Symmetry fractionalization of visons in $Z_2$ spin liquids

YANG QI, Perimeter Institute for Theoretical Physics, MENG CHENG, Station Q, Microsoft Research, CHEN FANG, Massachusetts Institute of Technology — In this work we study symmetry fractionalization of vison excitations in topological $Z_2$ spin liquids. We show that in the presence of the full SO(3) spin-rotational symmetry and if there is an odd number of spin-$\frac{1}{2}$ per unit cell, the symmetry fractionalization of visons is completely fixed. On the other hand, visons can have different classes of symmetry fractionalization if the spin-rotational symmetry is reduced. As a concrete example, we show that visons in the Balents-Fisher-Girvin $Z_2$ spin liquid have crystal symmetry fractionalization classes which are not allowed in SO(3) symmetric spin liquids, due to the reduced spin-rotational symmetry.

Yang Qi
Perimeter Institute for Theoretical Physics

Date submitted: 06 Nov 2015
Electronic form version 1.4