Nuclear Mass Number Dependence of Inclusive ω and ϕ Meson Production in 12.9 GeV/c p-A Collisions

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Recently, the phenomenon, partial restoration of chiral symmetry at finite density, has attracted considerable attention. Our experiment, KEK-PS E325, was designed to study it via modification of vector meson mass in nuclei. The spectrometer was designed to collect slowly moving mesons from 12.9 GeV/c p-A collisions. It had its acceptance for ϕ (ω) meson around -0.3 (-0.1) for Feynman's x ($x_{\rm F}$) and around 0.9 GeV/c (0.2 GeV/c) for transverse momentum ($p_{\rm T}$). For the analysis of such chiral phenomena, it is important to understand the production mechanism of vector mesons and interactions between hadrons in nuclei. We used JAM [1], a microscopic simulation program for nuclear collisions, for the purpose. We compared the calculation of JAM with our data of ω and ϕ mesons at the viewpoints of the production cross section and the kinetic distributions. Except for the production cross section of ω meson, JAM reproduced the distributions of our data well. It also gave consistent result with the data on mass number dependence α, with which production cross section $\sigma(A)$ is parameterised as $\sigma(A) = \sigma_0 A^\alpha$ for nucleus A. We obtained α=1.01$\pm$0.09 for ϕ meson and 0.87$\pm$0.08 for ω meson, while JAM predicted 1.08$\pm$0.01 and 0.79$\pm$0.01 respectively. The values of α for differential cross sections in JAM had the same tendency of dependence on $x_{\rm F}$ and $p_{\rm T}$ as our data. With increase in $x_{\rm F}$, α became smaller, but it did not depend on $p_{\rm T}$ in our kinetic region. We will discuss the production mechanism of vector mesons suggested by measured αs.

References

[1] Y.Nara *et al.*, Phys. Rev. C **61** (1999) 024901.

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