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The 2-flavor Schwinger model in anisotropic volumes

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Content

The Schwinger model represents Quantum Electrodynamics in 2 space-time dimensions ($2d$ QED). It shares key properties with $4d$ QCD, in particular confinement and topology. We present preliminary simulations results of its lattice formulation with N_f=2 degenerate fermion flavors, which are represented as Wilson fermions, in anisotropic volumes. At any N_f>1 the chiral condensate vanishes in the chiral limit. We present numerical results for its mass and temperature dependence, which are compatible with an analytic conjecture by Hosotani. Although the Mermin-Wagner Theorem excludes the spontaneous breaking of the flavor symmetry, at finite fermion mass we obtain a triplet of light quasi-Nambu-Goldstone bosons, which we denote as pions. Inverting the physical interpretation of the coordinates, we arrive at the delta-regime, and we measure the dependence of the pion mass on the spatial size at zero temperature. Theoeretical predictions for this dependence in QCD by Leutwyler, and in 3d sigma models by Hasenfratz and Niedermayer, have a universal feature which allows for an extrapolation to $2d$ QED. The numerical results accurately match this extrapolation.

Area of contribution

Simulations

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