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Monte Carlo studies of dynamical compactification of extra dimensions in a model of nonperturbative string theory

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The IIB matrix model has been proposed as a nonperturbative definition of superstring theory. In this work, we study the Euclidean version of this model in which extra dimensions can be dynamically compactified if a scenario of the spontaneous breakdown of the SO(10) rotational symmetry is realized. Monte Carlo calculations of the Euclidean IIB matrix model suffer from a very strong complex action problem due to the large fluctuations of the complex phase of the Pfaffian after integrating out the fermion. We employ the factorization method to achieve the effective sampling. We report on preliminary results that can be compared with previous studies of the rotational symmetry breakdown using the Gaussian expansion method.

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