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Scalar QCD at nonzero density

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We study scalar QCD at nonzero density in the strong coupling limit. It has a sign problem which looks structurally similar to the one in QCD. After introducing dual variables by integrating out the SU(3) gauge links we find that we need at least 3 flavors for a nontrivial dependence on the chemical potential.

In this dual representation there is no sign problem remaining.

The dual variables are partially constrained, thus we use a hybrid approach for the updates:

For unconstrained variables we use local updates,

while for constrained variables we use updates based on the worm algorithm.

Authors: Dr BRUCKMANN, Falk (University of Regensburg); Mr WELLNHOFER, Jacob (Universität Regensburg)

Presenter: Mr WELLNHOFER, Jacob (Universität Regensburg)

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