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Vison-Majorana complex zero-energy resonance in Kitaev's spin liquid

Dr. Masafumi Udagawa

Gakushuin University, Japan

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Abstract:

Recently, Kitaev's model is drawing considerable attention as a platform to study quantum spin liquid, and several compounds have been proposed as promising stages to realize this unusual spin liquid state. Among many non-trivial properties, it is remarkable that the spin liquid phases host unusual excitations: spins are fractionalized into itinerant Majoranas and Visions, and the latter behave as abelian/non-abelian anyons. In this light, the detection of Vison is strongly desired in terms of topological quantum computation, one of the most attractive applications of quantum spin liquid.

In this talk, we consider the effect of impurity in Kitaev's spin liquid, and look for possible experimental signatures of Visions. For this purpose, we construct an exact analytical formula of the real-time spin correlation in this system, and address the dynamical properties of the Kitaev's spin liquid, in the presence of site vacancy. In particular, we will focus on the zero-energy resonance appearing in the neighborhood of site vacancy, and discuss the possibility of its observation through the anomalous temperature and field-orientational dependence of spin-lattice relaxation rate.