



量子物理学・ナノサイエンス第 79 回特別セミナー

# Digital quantum simulation of the Schwinger model with topological term

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**日程** : 10月11日(月) 14:00 -

**場所** : Zoom\*

## 概要

I am going to talk about application of quantum computation to numerical simulation of quantum field theory. Specifically we implement a digital quantum simulation of a gauge theory with a topological term in Minkowski spacetime, which is practically inaccessible by standard lattice Monte Carlo simulations. We focus on 1+1 dimensional quantum electrodynamics with the  $\theta$ -term known as the Schwinger model. We construct the true vacuum state of a lattice Schwinger model using adiabatic state preparation which, in turn, allows us to compute an expectation value of the fermion mass operator with respect to the vacuum. Upon taking a continuum limit we find that our result in massless case agrees with the known exact result. In massive case, we find an agreement with mass perturbation theory in small mass regime and deviations in large mass regime. We also study the confinement versus screening problem in the Schwinger model. Our results imply that digital quantum simulation is already useful tool to explore non-perturbative aspects of gauge theories with real time and topological terms. This talk is based on joint works with Bipasha Chakraborty, Etsuko Itou, Taku Izubuchi, Yuta Kikuchi, Lento Nagano, Takuya Okuda, Yuya Tanizaki and Akio Tomiya.

\*本 ZOOM セミナーに参加されます場合には、事前に下記より登録を済ませてください。

<https://us06web.zoom.us/meeting/register/tZAsdOqgrzMoH9ftWLHelPzskzsAvJj3pn-k>

ご来聴を歓迎いたします。



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