

# Mathematical Rigor in Physics: Putting Exact Results in Their Place

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## Abstract

The present paper examines the role of exact results in the theory of many-body physics, and specifically the example of the Mermin-Wagner theorem, a rigorous result concerning the absence of phase transitions in low-dimensional systems. While the theorem has been shown to hold for a wide range of many-body models, it is frequently 'violated' by results derived from the same models using numerical techniques. This raises the question of how scientists regulate their theoretical commitments in such cases, given that the models, too, are often described as approximations to the underlying 'full' many-body problem.

**Keywords:** rigorous results, mathematical rigor, condensed matter physics, phase transitions, many-body physics, statistical physics, models

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