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Title: Spontaneous mass generation and chiral symmetry breaking in a lattice Nambu-Jona-Lasinio model

Abstract:

In quantum chromodynamics, without interactions, quarks have no mass and conserved quantity called chirality. In reality, quarks have mass, and chiral symmetry is broken. This is thought to be the result of spontaneous symmetry breaking by the interaction. In this talk, we consider a lattice version of Nambu-Jona-Lasinio model with interacting staggered fermions in the Kogut-Susskind Hamiltonian formalism. In a strong coupling regime for the four-fermion interaction, we prove that the mass of the fermions is spontaneously generated at sufficiently low temperatures. This means that the chiral symmetry will be spontaneously broken if the continuum limit exists. For the proof, the reflection positivity for fermions and the method of the infrared bound are crucial. This talk is based on joint work with Tohru Koma.