

The emergence of (3+1)-dimensional space-time in the type IIB matrix model

Thursday, 8 December 2022 14:00 (20 minutes)

We perform numerical studies of the type IIB matrix model, which was proposed as a nonperturbative formulation of superstring theory in 1996. We overcome the sign problem by using the complex Langevin method and show that it is necessary to add a term corresponding to infrared regularization to the action of the original model. By these procedures, we find the (3+1)D expanding space-time in this model.

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Session Classification: Parallel session A