Measurement of the Cross Section Ratio for Λ and Σ^0 Production

In order to complete the measurements of the energy dependence of the Λ/Σ^0 production ratio in the *pp* interaction as described in the COSY-11 proposal P-87 further beam time is requested for the second half of 2000.

In total 3 weeks were requested for the measurements at luminosities of about 10^{30} which were approved by the PAC in November 1999. A first week was recommended by the PAC for the first half of 2000 scheduled end of January 2000. This time was not taken. Instead, due to an exchange of beam time with the TOF collaboration, COSY-11 used two weeks in December 99 for the Λ/Σ^0 ratio measurements.

A preliminary analysis of the data for Λ/Σ^0 production has been performed. The integrated luminosity for this beamtime was rather low compared to the expected numbers used as basis for the requested beam time given in the proposal. Apart from the fact that due to the exchange of beam time COSY-11 got effectively about 4 days less compared to the scheduled beam time in January, the beam intensity as well as the target density were somewhat lower as usual resulting from the short preparation time. As a consequence the data taken during this December beam time correspond to only about one full week with a well prepared experiment with usual intensities of beam and target.

In Fig. 1 the cross section ratio for the Λ/Σ^0 production is shown in linear and logarithmic excess energy scale including the preliminary results from the December beam time. The full symbols represent cross section ratios as extracted from our published data [1]below 15 MeV excess energy and the estimated ratio at ϵ=142 MeV given in the proposal which is in the range of the high energy region indicated by the line at $\epsilon \sim 350$ MeV [2].The open symbols are the preliminary results from the new measurements at the four excess energy values of ϵ = 16, 20, 40 and 60 MeV. In the final analysis the errors will be reduced by a factor of about 2.

To complete the proposal 2 weeks of beamtime are needed for 4 data points, 2-3 data points above ϵ = 10 MeV and 1-2 data points below ϵ = 5 MeV. As stated in the proposal, about 4 days measurement time is necessary for each data point at usual beam and target conditions to achieve accuracies in the order of 10 %. The exact excess energies for the measurements will be determined after the results from our December data analysis have been improved which will take two to three months. The exact measurement time at each data point will result from online analysis allowing the extraction of preliminary event rates for Λ/Σ^0 production during the measurements.

Beam request for II/2000 : 2 weeks

References

[1] S. Sewerin et al.,Phys. Rev. Lett. 83 (1999) 682.
[2] A. Baldini et al., Landoldt-Börnstein, Numerical Data, Vol. 12 (1988)
[3] COSY Proposal No. 87, COSY-11 collaboration

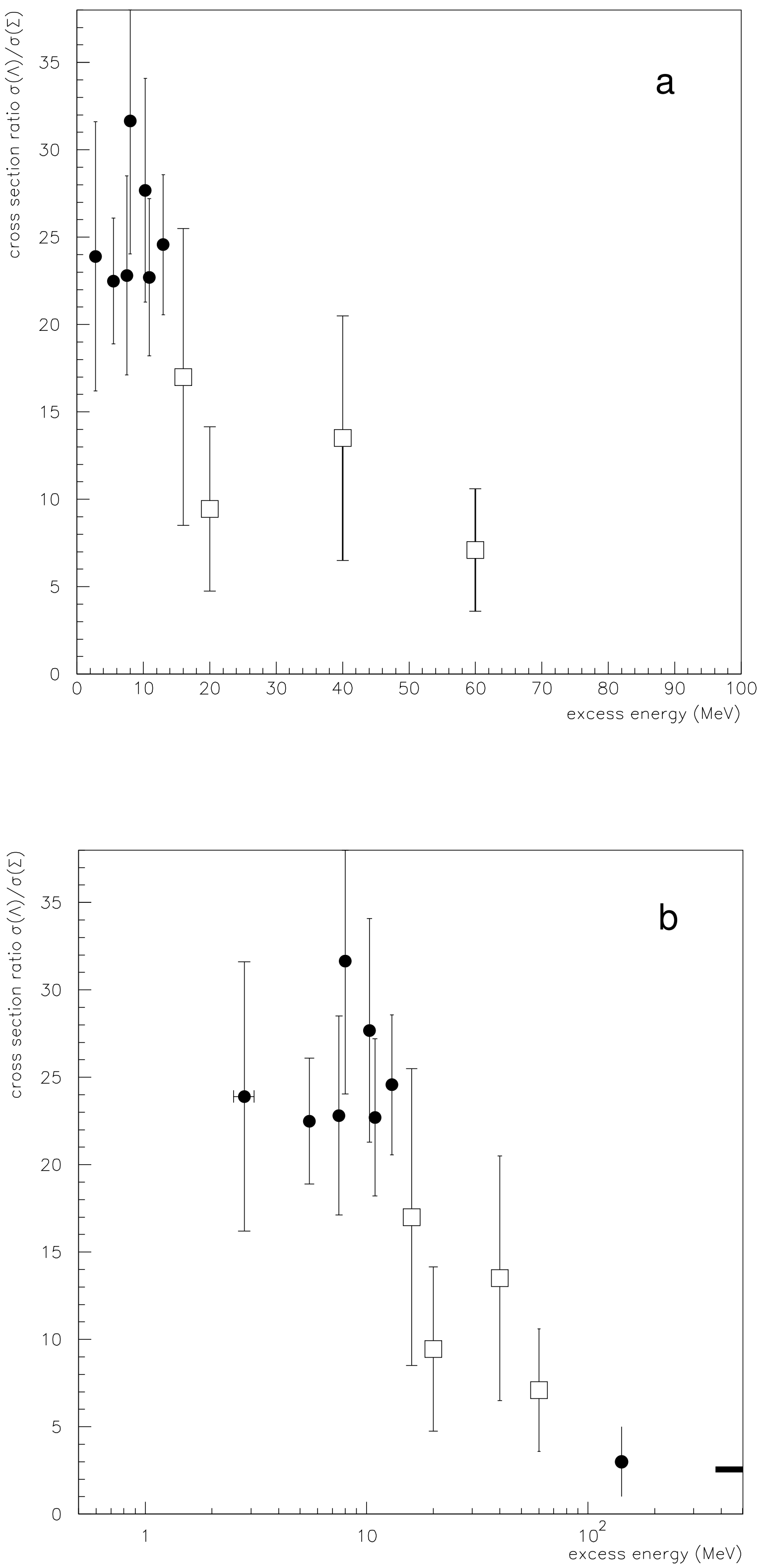

Figure 1: Cross section ratio of Λ/Σ^0 production in $pp \to pK^+Y$ reactions as a function of the excess energy with a) linear and b) logarithmic excess energy scale. The open symbols represent the cross section ratios resulting from a preliminary analysis of the data taken during the December 99 beam time. The full symbols are cross section ratios extracted from our published data [1]and the estimated ratio at $\epsilon = 142$ MeV [3]. The line in b) indicate the cross section ratio in the high energy region [2].