Contribution ID : **3** Type : **not specified**

Revisiting O(N) σ model at unphysical pion masses and high temperatures

Monday, 29 April 2024 11:50 (20)

Roy-equation analyses on lattice data of ππ scattering phase shifts at mπ = 391MeV reveals that the lowest f0 meson becomes a bound state under this condition. In addition, there is a pair of complex poles below threshold generated by crossing symmetry [1]. We use the N/D method to partially recover crossing symmetry of the O(N) σ model amplitude at leading order of 1/N expansion, and qualitatively reproduce the pole structure and pole trajectories with varying pion masses as revealed by Roy-equation analyses. The σ pole trajectory with varying temperature is also discussed and found to be similar to its properties when varying mπ . As the temperature increases, the complex σ poles firstly move from the second Riemann sheet to the real axis becoming two virtual state poles, and then one virtual state pole moves to the first sheet turning into a bound state pole and finally tends to the pion pole position at high temperature which is as expected from the chiral symmetry restoration. Our results provide further evidences that the lowest f0 state extracted from experiments and lattice data plays the role of σ meson in the spontaneous breaking of chiral symmetry. Finally, we also briefly discuss the problems of the effective potential in the situation when mπ and temperature get large.

Primary author(s) : □, □□ (Shanghai Jiao Tong University)

Presenter(s) : □, □□ (Shanghai Jiao Tong University)