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Electromagnetic response in a quantum spin Hall insulator with strong correlation JUN GORYO, NOBUKI MAEDA, KEN-ICHIRO IMURA —

The quantum spin Hall system is a time-reversal invariant band insulator with a non-trivial topological electronic structure caused by the spin-orbit coupling. We investigate such a system with strong electron correlation. The on-site correlation can be expressed by the spin gauge field coupled to the electron spin (s_x, s_y, s_z) in the strong coupling limit. Electromagnetic response of this system can be derived to integrate out Fermions and also spin gauge field. We find that the system shows superconducting response when s_z is conserved, and becomes insulating when s_z -conservation is broken by a perturbation like the Rashba term. In our discussions an induced BF-term, which is the topological term with mixing of electromagnetic gauge field and spin gauge field coupled to s_z , plays an important role.

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