COSY Proposal for II/97

Beam time request for the continuation of the measurements described in COSY proposal no. 46 for I/97.

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Measurement of the reaction $pp \to ppK^+K^-$ at threshold

It is asked for 2 weeks of beamtime to continue the studies of the $pp \to ppK^+K^-$ reaction at threshold. In the following table the up to now performed measurements at COSY-11 are summarized, including the week 17. In the last row the expected events for a cross section dependency on Q as $\sigma \sim Q^{5/2}$ is given, normalized to the preliminary result at 3.333 GeV/c.

P_{beam} $[GeV/c]$	Q [MeV]	Measurement time [days]		Integrated luminosity $[1/cm^2]$	preliminary detected events	expected events $\sigma \sim Q^{5/2}$
3.294	-2	2	(Apr. 96)	$\sim 1.4 \cdot 10^{34}$	0	-
3.305	1	3	(Okt. 95)	$< 10^{34}$	0	< 0.01
3.308	2	3	(Okt. 95)	$< 10^{34}$	0	< 0.02
3.315	4	8	(Apr. 97)	$\sim 1 \cdot 10^{36}$	-	8
3.321	6	5	(Apr. 96)	$\sim 2 \cdot 10^{35}$	2	1.7
3.327	8	5	(Mar. 97)	$\sim 1 \cdot 10^{36}$	-	12
3.333	10	3	(Dez. 96)	$\sim 5 \cdot 10^{35}$	8	8

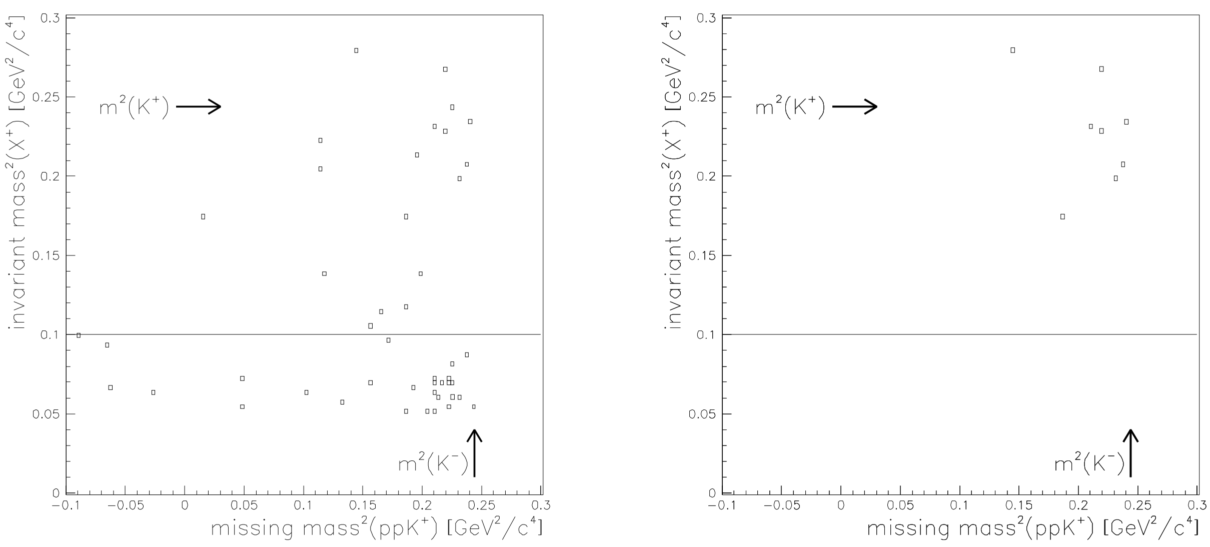

Figure 1: Squared invariant mass of the third positively charged particle versus the squared missing mass of the system (ppK^+) for all 3-track events with two identified protons without further cuts (left) and with some plain cuts, $m_{inv} > 0.1$ and reconstructed y-coordinate within dipole gap (right).

In the figure the preliminary result for the measurement at 3.333 GeV/c is shown.At the left side the invariant mass for the 3. track for 3-track events with two identified protons versus the missing mass squared is plotted, and at the right side the same picture is shown after the application of some plain cuts. The main error in the invariant mass results from incorrect detector calibration for the time of flight measurements which is still in the evaluation. Nevertheless a clear separation of (K^+K^-)-events is observed which will be improved with the correct detector calibration.

We propose to extend the statistics at 3.321 GeV/c and at 3.333 GeV/c. With a luminosity of $2 \cdot 10^{30}\ 1/cm^2s$, which was achieved in the last COSY-11 runs, eventrates of ~ 1.6 events/day for 3.321 GeV/c and ~ 3.2 events/day for 3.333 GeV/c are expected. Therefore a two week block should be devided in 10 days for 3.321 GeV/c and 4 days for 3.333 GeV/c.