

How standard model particles can be realized in the type IIB matrix model

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Abstract: The type IIB matrix model is considered as the non-perturbative formulation of superstring theory, which is believed to be able to explain both the origin of space-time and interactions of matters. The (3+1)-dimensional expanding space-time has been partially demonstrated using the Monte Carlo simulation. It is still curious to see if matter interactions similar to the standard model could arise naturally from the matrix model or not. In order to get the standard model particles at low energy scale, massless particles need to exist at the Planck scale. In this work, we study particle spectra of many classical solutions of the matrix model. In particular, we investigate analytical solutions which accomodate massless Dirac fermions. We found that a few of these solutions also give massless scalar bosons, which are essential in the Higgs mechanism.