Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Volution of upper critical field in fullerene superconductors near the Mott transition YUICHI KASAHARA, YOSHIHIRO IWASA, Quantum-Phase Electronics Center, The University of Tokyo, MATTHEW ROSSEINSKY, University of Liverpool, RUTH ZADIK, KOSMAS PRASSIDES, Durham University — We here report systematic investigations of the upper critical field H_{c2} of alkali-metal-doped fullerene superconductors A_3C_{60} (A: Alkali metal) including $Rb_xCs_{3-x}C_{60}$ ($0 < x < 1$), which is a new series of expanded fullerene superconductors. Using $Rb_xCs_{3-x}C_{60}$, we can access the novel regime from the T_c maximum to the antiferomagnetic phase even at ambient pressure. We have successfully synthesized high-purity $Rb_xCs_{3-x}C_{60}$ compounds with several Rb compositions of x. Determination of H_{c2} has been demonstrated by rf-penetration depth measurements under pulsed magnetic field up to 62 T. With expanding lattice volume with decreasing x, the system approaches to the Mott insulator from the superconducting phase. We found that H_{c2} continuously increases with decreasing x and it reaches as large as 80 T in the lowest $x = 0.35$, which is almost the verge of the Mott transition. Combining with specific heat measurements, underlying phenomena in the superconductor-insulator transition in the fullerene compounds will be discussed.

Yuichi Kasahara
Quantum-Phase Electronics Center, The University of Tokyo

Date submitted: 11 Nov 2013 Electronic form version 1.4