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The Reaction $p\bar{p} \to \Lambda\bar{\Lambda}$ in a K+K* Exchange Coupled Channels Approach

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In a recent experiment at LEAR the differential cross section and the spin observables of the reaction $p\bar{p} \to \Lambda\bar{\Lambda}$ have been measured[1]. In principle this reaction has a strong potential of becoming a powerful tool in the strong interaction dynamics. Therefore it is important to have reliable theoretical calculations for the process to reveal the underlying mechanism. A two body coupled channels approach is just about as exact as one can get at present. In ref.[2] this approach is applied by considering

1) as the initial state interaction a slightly modified form of the Dover-Richard potential[3] fitted to the up-to-date $p\bar{p}$ data. The imaginary part strength W_0 needed a readjustment to W_0 = 6 GeV.
2) as the transition potential for $N\bar{N} \to \Lambda\bar{\Lambda}$ the K+K* exchange potential with the coupling constants obtained from kaon-nucleon scattering and the SU(3) symmetry and
3) as the final state $\Lambda\bar{\Lambda}$ interaction the ω exchange plus the same annihilation potential as for the $N\bar{N}$ case. Modifications to this are also tested.

The results of the basic model of ref.[2] are shown in figs. 1-3 for the total cross section $\sigma(p\bar{p} \to \Lambda\bar{\Lambda})$, the differential cross section at a representative energy with the available data and for the polarization for a selection of energies. In ref.[2] also the spin correlation coefficients are given. Except for the nearly linear rise of $\sigma_{tot}(p\bar{p} \to \Lambda\bar{\Lambda})$ at high energies and the backward peak in the $d\sigma/d\Omega$, this K+K* exchange model appears very good considering that <u>no parameters have been fitted to the reaction in question</u>. This is an indication that the dominant reaction mechanism may be a meson exchange, which then requires a particularly careful consideration, before any conclusions can be made of possible quark contributions.

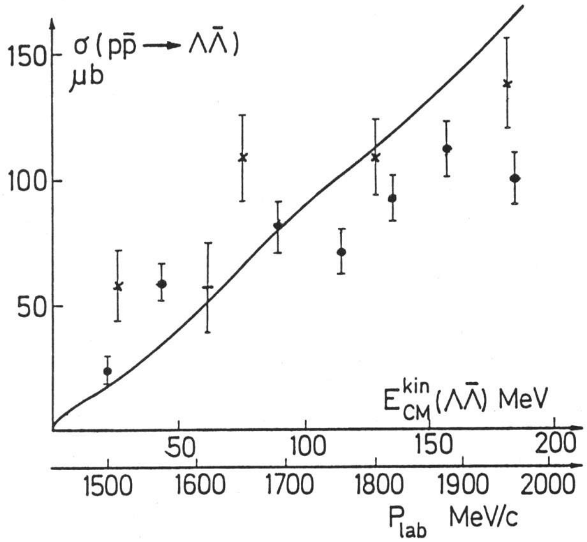
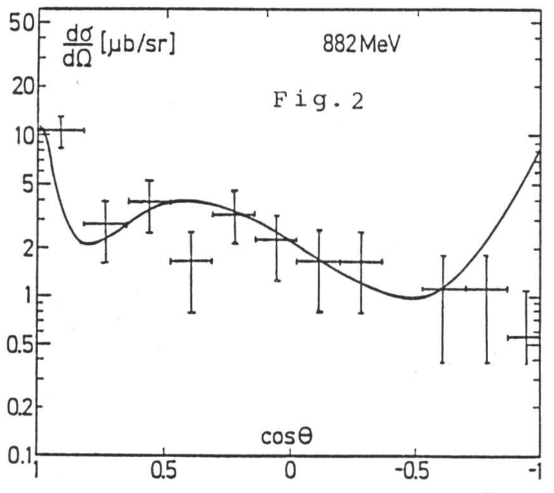


Fig. 1 The total cross section $\sigma(p\bar{p} \to \Lambda\bar{\Lambda})$ as a function of energy or momentum. The data from the compilation of Flaminio et al[4].



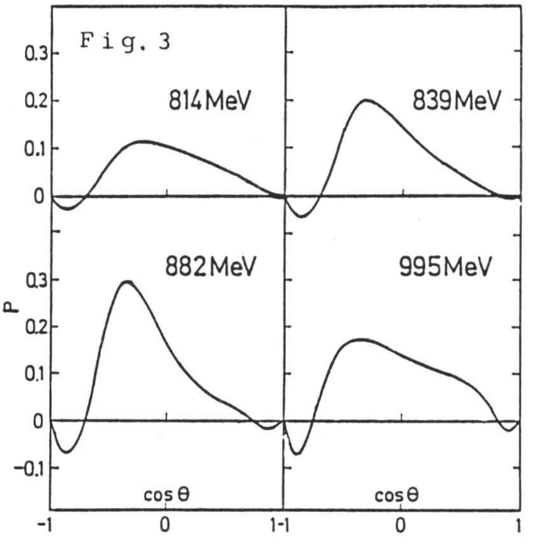


Fig. 2 The differential cross section at the laboratory energy 882 MeV. The data from Jayet et al[4].

Fig. 3 The polarization of $\bar{\Lambda}$(or Λ) for four laboratory energies including the ones of the LEAR experiment[1].

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