Analyzing power of the $\vec{p}p \to pp\pi^0$ reaction at beam energy of 390 MeV

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The analyzing power of $\vec{p}p \to pp\pi^0$ reaction has been measured at the beam energy of 390 MeV at Research Center for Nuclear Physics (RCNP), Osaka University, Japan. The missing mass technique of final protons has been applied to identify the π^0 production event. The dependences of the analyzing power on the pion emission-angle and the relative momentum of the protons have been obtained. The angular dependence could be decomposed by the Legendre polynomial and the relative contribution of the P_{21} to P_{11} function is less than 20% (Fig.1a). The theoretical calculation [1] based on the meson exchange model cannot explain not only the relative contribution but also the absolute value of the analyzing power. The momentum dependence of the analyzing power has also been obtained with the angular integration, which enable one to select the term of the P_{11} function and to observe the momentum dependence of the P-state amplitude. The interaction range of the pion production mechanism on P-state amplitude will be discussed using simple model (lines in Fig.1b).

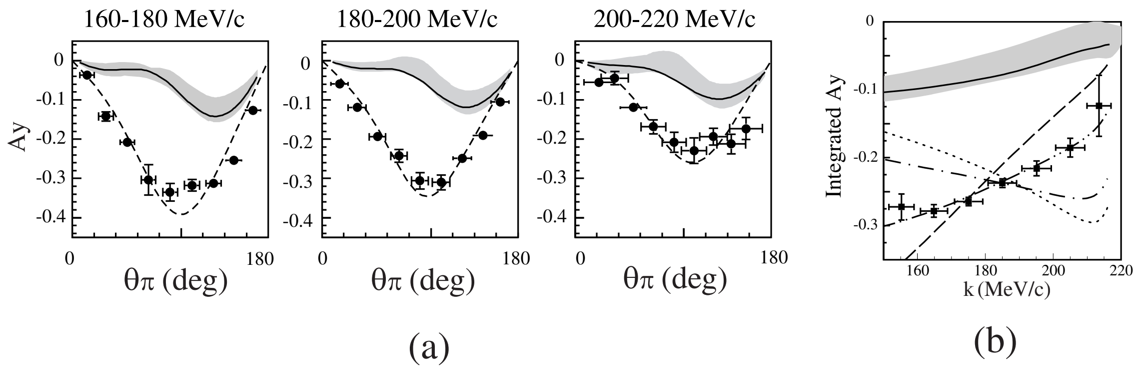

Figure 1: (a) The angular dependence of the analyzing power of the $\vec{p}p \to pp\pi^0$ reaction for three regions of relative momentum of final protons. The momenta range is shown at the top of figures. The horizontal axis shows the emitted angle of a pion in C.M.S. Solid lines show the result of theoretical calculation and shaded area indicates uncertainties for the calculation [1]. Dashed lines show the fitted result of the Legendre polynomial. (b) Relative momentum dependence of the analyzing power. The dotted, dash-dotted, dashed-double-dotted and dashed lines show the results with Bessel function dependently on typical interaction range between protons r=1, 2, 3 and 3.5 fm, respectively.

References

[1]K. Tamura, Y. Maeda, N. Matsuoka,Nucl. Phys. **A663-664**, (2000) 457c-460c ;Nucl. Phys. **A684**, (2001) 392c-396c.