

# Are the hole carriers in cuprates heavy fermions ?

H. Kamimura<sup>a</sup>, T. Hamada<sup>a</sup> and H. Ushio<sup>b</sup>

<sup>a</sup>Science University of Tokyo, <sup>b</sup>Tokyo National College of Technology

## Abstract

- (1) We have obtained the following result that the microscopic origins of the "high energy" pseudogap,  $T_{max}$ , and of the peculiar hole - concentration dependence of the electronic entropy correspond to a phase change between a phase consisting of the small Fermi surfaces (SF - phase) and a phase with a large Fermi surface (LF - phase).
- (2) We have further showed that the hole carriers in cuprates behave like heavy fermions.

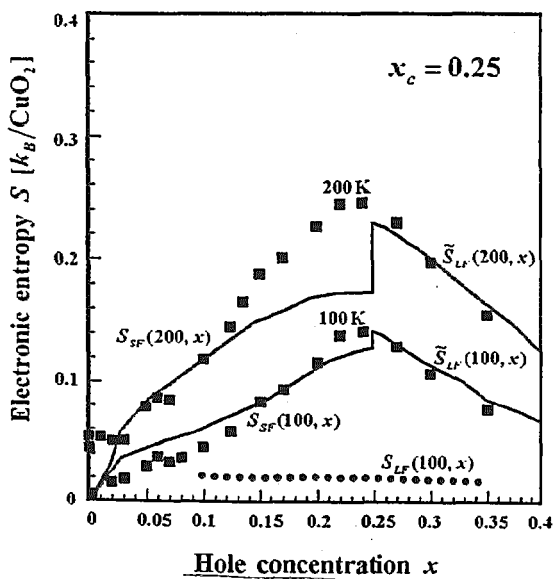


Fig. 1. The calculated results for the electronic entropies of the SF - and LF - phases in LSCO for  $T = 100$  K and  $T = 200$  K, where the experimental results of Loram *et al.* are also shown by closed squares. Further the electronic entropy calculated by the density of states of the LDA band is shown by dotted line.

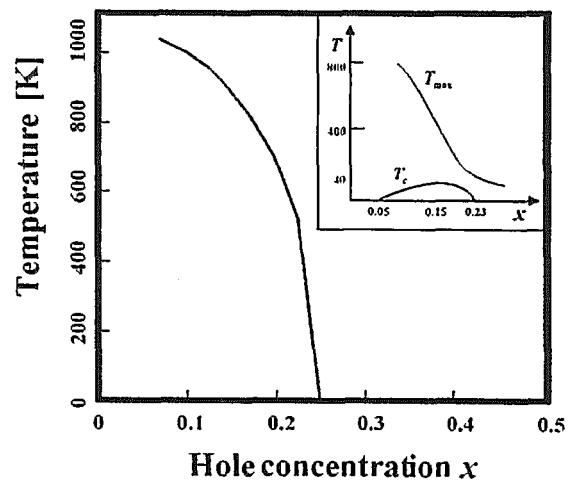


Fig. 2. The calculated results for the hole concentration dependence of  $T_{max}$  in LSCO. The experimental data for  $T_{max}$  by Nakano *et al.* are also shown, together with the sketch of the  $x$  dependence of  $T_c$  in the inset.