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Hall Effect Signature of Fermi Surface Reconstruction in High- T_c Superconductors¹ F.F. BALAKIREV, J.B. BETTS, A. MIGLIORI, Los Alamos National Laboratory, I. TSUKADA, Central Research Institute of Electric Power Industry, Japan, YOICHI ANDO, Osaka University, Japan, G.S. BOEBINGER, National High Magnetic Field Laboratory and Florida State University — The doping dependence of the Hall number in the normal state of two different HTS systems, $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ and $\text{Bi}_2\text{Sr}_{2-x}\text{La}_x\text{CuO}_{6+\delta}$, exhibits an anomalous peak at optimum doping that emerges only at low temperatures. With increasing hole doping, as the pseudogap energy scale decreases, the peak onset is ascribed to the emergence of electron-like Fermi pockets in the Brillouin zone. The destruction of the peak beyond optimum doping suggests the destruction of the electron pockets and emergence of a large hole pocket, two phenomena that would result simultaneously with the loss of the Brillouin zone folding associated with the pseudogap state. The low temperature Hall resistance thus elucidates the Fermi surface evolution in the HTS cuprates, characterized by a zero temperature phase transition upon collapse of the pseudogap near optimum doping.

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