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On the Lefschetz thimbles structure of the Thirring model

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The complexification of field variables is an elegant approach to attack the sign problem. In one approach one integrates on Lefschetz thimbles: over them, the imaginary part of the action stays constant and can be factored out of the integrals so that on each thimble the sign problem disappears. However, for systems in which more than one thimble contribute one is faced with the challenging task of collecting contributions coming from multiple thimbles.

The Thirring model is a nice playground to test multi-thimble integration techniques; even in a low dimensional theory, the thimble structure can be rich. It has been shown since a few years that collecting the contribution of the dominant thimble is not enough to capture the full content of the theory. We report preliminary results on reconstructing the complete results from multiple thimble simulations.

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