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**Ferroelectricity-ferromagnetism coexistence and electromagnons in multi-band electron systems** TAKAHIRO MIKAMI, TAKASHI OKA, HIDEO AOKI, Department of Physics, University of Tokyo — While it has been established that noncoliner spin textures can realize multiferroics through magnetoelectric effect, here we look into another senario. Namely, in multi-band systems that comprise odd- and even-parity orbits, homogeneous ferromagnetism and ferroelectricity can coexist as proposed by Batista. In multi-orbital systems Hund's exchange coupling is obviously expected to play an important role, but this has yet to be studied in the above scenario. We have here determined the finite-temperature phase diagram for the quarter-filled two-band Hubbard model in the strong coupling limit. A ferroelectric-ferromagnetic phase appears in multi-band insulator phases, where Hund's coupling, neglected in previous researches, is indeed found to be important for the multiferroic phase. We have further explored low-lying excitation spectrum in the multiferroic phase, since collective excitations should be an interesting experimental probe in the multiferroics. Similar to previous studies for the SU(4) Kugel-Khomskii model, magnon-pseudomagnon bound states appear as electromagnetic excitations due to a cross correlation in the homogeneous multiferroic phase.

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