

Abstract Submitted
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Energy gap of neutral excitations implies vanishing charge susceptibility HARUKI WATANABE¹, Applied Physics Department, University of Tokyo — In quantum many-body systems with a U(1) symmetry, such as the particle number conservation and the axial spin conservation, there are two distinct types of excitations: charge-neutral excitations and charged excitations. The energy gaps of these excitations may be independent with each other in strongly correlated systems. The static susceptibility of the U(1) charge vanishes when the charged excitations are all gapped, but its relation to the neutral excitations is not obvious. In this talk, we show that a finite excitation gap of the neutral excitations is, in fact, sufficient to prove that the charge susceptibility vanishes (i.e. the system is incompressible). This result gives a partial explanation on why the celebrated quantization condition that $n(S - m_z)$ must be an integer at magnetization plateaus works even in spatial dimensions greater than one. Ref: arXiv:1609.09543

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