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【124】 Extending Haldane's conjecture to SU(3) spin chain systems

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We apply field theory methods to SU(3) symmetric Heisenberg chains in the fully symmetric representation, with p boxes in the Young tableau, mapping them into a $SU(3)/(U(1) \times U(1))$ non-linear σ -model with a non-trivial topological term and a topological angle $\theta = 2\pi p/3$. Based on this mapping we argue that SU(3) spin chains are gapped for $p = 3m$, while gapless for $p = 3m \pm 1$ (for integer m). This is confirmed by Monte Carlo calculations on the σ -model. We further discuss the phase diagram and the renormalization flow of the σ -model, and its implications on spin chains.

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