STUART BROWN, Dept. Physics and Astronomy, UCLA —  $\text{Pb}_{1-x}\text{Tl}_x\text{Te}$  is noteworthy for a high superconducting transition temperature relative to carrier concentration, as well as normal state properties consistent with a charge-Kondo effect. Recent experiments also demonstrate that the onset of an observable superconducting  $T_c$  with Tl concentration at  $x \sim 0.3\%$  coincides with features characteristic of charge Kondo [1], including  $d\rho/dT < 0$  at low temperatures and an unusual linear variation of the resistivity  $\rho(T) = \rho_0 + AT$  at higher temperatures. Together, these observations are consistent with an association between the two phenomena [2]. We report the effect of applied pressures up to  $P \sim 1.5\text{GPa}$  on  $\rho(T)$ ,  $T_c$ , and the Hall number  $p_H \equiv R_H^{-1}$  for  $x = 0.3\%$ ,  $0.8\%$ , and  $1.3\%$ .  $T_c$  is reduced sharply with pressure,  $dT_c/dP = 400\text{-}500\text{mK/GPa}$  as the low temperature Kondo-like upturn in  $\rho(T)$  is weakened. Also,  $dA/dP < 0$  and  $dp_H/dP > 0$ . These observations are discussed in the context of the proposed charge-Kondo model for  $\text{Pb}_{1-x}\text{Tl}_x\text{Te}$ . [1] Y. Matsushita, H. Bluhm, T.H. Geballe and I.R. Fisher, Phys.Rev.Lett. 94, 157002(2005). [2] M. Dzero and J. Schmalian, Phys.Rev.Lett. 94, 157003 (2005). This work is supported by NSF grant DMR-0520552.

Jun Shinagawa  
UCLA

Date submitted: 01 Dec 2005

Electronic form version 1.4