Extreme Universe Colloquium

The 18th COLLOQUIUM

July 24th (Mon.) ONLINE

TALK 10:00 - 11:00 (JST)

July 24th (Mon.) 1:00 - 2:00 (UTC)

July 23th (Sun.) 21:00 - 22:00 (EDT)

ONLINE COFFEE TIME
11:00 - 12:00 (JST)

Registration required (click HERE)

Extreme Universe, JAPAN

Speaker

Prof. Synge Todo

The University of Tokyo

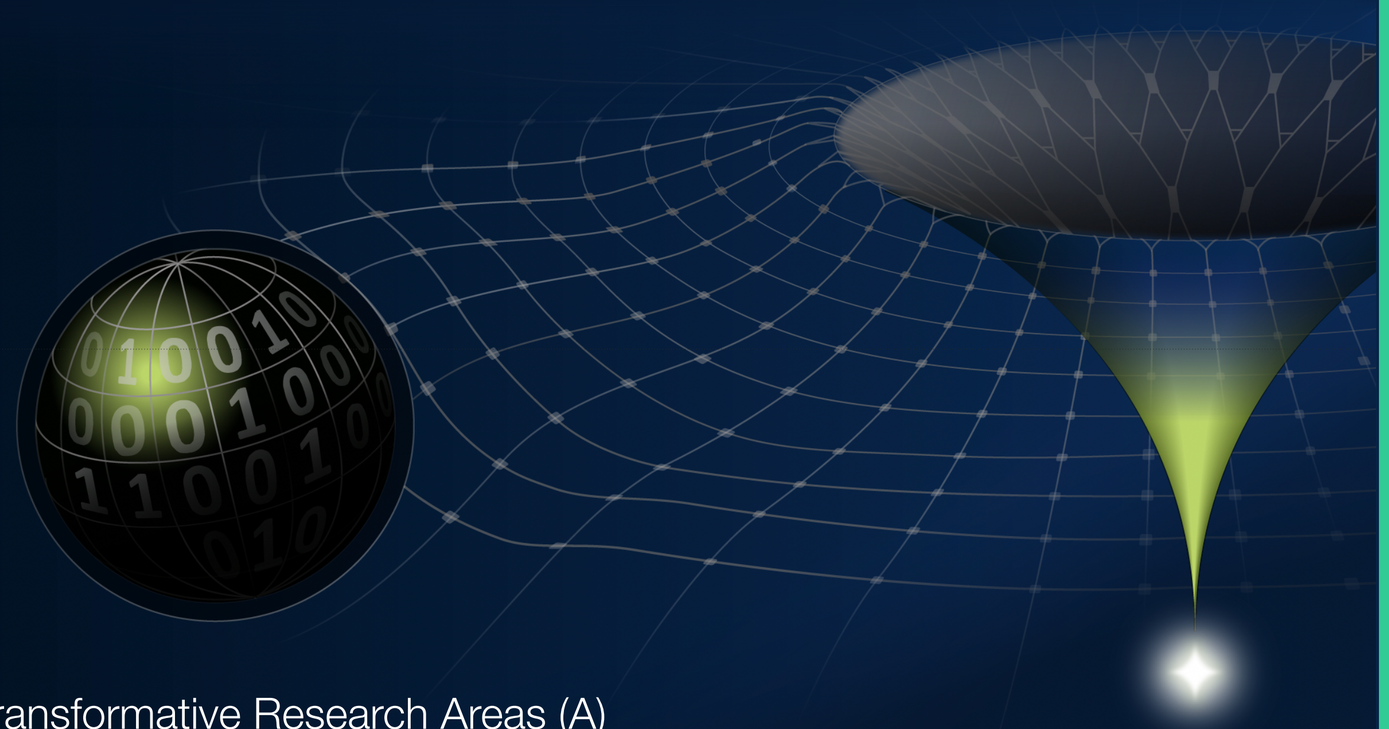
Title

Markov-Chain Monte Carlo in Tensor-Network Representation

Abstract

The partition functions of various classical and quantum lattice models can be represented as tensor networks. However, the exact contraction of a tensor network is generally exponentially expensive, and some approximation, such as low-rank approximation based on singular value decomposition, is usually required. Recently, we proposed a new tensor contraction method based on Monte Carlo sampling. The proposed method combines the stochastic basis transformation of tensors with the Markov chain Monte Carlo framework.
It can entirely remove the systematic error due to a finite bond dimension of the low-rank approximation while keeping the high accuracy of the tensor-network method. We also demonstrate how the proposed method works for systems with negative (or complex) weights, where the standard Markov chain Monte Carlo suffers from a severe sign problem.

2024



MEXT -KAKENHI- Grant-in-Aid for Transformative Research Areas (A)
The Natural Laws of Extreme Universe -A New Paradigm for Spacetime and Matter from Quantum Information-