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Skyrmion quantum numbers and quantized pumping in two dimensional topological chiral magnets[1] BOHM-JUNG YANG, NAOTO NAGAOSA, Correlated Electron Research Group (CERG), RIKEN Advanced Science Institute, Wako, Saitama 351-0198, Japan — We investigate the general conditions to achieve the adiabatic charge and spin polarizations and quantized pumping in 2D magnetic insulators possessing inhomogeneous spin structures. In particular, we focus on the chiral ferrimagnetic insulators which are generated via spontaneous symmetry breaking from correlated two dimensional topological insulators. Adiabatic deformation of the inhomogeneous spin structure generates the spin gauge flux, which induces adiabatic charge and spin polarization currents. The unit pumped charge/spin are determined by the product of two topological invariants which are defined in momentum and real spaces, respectively. The same topological invariants determine the charge and spin quantum numbers of skyrmion textures. It is found that in noncentrosymmetric systems, a new topological phase, dubbed the topological chiral magnetic insulator, exists in which a skyrmion defect is a spin-1/2 fermion with electric charge e. Considering the adiabatic current responses of generic inhomogeneous systems, it is shown that the quantized topological response of chiral magnetic insulators is endowed with the second Chern number.

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