

Medium modifications of light vector mesons in photoproduction reactions at JLab

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Theoretical calculations predict the modification of properties of vector mesons, such as a shift in their masses and/or broadening of their widths in dense nuclear matter. These effects can be related to partial restoration of chiral symmetry at high density or temperature. Photoproduction of vector mesons off nuclei were performed at Jefferson Lab using the CEBAF Large Acceptance Spectrometer (CLAS). The data were taken with a beam of tagged photons with energies up to 4 GeV on various nuclear targets. The properties of the rho vector mesons were investigated via their rare leptonic decay to e^+e^- . This decay channel is preferred over hadronic modes in order to eliminate final state interactions in the nuclear matter. The combinatorial background in the mass spectrum was removed by a self-normalizing mixed-event technique. The rho meson mass distributions were extracted for each of the targets. Statistically significant results regarding medium modification of the rho meson in the nuclear medium rule out large medium effects. Transparency studies of the omega and phi vector mesons allows a determination of their widths in the medium.