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Generalized Moment Method for Gap Estimation and Quantum Monte Carlo Level Spectroscopy HIDEMARO SUWA, SYNGE TODO, Department of Physics, The University of Tokyo — We formulate a convergent sequence for the gap estimation in the worldline quantum Monte Carlo method. The ambiguity left in the conventional gap calculation for quantum systems is eliminated. The level spectroscopy from quantum Monte Carlo data is developed as an application of the unbiased gap estimation. From the spectrum analysis, we precisely determine the Kosterlitz-Thouless type quantum phase transition point in the spin-Peierls model as $\lambda_c = 0.2245 \pm 0.0017$ for phonon frequency $\omega = 1/4$. We demonstrate that the criticality at the transition point is described by the $k = 1$ $SU(2)$ Wess-Zumino-Witten model. The detailed comparison to the previous approach to the gap estimation is shown and discussed. Reference: H. Suwa and S. Todo, arXiv:1402.0847.

Hidemaro Suwa
Department of Physics, The University of Tokyo

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