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Unconventional Superconductivity of Alkali-doped Fullerenes ANTON POTOCNIK, Jozef Stefan Institute, ANDRAZ KRAJNC, National Institute of Chemistry Slovenia, PETER JEGLIC, Jozef Stefan Institute, KOSMAS PRASSIDES, University of Durham, MATTHEW J. ROSSEINSKY, University of Liverpool, DENIS ARCON, Jozef Stefan Institute — The superconductivity of the alkali-doped fullerenes (A_3C_{60}, A = alkali metal) has been so far discussed within the standard theory of superconductivity developed by Bardeen, Cooper and Shrieffer (BCS), even thought, they exhibit relatively high critical temperatures (up to $T_c = 32$ K). However, after our recent high-pressure measurements on Cs_3C_{60} such description became questionable. We have shown that the superconducting phase of A_3C_{60}, in fact, borders the antiferromagnetic insulating phase (AFI), commonly observed for high-temperature superconductors like cuprates or pnictides. In addition, we also increased the maximal T_c to 38 K. To investigate this peculiar superconductivity close to the border with AFI state we employed nuclear magnetic resonance technique on $Cs_{3-x}Rb_xC_{60}$ and on Cs_3C_{60} at various high pressures. Our results could not be correctly explained either by the standard BCS or the extended BCS that includes electron-electron repulsion interaction - the Migdal-Eliashberg theory. Far better agreement is obtained by the Dynamical Mean Field Theory. Due to similarity with other unconventional superconductors these results could also be relevant to other unconventional high-temperature superconductors.

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