

Nonlinear and nonreciprocal responses of topological matters

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Topological aspects of the electronic states in solids have attracted recent intensive attention. The basic idea is that the manifold in the Hilbert space constituted by the low energy eigenstates often has nontrivial quantum geometry. Therefore, the applications of this concept have been restricted to the ground state and low energy phenomena. In this talk, I will talk about the possible generalization of this idea to the nonlinear and nonequilibrium states. In this case, the transitions between the two manifolds in Hilbert space play the key role. As a representative example, the shift current in noncentrosymmetric systems will be discussed.

This work has been done in collaboration with T. Morimoto.