$\pi\pi$ correlations in γ+A reactions

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In this contribution, an experimental study of the reactions $\gamma + A \to \pi^0\pi^0 + X$ and $\gamma + A \to \pi^0\pi^{+/-}$ with A=p, C, Ca and Pb is discussed. The data are compared to pion-induced measurements (π^+,$\pi^+\pi^-$) [1] and (π^-,$\pi^0\pi^0$) [2]. The results of the latter experiments have been interpreted as a modification of the $\pi\pi$ interaction in the nuclear medium which might indicate a partial restoration of chiral symmetry [2] at normal-nuclear density. In photon-induced reactions, larger nuclear densities can be reached which should be a more sensitive tool to study in-medium modifications of the $\pi\pi$ interaction. In Fig. 1 preliminary $\pi^0\pi^0$-mass distributions of the reaction $\gamma + A \to \pi^0\pi^0 + X$ for an incident-photon energy of E_γ=400-460 MeV are shown (solid circles). A significant change in the shape of the $\pi^0\pi^0$-mass distribution as function of A can be observed, which will be discussed in view of final-state interactions of the pions and of an in-medium modification of the $\pi\pi$ interaction.

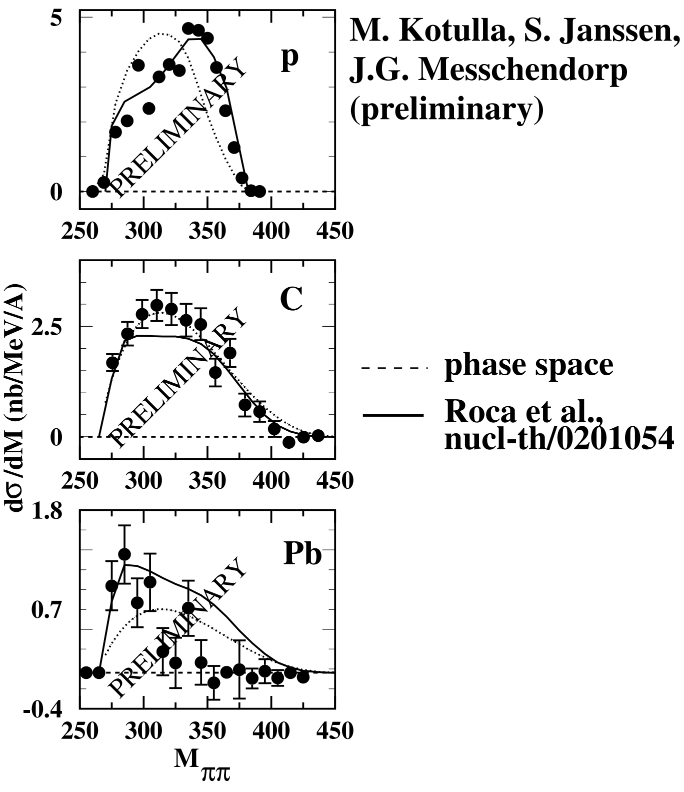

Figure 1: Preliminary results of a measurement of the $\pi^0\pi^0$ invariant-mass distribution for several nuclei for an incident-photon energy of E_γ=400-460 MeV (solid circles).

References

[1] F. Bonutti et al., Phys. Rev. Lett. 77, 603 (1996).
[2] A. Starostin et al., Phys. Rev. Lett. 85, 5539 (2000).
[3] T. Hatsuda et al., Phys. Rev. Lett. 82, 2840 (1999).