Photoproduction of K^* for the study of $\Lambda(1405)$

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The photo-induced K^* vector meson production as shown in Fig. 1 is investigated for the study of the $\Lambda(1405)$ resonance [1, 2]. This reaction is particularly suited to the isolation of the second pole in the $\Lambda(1405)$ region which couples dominantly to the $\bar{K}N$ channel. We obtain the mass distribution of the $\Lambda(1405)$ which peaks at 1420 MeV, and differs from the nominal one (Fig. 2). Combined with several other reactions, like the $\pi^- p \to K^0 \pi\Sigma$ which favours the first pole, this detailed study will reveal a novel structure of the $\Lambda(1405)$ state.

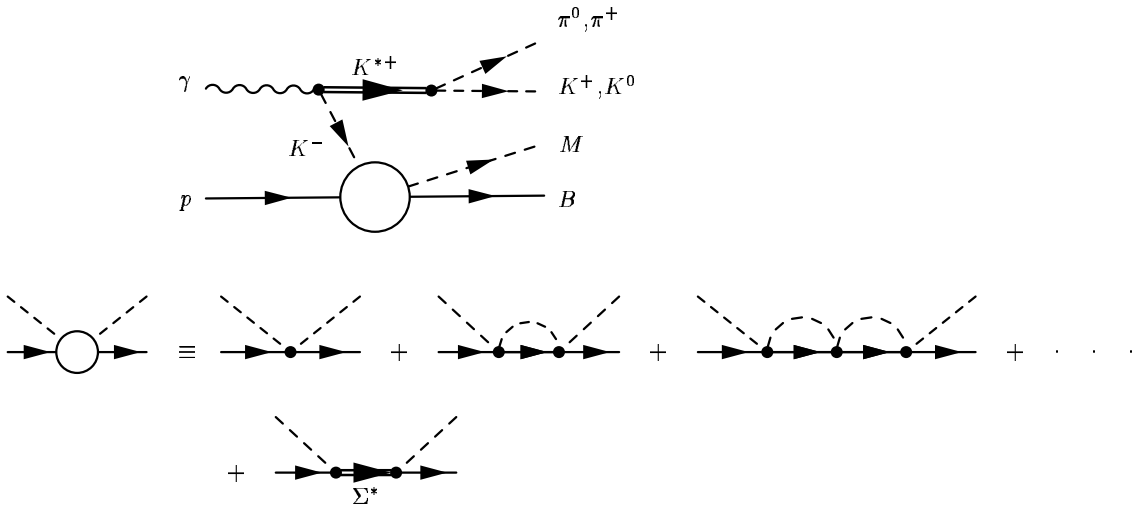

Figure 1: Feynman diagram for the reaction. M and B denote the meson and baryon of ten coupled channels of $S = -1$ meson-baryon scattering.

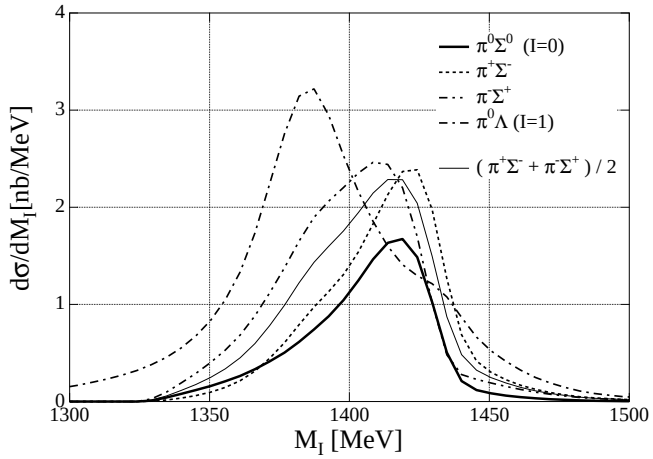

Figure 2: Invariant mass distributions of $\pi^0\Sigma^0$ (Thick solid), $\pi^+\Sigma^-$ (Dashed), $\pi^-\Sigma^+$ (Dash-dot-dotted), $\pi^0\Lambda$ (Dash-dotted) and $(\pi^+\Sigma^- + \pi^+\Sigma^-)/2$ (Thin solid) in units of [nb/MeV]. Initial photon energy in Lab. frame is 2500 MeV ($\sqrt{s} \sim 2350$ MeV, threshold of $K^*\Lambda(1405)$).

References

[1] T. Hyodo, A. Hosaka, M. J. Vicente Vacas and E. Oset, Phys. Lett. B **593**, 75 (2004).
[2] T. Hyodo, A. Hosaka, M. J. Vicente Vacas and E. Oset, nucl-th/0404031.