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Orbital Dzyaloshinskii-Moriya Exchange Interaction[1] PANJIN KIM, JUNG HOON HAN, Sungkyunkwan University — A superexchange calculation is performed for multi-orbital band models with broken inversion symmetry. Orbital-changing hopping terms allowed by the symmetry breaking electric field lead to a new kind of orbital exchange interaction closely resembling the Dzyaloshinskii-Moriya spin exchange. Inversion symmetry breaking as present in surfaces and interfaces and a strong on-site repulsion, but not the spin-orbit interaction, are the requirements to observe the proposed effect. Mean-field phase diagram exhibits a rich structure including anti-ferro-orbital, ferro-orbital, and both single and multiple spiral-orbital phases in close analogy with the Skyrmion spin crystal phase recently discovered in thin-film chiral magnets.

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Panjin Kim
Sungkyunkwan University

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