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Low-energy K+N scattering revisited and in-medium strange quark condensate

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It is important to investigate the in-medium quark condensates to understand the mechanism of the spontaneous breaking of chiral symmetry. The up and down quark condensates in nuclear medium are studied by pionic atoms and low energy pion nucleus scattering. It is found that the magnitude of the ud quark condensates may be reduced by 30% at the nuclear saturation density. This is known as partial restoration of chiral symmetry in nuclear medium. For a systematic study of partial restoration of chiral symmetry, it is interesting to see how the strange quark condensate behaves in nuclear matter. The chiral ward identity connects the in-medium quark condensate to the soft limit value of a correlation function of the pseudoscalar fields evaluated in nuclear medium. For the strange quark condensate, one considers the correlation function of the pseudoscalar fields with strangeness. The correlation function describes in-medium propagation of kaon and it is obtained phenomenologically by kaon-nucleon scattering in the low density approximation. In this talk we describe the kaon-nucleon scattering amplitude in chiral perturbation theory and its low energy constants are determined by existent K+N scattering data. Performing analytic continuation of the scattering amplitude obtained by chiral perturbation theory, we can take soft limit of the scattering amplitude. With this amplitude, we evaluate the in-medium strange quark condensate based on hadron phenomenology. We also discuss a possible broad resonance with S=+1 appearing in the KN scattering with I=0 around W=1650 MeV.

session

J. Strange Nuclear Systems

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