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K+ ID detector and Time Projection Chamber to study K+N interaction at DAΦNE (#7)

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"Chiral symmetry is thought to be partially restored in the finite density such as nucleus thus, quark condensation should be decreased. To investigate wether the chiral symmetry is surly restored and how much of the chiral symmetry will be restored, embedding hadrons in the nucleus is effective methods. As systematic studies of deeply bound pionic atoms and the low-energy π−-nucleus elastic scattering experiment have conducted. The result revealed that the chiral symmetry was about 30% restored in both bounded and scattered state. However it is not trivial that how dose the effect on the restoration of chiral symmetry appears in other nucleus-hadron systems. Therefor, from the systematic aspects, it is necessary to investigate the effect of restoration of the chiral symmetry breaking in other nucleus-hadron systems.
We are going to conduct elastic scattering experiment by using K+ mesons. Considering elastic scattering of K+ and nucleus, because the mean free path of the K+ is comparatively long in the nuclear medium, it is possible to expect that K+ will scatter with each nucleons. Therefor it is expected that the linear-density approximation; σ (K + A) ⊠ A σ (K + N) will be hold. However, the scattering cross section ratio for one nucleon as target as Carbon 12C and deuteron d is know to be
{σ(12C)/12}/{σ(K+d)/2} >1
from experiment. Thus, the linear-density approximation is broken and it can be said the K+N interaction in nuclear medium is larger than that in the vacuum. Although the interpretation of this phenomenon is still uncertain. One of the reason for this is the lack of experimental data in the low-energy region. We would like to show that such nontrivial behavior of the scattering cross section ration can be explained in terms of partial restoration of chiral symmetry."

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