Study of the K^+K^- interaction at COSY-11

Michał Silarski

Jagiellonian University, Cracow, Poland

The knowledge on the kaon-antikaon interaction is crucial for many physics topics. It is very important for example in the discussion on the nature of the scalar resonances $a_0(980)$ and $f_0(980)$, in particular for their interpretation as a kaon-antikaon molecules. So far, one of the few possibilities to study this interaction is the kaon pair production in multi particle exit channels like $pp \rightarrow ppK^+K^-$. Measurements of the reaction, performed near the kinematical threshold with the ANKE and COSY-11 experiments at the Cooler Synchrotron COSY, reveal a significant discrepancy between obtained excitation function and theoretical expectations neglecting interactions of kaons. Thus, the observed enhancement of the data above the predictions may be assigned to the influence of K^+K^- or Kp interaction. This may manifest itself even stronger in the distributions of the differential cross- sections. Therefore, in order to deepen our knowledge about the low energy dynamics of the $ppK^+K^$ system we investigated population of events for the $pp \to ppK^+K^-$ reaction measured by COSY-11 collaboration as a function of the invariant masses of two particle subsystems. Invariant mass distributions for the two- and three-particle subsystems allowed us also to test at low excess energies the ansatz and parameters for the description of the interaction in the ppK^+K^- system as derived from the COSY-ANKE data. Finally, based for the first time on the low-energy K^+K^- invariant mass distributions and the generalized Dalitz plot analysis, we estimated the scattering length for the K^+K^- interaction.

E-mail:

michal.silarski@lnf.infn.it