



筑波大学

University of Tsukuba

Condensed Matter Seminar

物性論セミナー

2023年2月15日 (水), Feb.15 (Wed.) 2023

13:00-14:00 [D301](#) (Univ. Tsukuba) / +Zoom

Numerical study of the Hubbard model for semions and anyon superconductor

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Abstract:

Non-interacting particles obeying certain fractional statistics have been predicted to exhibit superconductivity. In this seminar, we numerically demonstrate the emergence of superconducting states for attractively interacting spinful semions. To effectively investigate an interplay between the short-range interaction and the fractional statistics, we develop a method to construct a Hubbard model with finite U by virtually splitting sites for each spin. By calculating the reduced density matrix for two semions, we numerically show that the ground state exhibits off-diagonal long-range order (ODLRO) in the strong coupling limit. This is consistent with the expectation that a pair of semions behaves like a boson. We also discuss a BCS-BEC crossover for semions by comparing the behavior of ODLRO for fermions and semions [1].

[1] K. Kudo and J. Schirmer, Phys. Rev. B **106**, 214517 (2022)

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