Excitation of $S_{11}(1535)$ resonance in pion and eta photoproduction

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Using the DMT dynamical model, [1] we have obtained the background contribution to the imaginary part of the S- wave multipole for pion photoproduction. It differs considerably from the result of a unitary isobar model MAID2000 [2] (see Fig. 1). Within DMT model it becomes large and negative in the region of the $S_{11}(1535)$ resonance excitation. This requires a much larger resonance contribution in order to explain results of the recent SAID multipole analysis. We obtain a value of $A_{1/2} = 122$ (in $10^{-3}\mathrm{GeV}^{-1/2}$) for the electromagnet helicity amplitude with a total width of $\Gamma = 120$ MeV, which are close to the corresponding values extracted from the eta photoproduction [3]. This resolves the long standing discrepancy in the description of the pion and eta photoproduction reactions. In the right panel of Fig. 1 we also present our preliminary result for the eta photoproduction, which illustrates the importance of the coupling with the $\pi\eta$ channel.

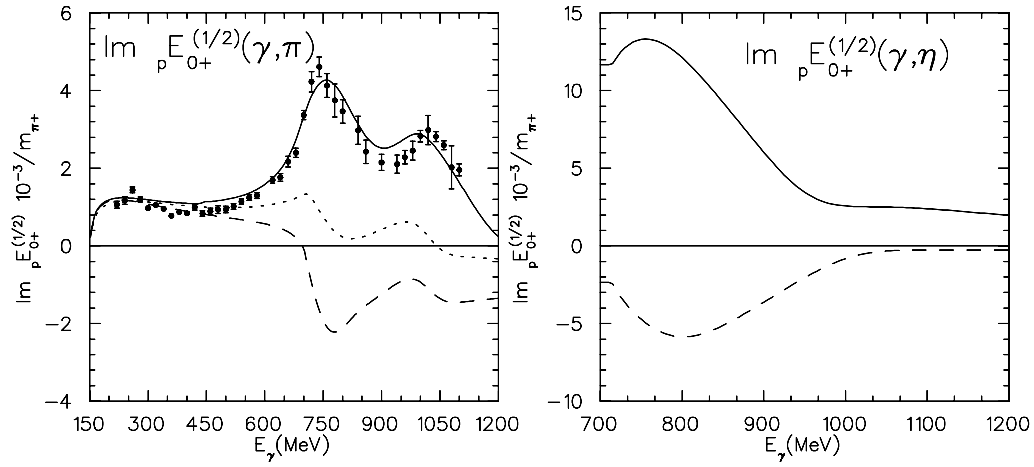

Figure 1: Imaginary parts of $_pE_{0+}^{1/2}$ multipoles for pion (left figure) and eta (right figure) photoproduction on the proton. Dotted and dashed curves are the MAID2000 [2] and DMT [1] background contributions. In the case of eta photoproduction the main contribution to the background comes from the coupling with $\pi\eta$ channel, as given by the dashed curve. Solid curves is the total result with contributions from $S_{11}(1535)$ resonance.

References

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[3] B. Krusche *et al.*, Phys. Rev. Lett. **74** (1995) 3736.