Absorption of $\pi^+\pi^-$ Emitting from Coherent ρ^0 Propagation

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The rho-nucleus interaction can be investigated conspicuously by the coherent rho meson production from the nucleus. For (p, p') reaction on nucleus, the virtual ρ^0 emitting at the pp' vertex is governed by the relativistic ρNN Lagrangian $\mathcal{L}_{\rho NN}$. This virtual meson propagates, usually denoted by $G_\rho(t)$, to a certain position $\mathbf{r}$, where it interacts with the nucleus through its self-energy $\Pi_\rho(w, \mathbf{r})[= 2wV_{O\rho}(\mathbf{r})$, here $V_{O\rho}(\mathbf{r})$ is the rho-nucleus optical potential]. Due to this interaction, the off-shell ρ^0 become on-shell particle whose forward propagation, $S_\rho(\mathbf{r}', \mathbf{r})$, from $\mathbf{r}$ to $\mathbf{r}'$ can be described by the eikonal form [1]. To generate $S_\rho(\mathbf{r}', \mathbf{r})$, the rho-nucleus optical potential is taken to be the form [2]: $V_{O\rho}(\mathbf{r}) = -\frac{v}{2}(i + \alpha)\sigma_t \varrho(\mathbf{r})$. The rho-nucleon scattering parameters, i.e., $\alpha[= Ref_{\rho N}(0)/Imf_{\rho N}(0)]$ and σ_t, can be found in Ref. [3]. At $\mathbf{r}'$, being an unstable particle, this ρ^0 decays into $\pi^+\pi^-$ which can be accounted for by the relativistic $\rho\pi\pi$ Lagrangian $\mathcal{L}_{\rho\pi\pi}$. The wave functions for the continuum particles, i.e., p, p', π^+ and π^-, are represented by the eikonal form. They are generated by using the corresponding optical potential of the form same as $V_{O\rho}(\mathbf{r})$. The measured values of α and σ_t for protons and pions are available in Ref. [4]. For pions only absorptive part of the potential has been considered at present. The calculated $\pi^+\pi^-$ emission spectra are shown below.

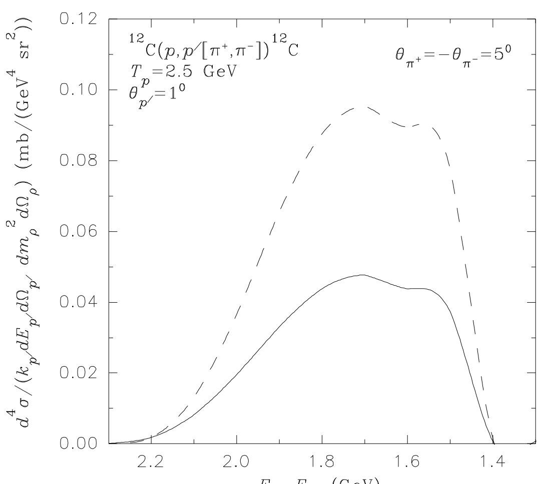

Fig.1: Solid and dashed curves are due to with and without pions absorption..

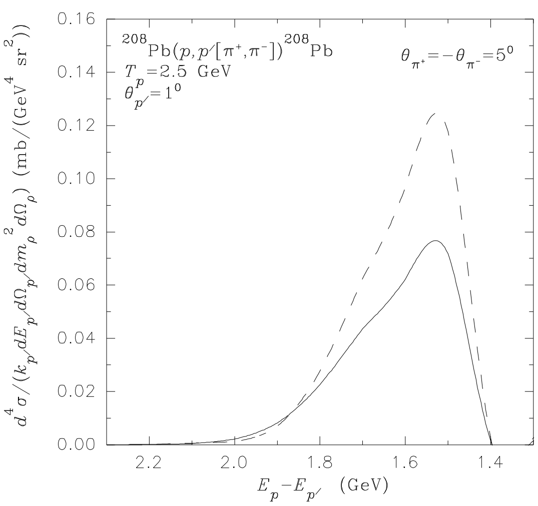

Fig.2: Solid and dashed curves are due to with and without pions absorption.

References

[1] Ye.S. Golubeva et al., Nucl. Phys. A **625** (1997) 832. [2] Swapan Das et al., Phys. Rev. C **63** (2001) 054601. [3] L.A. Kondratyuk et al., Phys. Rev. C **58** (1998) 1078; M.F.M. Lutz et al., nucl-th/0112052. [4] Particle Data Group, Phys. Rev. D **54** (1996) 1; W. Grein, Nucl. Phys. B **131** (1977) 255.