

Study for the modification of the ϕ meson mass and chiral-symmetry restoration in nuclear density at J-PARC

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Content

J-PARC E88 aims to study chiral-symmetry restoration by measuring high-statistics ϕ meson decays to K^+K^- in proton-nucleus collisions [1,2]. In the previous KEK-E325 experiment, the mass reduction of ϕ was observed at low velocity ϕ in p+Cu collisions in the e^+e^- decay [3]. We will collect about one million decay events in p+C, p+Cu, and p+Pb collisions for low-velocity ϕ mesons to study the mass dependence on the momentum (dispersion relation) in high precision. The $\bar{s}s$ condensate at finite density will be evaluated quantitatively by extrapolating the ϕ mass shift to zero momentum. We also aim to measure the dependence of the dispersion relation on ϕ polarities for the first time, which is predicted to be different between longitudinal and transverse polarization by QCD sum rules [4]. The ϕ polarity can be distinguished with a K^\pm decay angle in the rest frame of ϕ at E88 [5].

Particle identification detectors, MRPC (Multi-gap Resistive Plate Chamber), SC (Start-timing Counter), and AC (Aerogel Cherenkov counter) have been developed to be installed at forward angles in the J-PARC E16 spectrometer for Kaon identification [1,2].

In this presentation, we will show the physics goals, the experimental setup, and the feasibility of mass shift measurements. Next, we present the status of detector preparation and the schedule for J-PARC E88.

Reference

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Field of Research: Strange mesons in nuclei

Experiment / Theory: Experiment

Contribution Type: Contributed talk