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Gauge field fluctuations in three-dimensional topological Mott insulators[1] WILLIAM WITCZAK-KREMPA, TING PONG CHOY[2], University of Toronto, Canada, YONG BAEK KIM, University of Toronto, Canada & Korea Institute for Advanced Study, Korea — We discuss the low-energy properties of 3D topological Mott insulators that can be viewed as strong topological insulators of spinons interacting with a 3D gauge field. The low-energy behavior of such systems is dominated by gapless surface spinons (Dirac fermions) coupled to bulk gauge bosons. We find that a dimensional crossover from 3D to 2D in the gauge field fluctuations may occur as the system's thickness and/or temperature is varied. In the thin sample limit, the gauge field fluctuations effectively become 2D and the problem becomes analogous to the standard 2D spinon-gauge field theory. In the 3D limit, the bulk gauge field fluctuations lead to a novel low-energy theory for the coupled system that is more controlled than in the 2D regime. We discuss various experimental signatures such as the heat capacity scaling as T ln(1/T) as well as modified RKKY interactions on the surface.

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[2]Currently at University of Leiden, Instituut-Lorentz for theoretical Physics

William Witczak-Krempa
University of Toronto

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