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A worm algorithm for the lattice CP(N-1) model

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The CP(N-1) model in 2D is an interesting toy model for 4D QCD as it possesses confinement, asymptotic freedom and a non-trivial vacuum structure. Due to the lower dimensionality and the absence of fermions, the computational cost for simulating 2D CP(N-1) on the lattice is much lower than the one for simulating 4D QCD. However to our knowledge, no efficient algorithm for simulating the lattice CP(N-1) model has been tested so far, which also works at finite density. To this end we propose a new type of worm algorithm which is appropriate to simulate the lattice CP(N-1) model in a dual, flux-variables based representation, in which the introduction of a chemical potential does not give rise to any complications.

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