



独立行政法人理化学研究所 仁科加速器研究センター
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Generalization of the Nambu-Goldstone theorem

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Symmetry and its spontaneous breaking are of basic importance for understanding the low energy physics in many-body systems. When a continuum symmetry is spontaneously broken, there exist a zero mode called Nambu-Goldstone (NG) mode, which is well developed in Lorentz invariant systems. In contrast, in non-Lorentz invariant systems, the NG theorem has not been well developed. In this talk, we introduce the recent progress in generalization of NG theorem, and discuss the counting rule for NG modes using the Langevin equation derived from Mori's projection operator method. We show that the number of NG modes is equal to the number of broken charges, Q_a , minus half the rank of the expectation value of $[Q_a, Q_b]$. We also discuss the spontaneous breaking of space-time symmetries.

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