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Blocking versus Sampling

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The idea of blocking in configuration space has played an important role in the development of the RG ideas. However, despite
being half a century old and having had a huge intellectual impact, generic numerical methods to perform blocking for lattice models have progressed more slowly than sampling methods. Blocking may be essential to deal with near conformal situations. Typically, blocking methods have smaller statistical errors but larger systematic errors than sampling methods. This situation is evolving with recent developments based on the Tensor RG (TRG) method. We report recent results for spin and gauge lattice models obtained with this new method regarding searches for fixed points, calculations of critical exponents and resolutions of sign problems. An interesting model for comparison is the 2-dimensional O(2) model with a chemical potential which has a sign problem with conventional Monte Carlo but allows sampling with the worm algorithm and blocking with various TRG formulations. We compare the efficiency and accuracy of these methods and discuss the possibility of combining them.

Summary

We compare new blocking methods (tensor RG) recently developed for spin and gauge models with conventional sampling methods.

Primary author: MEURICE, Yannick (University of Iowa)

Co-authors: ZOU, Haiyuan (University of Iowa); UNMUTH-YOCKEY, Judah (University of Iowa); Dr LIU, Yuzhi (University of Colorado Boulder)

Presenter: MEURICE, Yannick (University of Iowa)

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