Bender-Wu formulas and generalized nonanalytic expansions for odd anharmonic oscillators

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Abstract

Since the seminal investigations of Bender and Wu in the 1970s [1], there has been one unresolved problem in the theory of anharmonic oscillators: What is the leading-order factorial growth of perturbative coefficients, for an arbitrary energy elevel of an arbitrary odd anharmonic oscillator? This very question has been answered by Bender and Wu for even oscillators, but the same basic question had been left unanswered for the odd case. We present results for dispersion relations and for generalized nonanalytic expansions that describe the energy levels, thereby answering a few of the remaining questions, and sustain the results by numerical verification [2].

References

[1] C. M. Bender and T. T. Wu, Phys. Rev. Lett. **27**, 461 (1971).

[2] U. D. Jentschura, A. Surzhykov and J. Zinn-Justin Phys. Rev. Lett. **102**, 011601 (2009).