

Anomalous Tunneling of Spin Wave in Heisenberg Ferromagnet

Y. Kato^a, S. Watabe^{b, c}, and Y. Ohashi^{b, c}

^aDepartment of Basic Science, The University of Tokyo, Tokyo, Japan

^bDepartment of Physics, Keio University, Yokohama, Japan

^cCREST(JST), Saitama, Japan

The ferromagnetic spin wave (FSW) in classical Heisenberg chain exhibits the perfect transmission at long-wavelength limit in the transmission-reflection problem with an inhomogeneity of exchange integral. In the presence of local magnetic field, on the other hand, FSW undergoes the perfect reflection at long-wavelength limit. The difference at long-wavelength limit is attributed to the symmetry property of the scatterers; it is crucial whether the potential preserves or breaks the spin rotation symmetry. Our result implies that the anomalous tunneling property (perfect transmission at low energy limit) found in scalar¹ and spinor² BEC is not specific to the gapless modes in superfluids but is a common property shared with generic Nambu-Goldstone modes in the presence of a symmetry-preserving potential scatterer.

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