

## Attacking the Sinh-Gordon model with relativistic continuous matrix product states\*

*Monday, May 23, 2022 10:00 AM (1 hour)*

The Sinh-Gordon model is a 1+1 dimensional quantum field theory with a potential  $\cosh(b\phi)$  that is quite peculiar. It is at the same time exactly solvable (for many observables) and not well understood. I will present the results of a variational exploration of its strong coupling regime with a recent generalization of continuous matrix product states. The advantage of this method is that it does not require introducing a cutoff, UV or IR, is fully non-perturbative, typically converges fast for Hamiltonians with polynomial interactions, and gives rigorous energy upper bounds. Its application to the Sinh-Gordon model is only partly successful: observables can be computed accurately up to fairly large values of the coupling, but the ultra strong coupling regime remains difficult to access without extrapolations. As a result, the behavior near the self-dual point is not yet fully settled. I will show the basics of relativistic continuous matrix product states, explain how they typically work for  $\phi^4$  like theories or even the easier Sine-Gordon model and finally discuss my attempts at taming Sinh-Gordon.

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