Hyperon Production, Λ-Polarization and the Pentaquark θ^+ at COSY-TOF*

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The associated strangeness production in elementary nucleon -nucleon-induced reactions is studied exclusively at the external COSY beam using the time of flight spectrometer COSY-TOF. The complete reconstruction of all charged particle tracks allows the extraction of total and differential cross sections and Dalitz plots as well. The Erlangen Start Detector System, which consists of several layers of high granular detecto r components, was developed and optimized for the precise track reconstructions, both of primary and secondary decay tracks. The design of the COSY apparatus provides the opportunity to cover the full phase space of the reactions from threshold up to the COSY limit. The main goal in the investigations of the reaction channels NN $\rightarrow$ NKY is the insight into the dynamics of the strange-anti-strange-production, which may also be connected with the questions of the strange content of the nucleon. The theoretical access to the reaction mechanisms can be described within the meson exchange model including resonance contributions, final and initial state interaction and other effects based on coupled channel mechanisms.

Especially the reaction channel pp $\rightarrow$ pKΛ was investigated recently in detail in high statistic runs and delivered precise results which show strong N* and FSI contribution. Moreover, results on Λ-polarization could be obtained and are compared with results from other experiments . Alongside the Λ-production the production of Σ-Hyperons is a further point of interest within the associated strangeness production. Both Σ^0 and Σ^+ production channels have been measured with respect to total cross sections and angular distributions. The verification of observables of different reaction channels at equal excess energies provides a further tool to test model calculations. Especially the reaction channels pp $\rightarrow pK^0\Sigma^+$ and pp $\rightarrow nK^+\Sigma^+$ are of high interest regarding the recently discovered exotic pentaquark resonance θ^+ which might contribute to the production mechanisms.

This talk will focus on the recent results of the TOF experiment and will compare them with the current status of theoretical calculations within the framework of the meson exchange models. Mor eover the clear peak in the invariant mass spectrum of the K^0p-subsystem of the reaction channel pp $\rightarrow pK^0\Sigma^+$ will be discussed to be the mentioned pentaquark state θ^+. An outlook focu ssing on polarization observables which will be obtained from a very recen t run using a polarized COSY beam will be given. Additionally a short discussion on further reaction channels in pn collisions measured in a test run on a deuterium target will finish the talk.

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