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Grassmann tensor network study of multi-flavor gauge theory

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Dealing with multiple flavors of Wilson fermions with Grassmann TRG is known to be difficult due to the exponential growth of the tensor size. Here, we propose a way to overcome this problem by separating the initial tensor into layers, each corresponding to different flavor. A compression scheme for the initial tensor is also proposed to further reduce the size. We test our method by studying the chiral phase transition. We also demonstrate the Silver Blaze phenomenon in Abelian gauge theory with up to 4 flavors, which is impossible with the Monte Carlo method due to the severe sign problem.

Presenter: Mr YOSPRAKOB, Atis (Niigata University)

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