Smart and Human

常翔学園

摂南大学

Monte Carlo simulations of a supersymmetric matrix model of dynamical compactification in nonperturbative string theory

Poster session at KEK Workshop 2013,
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Konstantinos N. Anagnostopoulos, ***Takehiro Azuma***, Jun Nishimura,
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Content of the poster session

SETSUDAI

IKKT model (IIB matrix model)
⇒Promising candidate for nonperturbative formulation of superstring theory

$$S = \underbrace{-\frac{N}{4}\mathrm{tr}[A_\mu, A_\nu]^2}_{=S_B} + \underbrace{\frac{N}{2}\mathrm{tr}\bar{\psi}_\alpha(\Gamma_\mu)_{\alpha\beta}[A_\mu, \psi_\beta]}_{=S_F}.$$

How does our 4dim spacetime emerge from superstring theory?

We studied Spontaneous Symmetry Breakdown (SSB)
of the SO(6) symmetry in the Euclidean 6d version of the IKKT model.

⇒Dynamical compactification of spacetime.

Complex phase of the fermion determinant
⇒important for *SO(6) rotational symmetry breakdown*.

Monte Carlo simulation via factorization method
⇒To what extent do our numerical studies agree with the Gaussian Expansion Method (GEM) results?

- Spontaneous breakdown of SO(6) rotational symmetry to SO(3).
- Universal “compactification” scale.
- Constant volume property.