

Weak Finite-Size Dependence of Velocity and Strong Phase Dependence of Central Charge

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Abstract: We study the finite-size scaling behavior of velocity and central charge for different coupling constants and different phases in (1+1)-dimensional lattice model in very short chains. Using XXZ spin 1/2 chains with 15 or fewer sites, we demonstrate the weak finite-size dependence of spinon velocity for any magnitude of coupling strength J_z and the strong phase dependence of central charge. This behavior of velocity and central charge in different coupling constants and different phases gives a method to determine phase transitions of (1+1)-dimensional models. This method is simple and efficient by utilizing only the ground state energy of very short finite-size chains. It is also general and powerful for various one-dimensional lattice models and it uncovers even the weakest Berezinski-Kosterlitz-Thouless phase transitions.

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Key words: phase diagram, one-dimensional model, central charge

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