CERN/SPSC 88-44
SPSC/R 79
18.10.1988

Brief status of NA 36.

October 1988.

C.R. Gruhn,
Spokesman of NA 36.

Introduction.

The following points are discussed:

1. As have been detected in S-Pb collisions over a full range of multiplicities including central S-Pb collisions.

   A first measurement of the multiplicity dependence of the efficiency is shown.

   A first measurement of the Λ multiplicity as a function of event multiplicity (consistent with a superposition of independent nucleon-nucleon interactions, contrary to the NA 35 results on S-S) is given.

2. The amount of strange hadron data available from the 1987 sulphur run is shown with the present reconstruction efficiency and the calculated geometric acceptance .

3. Comments are given concerning the external tracking and calorimetry.

4. The TPC end cap upgrade strategy is discussed with an explanation why there will be a low risk and a high pay-off.

Λ production in S-A collisions.

A Λ mass distribution is shown in figure 1.

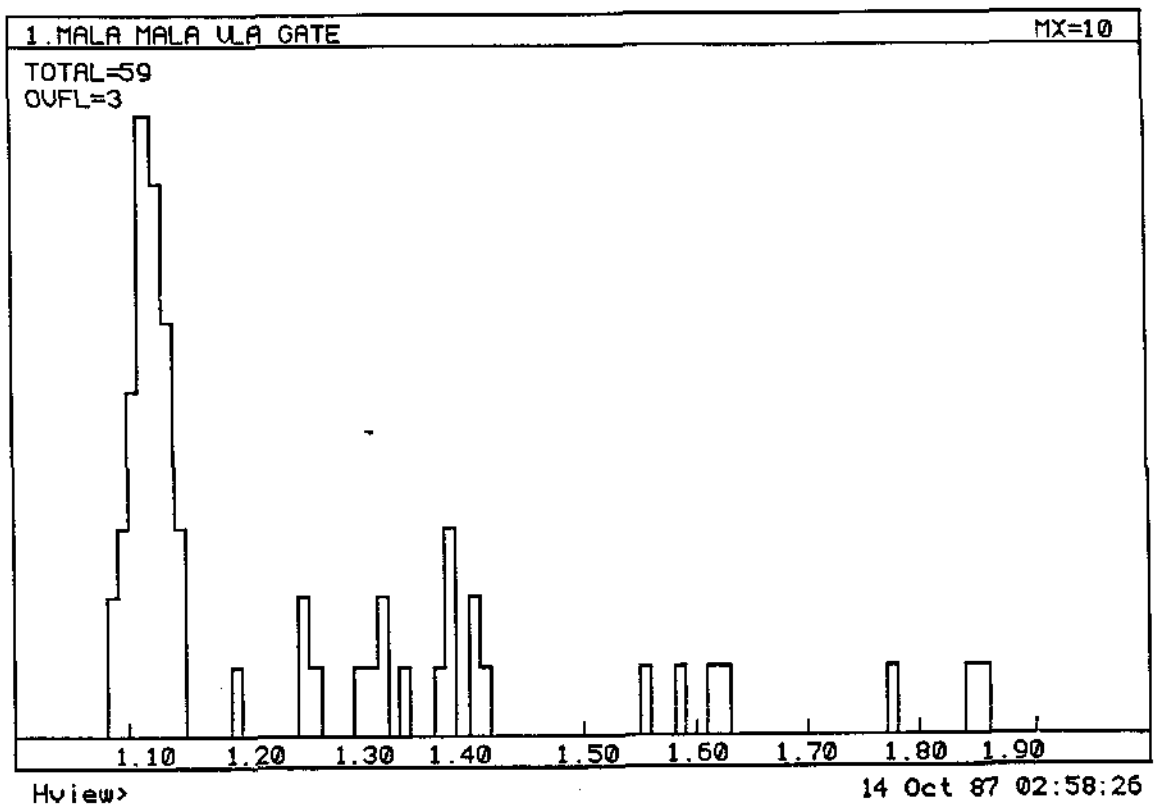

Figure 1: Λ mass distribution from sulphur data spanning track multiplicities seen in the TPC from 0 to 250

In figure 2 the normalized lifetime distribution is shown for these As.

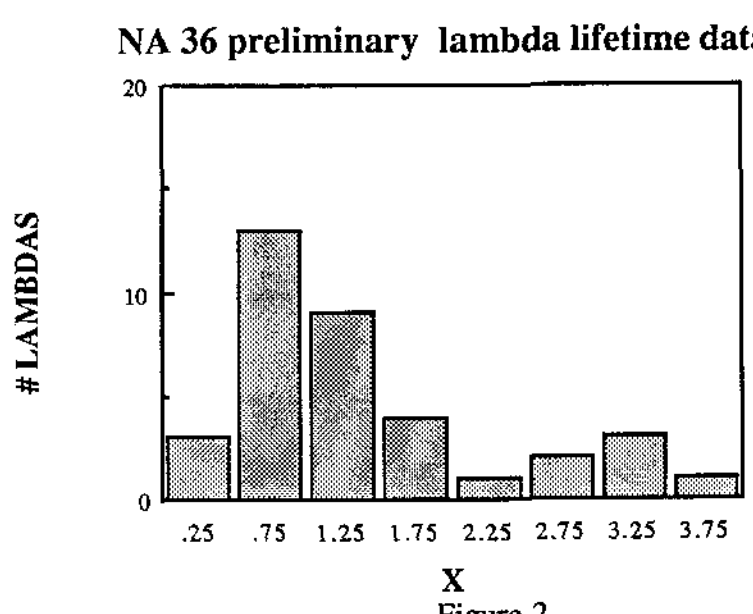

Figure 2.

This distribution has been obtained after selected cuts on the S-Pb collisions with a mixed trigger (beam, minimum bias and central). The mass resolution is 16 MeV/c. There are 3 categories of cuts used, resolution, B-field related and geometric.

Resolution: For these cuts the momentum resolution and momentum of the individual tracks were required to be consistent with the measured TPC tracking capabilities. In addition a loose chi-square result on the V-finder is required.

B-field related: the difference in y position at the target in a trace-back of the 2 tracks of a V has to be greater than 4 cm. This cuts away accidentals coming from the target. The V vector must point back to the target or below it. The average value of the z component of the transverse momentum internal to the decay is required to be greater than 10 MeV/c. This excludes gamma conversions.

Geometric: background sources are cut out by rejecting a V vertex which is on a window, on the field cage or on the beam. In this data As have been accepted when they originate from 3.5 cm or more above the beam and either inside the TPC or inside the vacuum tank in front of the TPC.

The relative efficiency was calibrated by embedding 100 As (found in the p-Pb data) in the sulphur events. These events were selected according to the track multiplicity found in the TPC. No events were excluded other than by track number binning.

In figure 3 the measured efficiency for Λ finding is shown as a function of multiplicity of tracks in the TPC. This track multiplicity scales to half the approximate event charged multiplicity. The mean minimum bias multiplicity found in the TPC corresponds to approximatly 45 tracks.

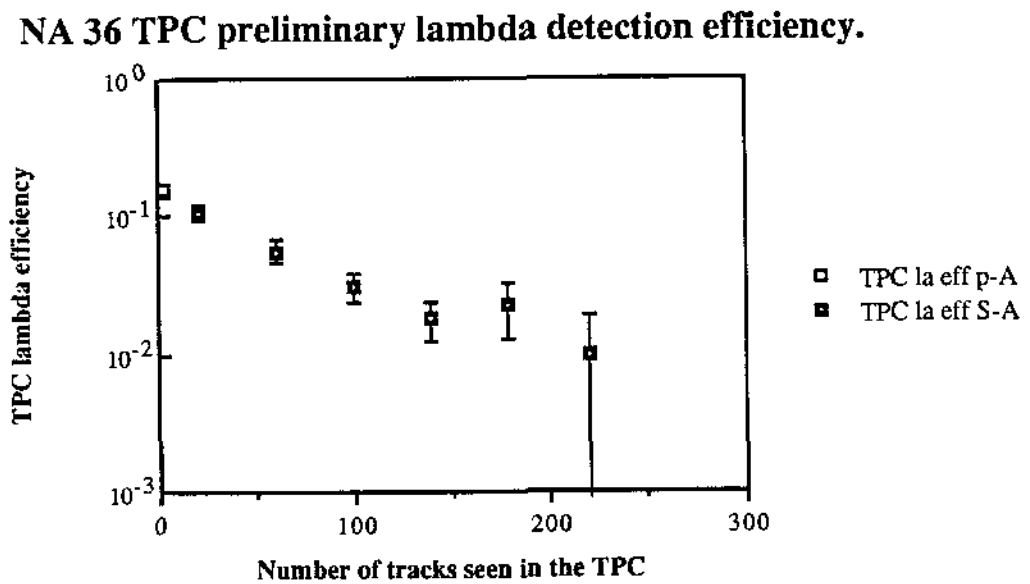

Figure 3.

Figure 3 shows that the efficiency drops approximately a factor 5 with multiplicity.

In figure 4 the Λ multiplicity per event is shown as a function of the multiplicity.

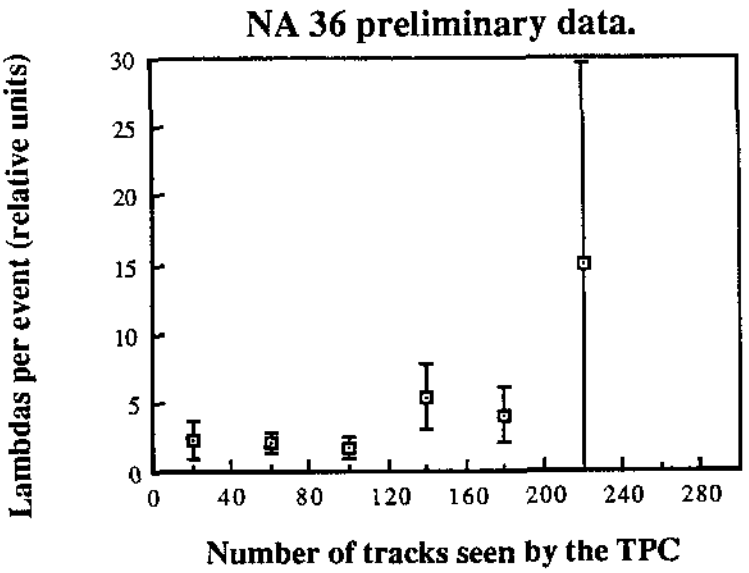

Figure 4.

This data is acceptance corrected. The result is consistent with a superposition of independent nucleon-nucleon interactions. This result is in contradiction with the squared multiplicity dependence for S-S collisions at the same energies as reported by NA 35 during the Lenox and Tucson meetings.

In addition figure 5 and 6 show the rapidity and Pt distributions for this data. These statistics are based on 4 percent of the total 1987 ion data.

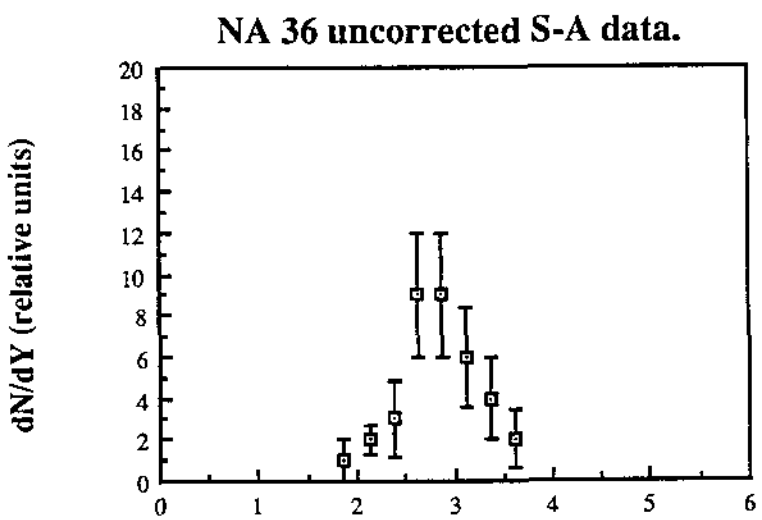

Figure 5.

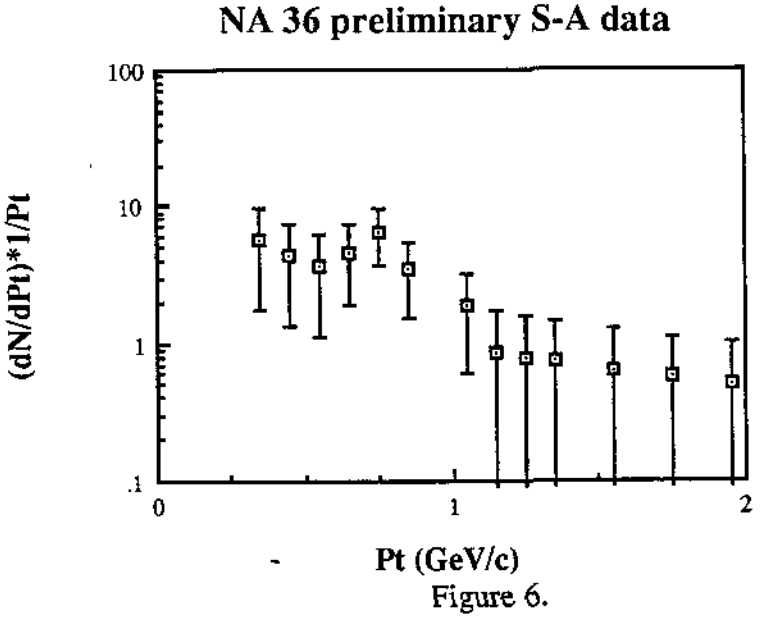

Figure 6.

Estimation of the amount of accepted data.

In table 1 an estimation is given of the amount of strange hadrons which can be expected in the 1987 ion data. The estimation is based on the described efficiency calibration. Also the expectations for the 1990/1991 ion run is given based on the same efficiency.

Table 1: NA 36 accepted strange hadrons as a function of efficiency and the triggers which were taken or requested.

	1987 (present)	1990 (present)	1990 (expected)
K^0	850	4000	20000
Λ	860	4000	20000
$\overline{\Lambda}$	550	2500	12500
Ξ	80	360	1800
Ω	2	9	46

The efficiency for Ξ is assumed to be 1/3 of the efficiency for Λs and that for Ωs 1/6. The multiplicity dependence is assumed to be the same .

External tracking and calorimetry.

External tracking.

Physicists from 5 of the collaborating institutes are involved in the effort relating to the external tracking. The present status is:

- Tracking and alignment is installed in the general NA 36 code and is in the process of being tuned.

- TPC tracks have been extended to hits found in the external tracking using a "road" technique. The work on this algorythm in progress.

This tracking will be used to fix the beam-target interaction position and, where possible, to enhance the TPC momentum resolution.

Calorimetry.

Physicists of 4 of the collaborating institutes are working on the calorimetry. The effort has yielded one Ph.D.. Calorimeter results on both Et and zero degree energy flow have been published. The calorimetry and in particular the zero-degree calorimetry will be used in the strangeness measurements where needed. The results on Et and zero degree energy flow have been given to J. Garvey (referee for NA 36 in the SPSC) and have partially been included in the addendum (CERN/SPSC 88-23) send to the SPSC in JUNE 1988.

TPC end cap upgrade.

A low risk strategy has been adopted in the design and for the introduction of a new end cap for the 1990/1991 ion run.

1. The present end cap will remain installed and operational until the new end cap has proved to be operational.
2. The time needed for the exchange of end caps will be less than a week.
3. The old end cap will be maintained such that it can be reinstalled.
4. The electronics chain and cabling will remain unchanged.
5. The design is compatible with the present software.
6. The modular concept allows to initiate a simple prototyping.

The changes for the new end cap will be:

1. The focussing wires will have a 50 micron diameter instead of 20 micron.
2. The layout for the focussing wires on the PC board will be designed such that it can handle the needed operational voltage.
3. The anode wires will have a length of 15 mm instead of 10 mm.
4. The TPC will be operated with a "cool"gas. The TDC clock will be slowed down for this.

These changes in combination with the present software are expected to give a 10 times better two-track resolution. This will result in an improved track reconstruction efficiency and thus better statistics.

A prototype study is being carried out to use focussing wire signals (as is being done by the L3 experiment) to allow for interpolation of both y and z measurements. A factor 5 improvement of single track resolution (150 micron) in the bend direction is anticipated. This would result in higher statistics and better mass resolution. A few hundred channels of electronics would be sufficient. for this task This additional modification will be operationally independent from the other modifications. The design can be seen as a model for the NA 36/WA 85 lead beam experiment which is being planned.