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Weak ferromagnetism in lightly electron-doped CaMnO_3 HIROMASA OHNISHI, TAICHI KOSUGI, SHOJI ISHIBASHI, Nanosystem Research Institute (NRI), National Institute of Advanced Industrial Science and Technology (AIST), KIYOYUKI TERAOKURA, Research Center for Integrated Science (RCIS), Japan Advanced Institute of Science and Technology (JAIST) — The origin of the weak ferromagnetism, that is observed in lightly electron-doped CaMnO_3 , is studied by means of the non-collinear spin density functional theory, including the spin-orbit interaction. We show that the spin-canting in the G-type antiferromagnetic structure is realized by the electron-doping, and the canting angle becomes larger with increase of the doping amount. The estimated canting angle is in a good agreement with the experimental value of the Ce-doped CaMnO_3 [1] The spin-canted state is stabilized by the double-exchange interaction, and the spin-orbit interaction does not play a crucial role in this phenomenon. In addition, the spin-canted state shows metallic behavior by the double-exchange transfer that gives a reasonable interpretation for the experimental electronic transport property [2] We also clarify a possibility of the antiferromagnetic-ferromagnetic phase separation [3] that will be realized when doped-electrons are strongly localized.

[1] E.N. Caspi et al., Phys. Rev. B 69, 104402 (2004).

[2] P.-H. Xiang et al., Appl. Phys. Lett. 94, 062109 (2009).

[3] E. Dagotto et al., Phys.Rep. 344, 1 (2001).

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