Abstract Submitted
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Fulleride Superconductors are Phonon-Driven and Strongly Correlated[1] ERIO TOSATTI, SISSA, ICTP. CNR-Democritos, Trieste, Italy, MASSIMO CAPONE, CNR INFM, SMC, I-00185 Rome, Italy, CLAUDIO CASTELLANI, Univ Roma La Sapienza, Physics Dept. and CRS SMC, CNR INFM, I-00185 Rome, Italy, MICHELE FABRIZIO, SISSA, ICTP, CNR-Democritos, Trieste, Italy — Superconductivity in trivalent alkali fullerides is believed to be phonon-driven and s-wave, similar in that to ordinary BCS systems. There is nonetheless in these materials a metal-Mott insulator transition upon lattice expansion, indicating exceedingly strong electron-electron correlations. Using Dynamical Mean Field Theory we solved a 3-band Hubbard model, including both electron-electron and (simplified) electron-phonon interactions, which yields a phase diagram [1] in striking agreement with the experimental one for the recently discovered expanded fulleride Cs3C60 as a function of pressure.[2] A dome-shaped superconducting order parameter, a pseudogap phase, and the subsequent Mott transition upon expansion thus assimilate the phonon driven fulleride superconductors to cuprates and to 2D organics, despite their obvious differences. Some experimental predictions are made, including a kinetic energy gain and a Drude weight increase in the superconducting state relative to the normal state, contrary to BCS, but similar to cuprates. [1] M. Capone, et al., Rev. Mod. Phys. 81,943 (2009); [2] Y. Takabayashi et al., Science 323, 1585 (2009).

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