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.