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A variational approach to QFT in low dimensions?

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Massive quantum field theories in 1+1 dimensions are interesting in that they are fairly easy to define rigorously but still very difficult to solve (except at some integrable points). In the past few years, my collaborators and I have introduced and developed a variational method to solve them. The variational ansatz is based on a combination of continuous matrix product states and Bogoliubov transform. It is mathematically interesting in that it is in principle arbitrarily precise, works in the continuum and in the thermodynamic limit directly, and gives rigorous bounds to the energy density of the vacuum. I will motivate this variational class, explain what models we already applied it to, and list the many open problems ahead to make it a fully general method to solve generic QFT in 1+1d.

Orateur: TILLOY, Antoine (LPENS & Mines Paris & INRIA)