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# Exponential improvement of the sign problem via contour deformations in the 2+1D XY model at nonzero density

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We studied the 2+1 dimensional XY model at nonzero chemical potential on deformed integration manifolds with the aim of alleviating its sign problem. We investigated several proposals for the deformations and managed to considerably improve on the severity of the sign problem with respect to standard reweighting approaches. In this talk I present numerical evidence that a significant reduction of the sign problem can be achieved which is exponential in both the squared chemical potential and the spatial volume. Furthermore, I discuss a new approach to the optimizaiton procedure, based on reweighting, that sensibly reduces its computational cost.

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