

Experimental research on the spectral modifications of vector mesons in nuclear medium at J-PARC (invited talk)

Wednesday, April 2, 2025 2:00 PM (30 minutes)

Hadrons are elementary excitations of the QCD vacuum and reflect its fundamental properties. A large fraction of their mass originates from chiral symmetry breaking, which is expected to be partially restored under high-temperature or high-density conditions. In such environments, the modification of hadron mass spectra is expected.

To investigate in-medium modifications of hadron masses, experimental studies have been conducted in high-energy heavy-ion collisions and nuclear environments.

The J-PARC E16 experiment aims to measure the mass spectra of vector mesons (ρ, ω, ϕ) produced via the $p+A \rightarrow \rho, \omega, \phi + X$ reaction in nuclei. In dense nuclear matter, vector mesons are expected to exhibit reduced masses compared to their vacuum states. Their decay into $e^+ e^-$ pairs is particularly suitable for this study, as the dilepton channel avoids final-state interactions and preserves the in-medium spectral information.

The E16 spectrometer has been developed to achieve high-mass resolution and collect large-statistics data through a combination of large acceptance and high-intensity beams. After completing development and commissioning runs, the experiment is moving toward the data-taking phase to study in-medium hadron modifications.

The current status, particularly on the data collected in 2024, will be presented.

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Session Classification: Parallel Session (A)