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Monte Carlo study of Schwinger model without the sign problem

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In the conventional lattice formulation, conducting a Monte Carlo study of the Schwinger model (quantum electrodynamics in 1 + 1 dimensions) with a topological θ term or at finite density is almost impossible due to the sign problem. In this talk, I present the lattice formulation of the bosonized Schwinger model, which allows us to study the model using the Monte Carlo method without encountering the sign problem. I demonstrate the validity of the formulation by presenting numerical results at a finite θ angle and finite density. I also discuss possible applications of this formulation to other models.

Topical area

QCD at Non-zero Density

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