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Hole dynamics in spin and orbital ordered vanadium perovskites
SUMIO ISHIHARA, Department of Physics, Tohoku University — We present a theory of the doped perovskite vanadates with spin and orbital orders [1]. Two kinds of spin-orbital orders are found in the ground state: the G-type (three-dimensional (3D) staggered) spin order (SO) with the C-type (rod type) orbital order (OO) (the alternative $d^1_{xy}d^1_{yz}/d^1_{xy}d^1_{zx}$ configuration) termed (SG/OC) in YVO_3, and the C-type SO with the G-type OO termed (SC/OG) in $LaVO_3$. Mobile holes are strongly renormalized by spin excitations (magnons) in the spin G-type and orbital C-type (SG/OC) order, and orbital excitations (orbitons) in the spin C-type and orbital G-type (SC/OG) one. It is found that hole dynamics in a staggered t_{2g} orbital array is distinct from that in a antiferromagnetic order as well as the e_g orbital one. The anomalously fragile character of the (SG/OC) order observed in $Y_{1-x}Ca_xVO_3$ is attributed to the orbiton softening induced by a reduction of the spin order parameter. [1] S. Ishihara, cond-mat/0408395.

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