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Higher-Dimensional Fermionic SYK Model in IR Region

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We study the 2D fermionic SYK model with Majorana fermions, featuring a kinetic term with a quartic expression and a $2q$-body interaction with Gaussian disorder. By minimizing the effective action or solving the SD equation for $q = 1$, we determine that the appropriate ansatz involves zero spins. Our computation of the Lyapunov exponent shows violations of chaos and unitarity bounds. The gravitational dual corresponds to AdS_3 Einstein gravity with a finite radial cut-off even if we lose the non-zero spins. We also extend the SYK model to higher dimensions while maintaining a similar SD equation in the IR.

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