Comparison of first results on K^+ production at ANKE with model calculations

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Kaon production in the reaction p+C→K^++X has been measured with the ANKE spectrometer at beam energies of 2.3, 1.8, 1.5, 1.2 and 1.0 GeV. The calibration of the data is still in progress, nevertheless the detected and analysed Kaon rates can be compared with ROC-model [1] calculations if the acceptance and efficiency of the detection process at ANKE is taken into account. Thus the ROC-model was used as an event generator for GEANT simulations of the ANKE side-detector system.

In Fig. 1 the detection efficiencies for kaons from such simulations are shown. They are plotted as a function of the telescope number, normalised to the total number of generated kaons. Curve **b** shows the number of kaons generated in the acceptance range of each considered telescope. The difference to curve **a** represents losses due to scattering and due to the gaps between the telescopes. Curve **c** takes into account the loss due to cuts on time of flight and energy loss in the scintillation counters. Curve **d** takes the lifetime of the kaons on their way through the detector into acount. Curve **e** shows the kaons counted in the veto counter with a decay time larger than 2.6 ns. In comparison to the experimentally determined kaon detection efficiency (△) [2] there are some significant discrepancies for telescopes 6 to 8 which may depend on the slightly different cut parameters and degrader thicknesses, while the dip at telescope 7 is visible in both treatments.

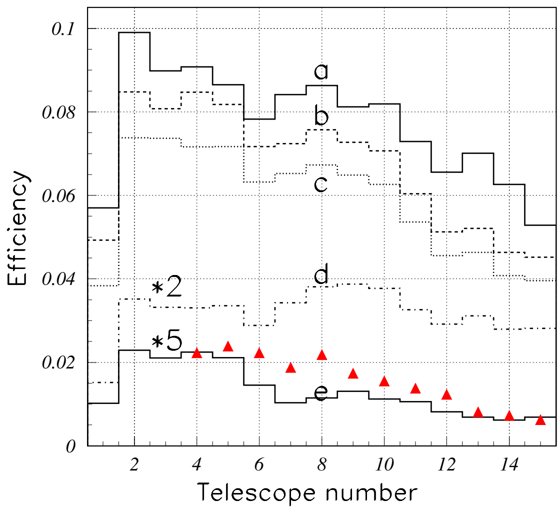

Figure 1: Simulation of the K^+ detection efficiency with the ANKE side detector as a function of the telescope number. The curves are explained in the text. The experimental data points (△) are from [2] and were normalized to curve **a**.

Very primilary results of the data analysis for beam energies of 1.0 GeV and 1.2 GeV are shown in Fig. 2. The raw numbers of extracted kaons for the specified data collecting time are plotted as a function of the mean particle momentum measured in every telescope. A preliminary normalisation to comparable experiment conditions results in a factor of ~ 30 [2] between the cross sections at the two energies.

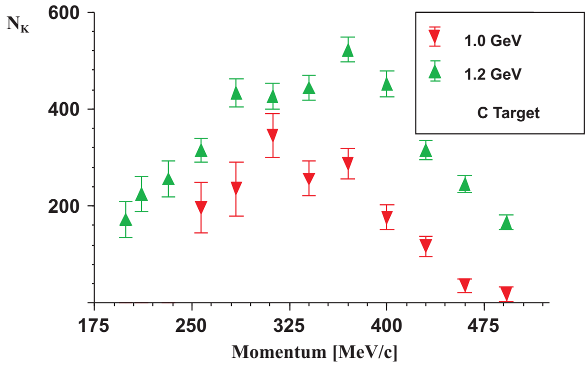

Figure 2: Number of identified kaons in each telescope from the experimental runs at 1.2 and 1.0 GeV [3].

The cross sections obtained from the ROC-Geant simulations are plotted in Fig. 3. They take into account all losses described in Fig. 1. The ratio of the measured production rate at 1.0 GeV and 1.2 GeV at the covered forward angle around 0° is comparable to the prediction of our simulations.

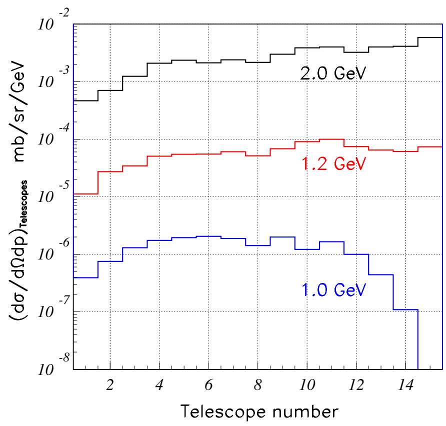

Figure 3: Simulated detection cross sections, when the ROC-model is used as a generator for GEANT simulation of the ANKE spectrometer.

References:

[1] H. Müller, Z. Phys. **A 355**, 223 (1996).

[2] M. Büscher et al., publication in preparation for NIM A; M. Büscher, H. Junghans et al., contribution to this annual report.

[3] S. Barsov et al., Nucl. Phys. **A 675**, 230 (2000).

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