Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Repulsive interaction helps superconductivity in fullerides SATOSHI YAMAZAKI, YOSHIO KURAMOTO, Tohoku University — Alkali metal (A) doped fullerides (A_3C_{60}) show not only superconductivity (SC) with high transition temperature Tc up to about 40K, but also antiferromagnetism (AF) with A=Cs. In view of nearby presence of the AF state, the Coulomb repulsion should play a significant role in the SC state. However, various experimental evidences point to a fully symmetric s-wave SC state being realized. In the conventional theory, the s-wave state is unfavorable in the presence of Coulomb repulsion. Then the fundamental question remains why the Tc in fullerides is so high. As a step toward the complete understanding, we study a purely repulsive interaction model with the characteristic band structure derived by degenerate molecular orbitals in fullerides. We calculate SC coupling constants for various symmetries of SC pairs by using the second order perturbation theory We find that even with the repulsive interaction model, the s-wave pair can be formed. With the electron-phonon interaction combined, it is likely that the s-wave pair becomes the most stable. According to our result, we propose that the cooperation between Coulomb repulsion and electron-phonon interaction is responsible for the high Tc.

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Date submitted: 26 Nov 2012 Electronic form version 1.4