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Quantized coefficients for the Chern-Simons terms in bosonic and fermionic symmetry protected topological states in 2n+1D with U(1) symmetry CHAO-MING JIAN, Stanford Univ, PENG YE, Perimeter Institute for Theoretical Physics, XIAO-LIANG QI, Stanford Univ — The study of symmetry protected topological (SPT) phases has led to many fruitful results. The classification of SPT states shows a big difference between bosonic systems and fermionic systems even when they share the same symmetry. In this talk, I will focus on SPT states with U(1) symmetry. In 2n+1 dimensions, when we gauge the U(1) symmetry, the effective actions of the gauge field contain Chern-Simons term (and its generalization in higher dimensions) with quantized coefficients. The quantization of these coefficients is different between bosonic and fermionic systems. I will derive, using different methods, the quantization of coefficients for bosonic systems using general gauge invariance principle. I use Dirac fermions in 2n+1D coupled to U(1) gauge field to show the quantization for fermionic systems. I find that the bosonic and fermionic systems have a factor of (n+1)! difference in the quantization unit of the quantized coefficients.

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