Cu-NMR Study of $Bi_2Sr_{2-x}La_xCuO_{6+\delta}$ Superconductor in Very High Magnetic Fields

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We report the results of ^{63,65}Cu-NMR measurements on single-layered copper-oxide $Bi_2Sr_{2-x}La_xCuO_{6+\delta}$ ($0.0 \leq x \leq 0.9$) conducted under very high magnetic fields up to 45 T [1,2]. The high magnetic field suppresses superconductivity completely, and the pseudogap ground state is revealed.
The ^{63}Cu-NMR Knight shift shows that there remains a finite density of states at the Fermi level in the zero-temperature limit, which indicates that the pseudogap ground state is a metallic state with a finite volume of Fermi surface. The residual density of states in the pseudogap ground state decreases with decreasing doping (increasing x) but remains quite large even at the vicinity of the magnetically ordered phase of $x \geq 0.8$, which suggests that the density of states plunges to zero upon approaching the Mott insulating phase.

[1]G. -q. Zheng *et al.*, Phys. Rev. Lett. **94**, 047006 (2005).
[2]S. Kawasaki *et al.*, Phys. Rev. Lett. **105**, 137002 (2010).