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MEMORANDUM

To: SPSC members.

From: NA 36 collaboration (Bergen, Berkeley (LBL), Birmingham, Carnegie-Mellon, CERN, Chandigarh, Krakow, Madrid, Santiago, Strasbourg, Vienna, York) C.R. Gruhn, spokesman.

Subject: **SPSC addendum June 1988.**

INTRODUCTION.

It is the purpose of this addendum to request ion beam running time in 1989/1990 in order to complete the experiment NA 36 in accordance with its original physics goals. We present here information in support of this request.

For completeness we first summarize our physics goals. It should be emphasized that these goals have not changed from the original proposal. We wish to measure inclusive strangeness production in the central rapidity region correlated to a few global event parameters such as energy flow in the forward hemisphere, for minimum bias and central collision triggers.

The status of NA 36 is given with some emphasis on our progress in the analysis. We report sulphur '87 and proton '88 run statistics. Using acceptances generated with IRIS Monte Carlo we estimate our strange hadron statistics for these two runs.

The analysis effort has been made difficult but interesting for several reasons:

1. The TPC and tracking must deal with very high multiplicities, sometimes as many as 200 tracks in the TPC.

2. The nonuniformity of the magnetic field is large and must be carefully dealt with.

Although the TPC was designed to handle these problems, the tracking and therefore the analysis effort has become an iterative one out of necessity. Much progress on the analysis effort has been made, which we shall report on here. We describe our tracking in the TPC, the measured momentum resolution of the TPC, various efficiencies and acceptances. We include relative inclusive distributions as a function of P_t and rapidity showing the high statistical advantage of the TPC combined with a relatively low P_t threshold over other experiments. This allows an attempt at some high-P_t physics. A discussion of our V^0 analysis is given along with initial results. Another advantage of the high statistics TPC inclusive data is that a HBT (Hanbury-Brown-Twiss) analysis comes as a by product which should yield information on the characteristic size of the emitting source. Lastly we report our status of both the inelastic cross-section and projectile fragmentation measurements which have also come as a by product in our experiment.

It should be noted that NA 36 has 12 Ph. D. students, 10 of whom are from European institutes.

Minimal changes in the hardware are foreseen for the 1989/1990 ion run. The main point of any change being considered is to improve our effectiveness in achieving our proposal. Perhaps the most important aspect being considered here is a modification of the TPC end cap which will allow us to place the target at 10 cm from the TPC which would be placed 2 cm above the beam. This is motivated by the fact that beam time is a precious commodity and would allow an obvious increase in our acceptance. The second important modification which will enhance our statistics is to read the data from FASTBUS directly to tape. This is expected to increase the data acquisition rate by a factor 2.

The beam request is for an amount of time previously requested and approved by the SPSC. Supporting arguments for 60 and 200 GeV/c running are added.

We summarize the statistics resulting from the modifications in the hardware. It should be emphasized that these modifications are not costly and the basic experiment is nearly the same from both the hardware and software point of view.

Lastly we comment briefly on the intent of NA 36 relative to the lead beam era.

PHYSICS GOALS.

NA 36 has as its primary goal the measurement of strangeness in relativistic nucleus-nucleus collisions. The focus of the experiment is a precise measurement of the inclusive cross sections of the strange (anti) hadrons Ks, Λs, Ξs and Ωs with 60 and 200 GeV/cA sulphur ions on sulphur, copper, silver and lead targets. Theory has suggested that a measurement of the relative production of strange quarks to light quarks will be a good signal for the formation of the quark gluon plasma (QGP) in nucleus-nucleus collisions at SPS energies. A discussion of the theory is given in SPSC/M 382. A discussion of the experimental layout is given in SPSC/M390.

The motivation for NA 36 to take data at 60GeV/cA can be summarized as follows:

1. Strangeness production is suppressed in pp collisions. (That is SU(3) symmetry is violated). It has been pointed out that the QGP will be SU(3) symmetric and even partially SU(4) symmetric. Therefore the strangeness signature of the QGP is expected to be more sensitive measured against a background of independent nucleon-nucleon collisions at 60 GeV/cA.

2. The stopping power seems to increase as one goes to lower energies as seen by E_t measurements of E802 and WA 80.

3. The $\bar{\Lambda}/\Lambda$ ratio seen in the preliminary data of E810 increases in Si-Al by 10 times over p-Be collisions (the statistics of this point may be questioned) at 15 GeV/cA, whereas NA 35 sees no change in this ratio at 200 GeV/cA.

4. NA 36 with the possibility of high statistics and a relatively fast analysis per event will be sensitive to this strange baryon signal even though the relative

multiplicity is down (even for Ξ).

It should be noted that the ion community deferred the 60 GeV/cA running to 1989 (SPSC/M434).

The NA 36 TPC is sensitive to other physics associated with ion collisions as it takes the necessary data for the strangeness measurements. The TPC detects negatively and positively charged particles over a net rapidity range between 2 and 4.5 when both polarities of the magnet are used, thus allowing inclusive particle production studies vs P_t and pseudo-rapidity to be made. This type of physics provides an additional test of the tracking capability of the TPC and our ability to handle the non-uniform magnetic field. The high statistics data along with a relatively fast analysis allows us to make rather detailed studies of correlations. In addition inclusive measurements of protons (also at high P_t) from differences in the production of positive and negative particles and Bose-Einstein correlations can be done. These measured quantities will be correlated to strangeness production thus enhancing the sensitivity to whatever unusual feature may be in ion collisions.

STATUS OF NA 36.

Sulphur run: October '87 run statistics.

The sulphur ion run of October 1987 was a remarkable achievement for both the CERN SPS/PS accelerator complex and the ion experiments which received and used the new beams for the first time. A total of 18 days was used for these experiments. For NA 36 this time was divided essentially into three parts; the accelerator staff required time to gain the necessary experience to deliver stable beams to the experiments; NA 35 blocked the beam for a portion of their experiment (needed for their trigger); and NA 36 took beam for their experiment. As a result NA 36 had approximately 6 days of sulphur beam (34560 spills). During this short period NA 36 managed to take 1.8 M triggers (mixed beam, minimum bias and central) with the TPC 1 cm above the beam and about 1meter from the target. Two polarities of the magnet (2.7 T) were used.

The beam rate on target was 20 k/spill. The rate was limited to this value because the TPC drift volume must be protected from secondary interactions up stream that have a chance overlap with an event. The protection time needed is 20 μs. This rate also fitted the data acquisition capacity to store data.

About equal amounts of data were taken with lead, silver, copper and sulphur targets all placed about 1meter from the TPC. Approximately 200 k minimum bias triggers were taken for each of two polarities of the magnet and each metallic target. A total of 370 k central collision triggers were taken in addition for all the targets.

Proton run Spring '88.

NA 36 has a proton comparison and calibration run during April, May and June 1988 for a total of 36 days. The calibration and run set up has been finished the first part of this period and the pA collision comparison data are being taken now. About 4 M triggers of comparison data are expected for the same running conditions as the October '87 ion run. About 50 k protons are taken per spill.

A significant portion of the proton running was needed for calibrations; divided between calorimetry, wire chambers, trigger tuning, TPC absolute momentum measurements and tracking studies. Results of the TPC momentum measurements are included in this addendum.

Acceptances and data statistics.

Acceptances for the TPC as operated during the October '87 ion run have been calculated using IRIS Monte Carlo generated events injected into a GEANT simulation of the NA 36 experimental setup. Geometric acceptances are given here for the strange hadrons. K^0s and Λ production was taken as produced by IRIS. However in order to realize sufficient statistics $\bar{\Lambda}$, Ξ and Ω were generated using $\bar{p}$ X&s.f. distributions and mass depending P_t. These geometric acceptances are given in table 1 for 200 GeV/c incident beam. The distance from the target to the TPC was 129 cm.

table 1: NA 36 TPC geometric acceptances, sulphur October '87 run.

particle	percent
K^0_s	0.83
Λ	0.76
$\bar{\Lambda}$	2.20
Ξ	3.60
Ω	2.60

For the 1989/1990 running we assume the endcap modifications which will allow the target to be placed 10 cm from the TPC. A corresponding improvement is seen in the acceptances as we list in table 2. The same Monte Carlo data as used above is used again to generate the 1989/1990 acceptances.

table 2: NA 36 TPC geometric acceptances sulphur 1989/1990 run.

particle	200 GeV/cA	60 GeV/cA
K^0_S	3.36	5.00
Λ	4.50	5.50
$\bar{\Lambda}$	3.80	7.50
Ξ	4.4	9.1
Ω	3.80	7.80

The estimated numbers of geometrically accepted strange hadrons from the sulphur October 1987 run are presented in table 3. They are calculated from the product of average pp multiplicity, the decay branching ratio, estimated ratio of AA multiplicity to pp multiplicity, the geometric acceptance and the number of events. It is assumed that the central collision multiplicities are 2.5 times higher than the minimum bias multiplicities. It is important to emphasize that the estimates could be in error by factors up to 5, especially for the more massive strange baryons where there is very little data to base the estimate on. In addition, our reconstruction efficiency for strange baryons, especially for the higher multiplicities, is likely to be between 0.1 and 0.3.

table 3: Estimated geometrically accepted strange hadrons.

Sulphur data October 1987 (200 GeV/cA).

particle	10^5 minimum bias events on Pb target	All triggers run total
K^0_S	2730	60 k
Λ	1406	30 k
$\bar{\Lambda}$	880	19 k
Ξ	345	8 k
Ω	26	0.6 k

A similar estimate of accepted strange hadrons taken in June 1988 is given in table 4. Since this run is not yet complete the total number of triggers is estimated to be 4 M.

table 4: Estimated geometrically accepted hadrons.

Spring 1988 proton comparison run (200 GeV/cA).

particle	10^5 minimum bias events on Pb target	All triggers run total
K^0_S	249	9711
Λ	129	5031
$\bar{\Lambda}$	81	3160
Ξ	24	943
Ω	2.3	90

Analysis status.

Tracking in the TPC:

Software has been developed to reconstruct the measured tracks in the TPC. The TPC raw hit coordinates are first corrected for the charge transport in the nonuniform magnetic field. Track reconstruction algorithms are presently under investigation. As a first iteration a track following method based on an algorithm of M. Mermekides (ALEPH) has been used. The method works well for high multiplicity and is very fast. More sophisticated approaches with several passes through the data, replacing a simple helix track model by tracking using Runge-Kutta method is being tried on a large sample of data. These modifications make the analysis slower but seem to improve results.The first step of pattern recognition can be improved by using a track road method. The code to do this is ready and tested and will be used from now on.

Momentum resolution in the tpc:

During the calibration running in April '88 10 GeV/c electrons were selected and deflected up into the TPC. The TPC was operated in identical conditions to that of the sulphur October '87 run. These electron tracks were then reconstructed with the track following method from which we deduced the momentum (9.8 ± 0.2GeV/c). The momentum resolution is seen to be 9.8 %. The momentum resolution design value is 6 % (including multiple scattering). The momentum spectrum for this measurement is seen in figure 1. This result indicates that corrections and tracking in the nonuniform magnetic field is relatively well understood at this point.

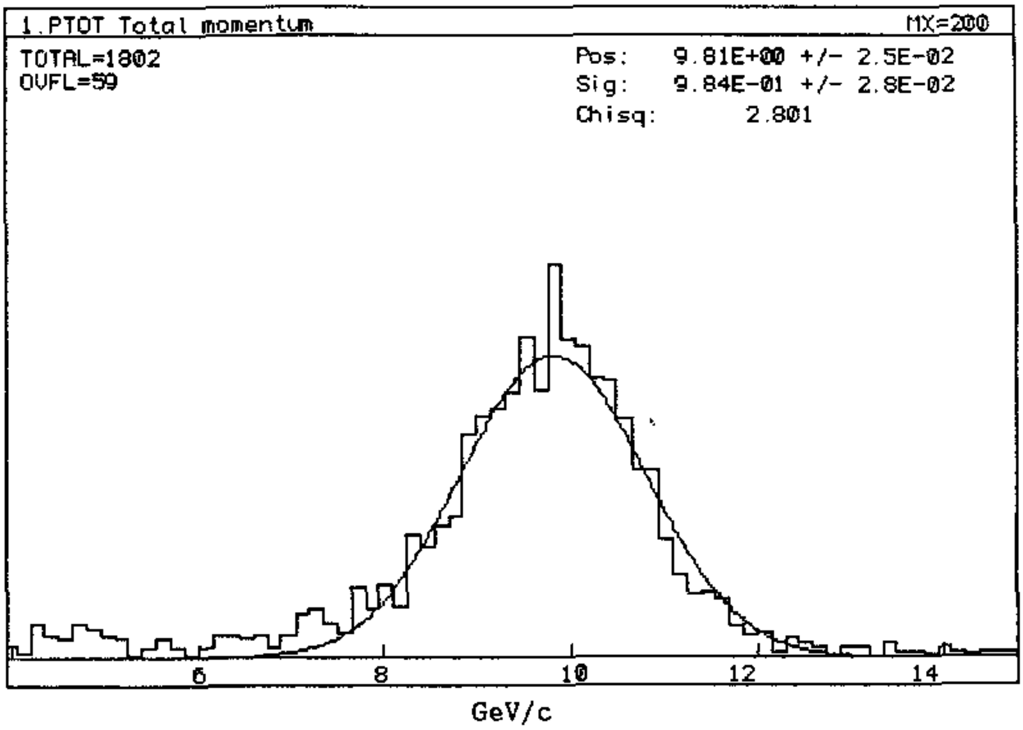

figure 1: Momentum resolution of the TPC.

Inclusive distributions:

As a further test of our understanding of the tracking in the TPC, preliminary inclusive Pt and rapidity distributions of negative particles have been measured (figure 2 and figure 3). The data are compared with Monte Carlo IRIS sulphur on lead events in the acceptance of the TPC. The preliminary data agree with the IRIS Monte Carlo calculations. The data represents 2 % of the available data. We expect to take the P_t distribution out to P_t = 4.5 GeV/c. At a minimum this provides a bridge between the low statistics NA 35 results and the high P_t results of WA 85. The high statistics of this data at low P_t will allow a systematic study of various correlations to be made and of their dependence on the target nucleus.

The data were taken with a polarity of the magnet such that the negative particles were swept up into the TPC. The TPC also accepted positive particles but with a P_t cut for this polarity. However data were also taken with the magnet field polarity such that positive particles were swept up into the TPC. We will extract a proton Pt distribution from the differences, between data taken with each polarity.

This data can be taken as evidence that rapid progress is being made in establishing the NA 36 tracking.

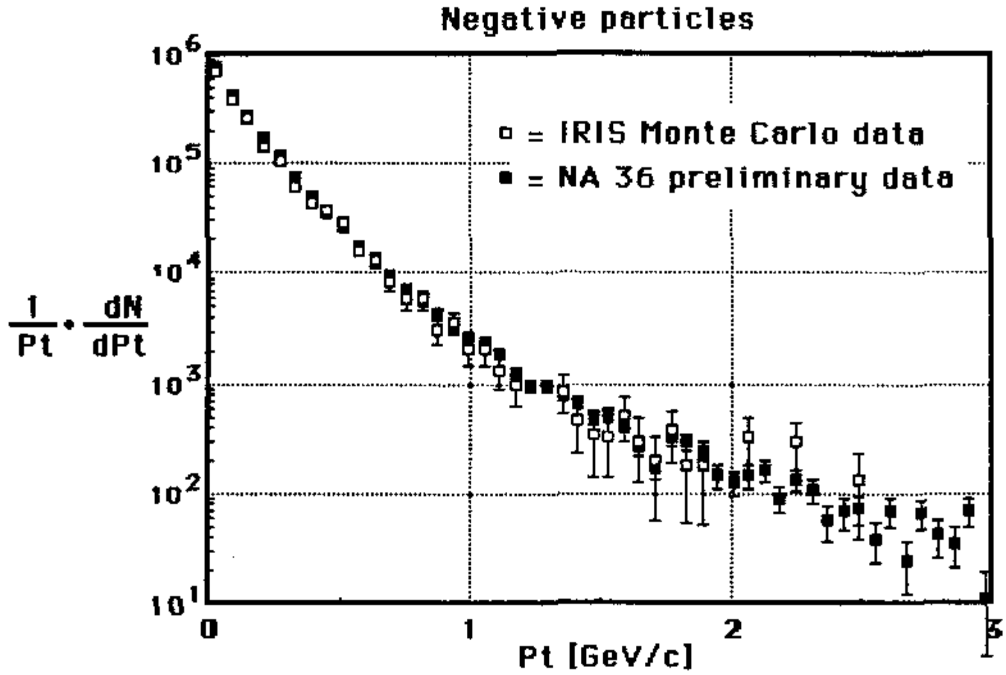

figure 2: Uncorrected inclusive P_t distribution. from mixed Pb, Ag and Cu targets at 200 GeV/cA.

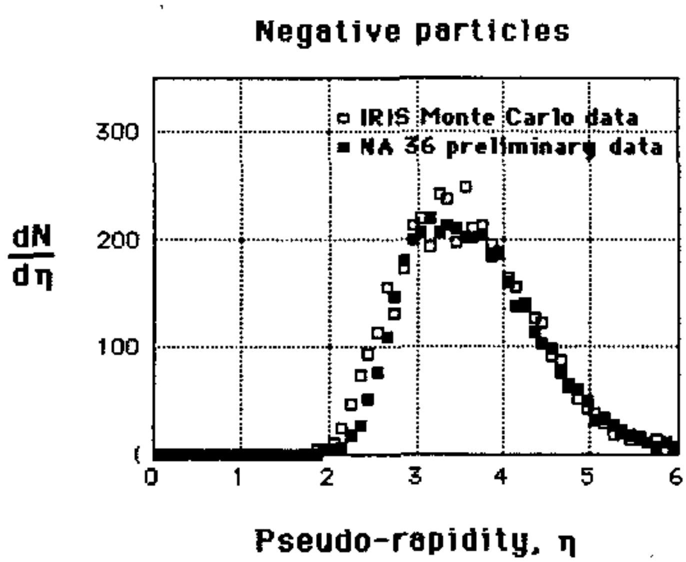

figure 3: Uncorrected inclusive pseudo-rapidity distribution. from S on mixed Pb, Ag and Cu targets at 200 GeV/cA.

V^0 analysis.

The analysis of V^0s and mass identification depends critically on a well-tuned tracking code and complete understanding of the backgrounds. NA 36 tracking is in its second iteration with evident success in the production of the inclusive Pt and rapidity distribution seen in figure 2 and figure 3. This stage of the tracking has been applied to generate Λ mass identification along with background and is shown in figure 4. This result should be considered to be very preliminary. Improvements are expected as the understanding of the cuts and the tracking is upgraded.

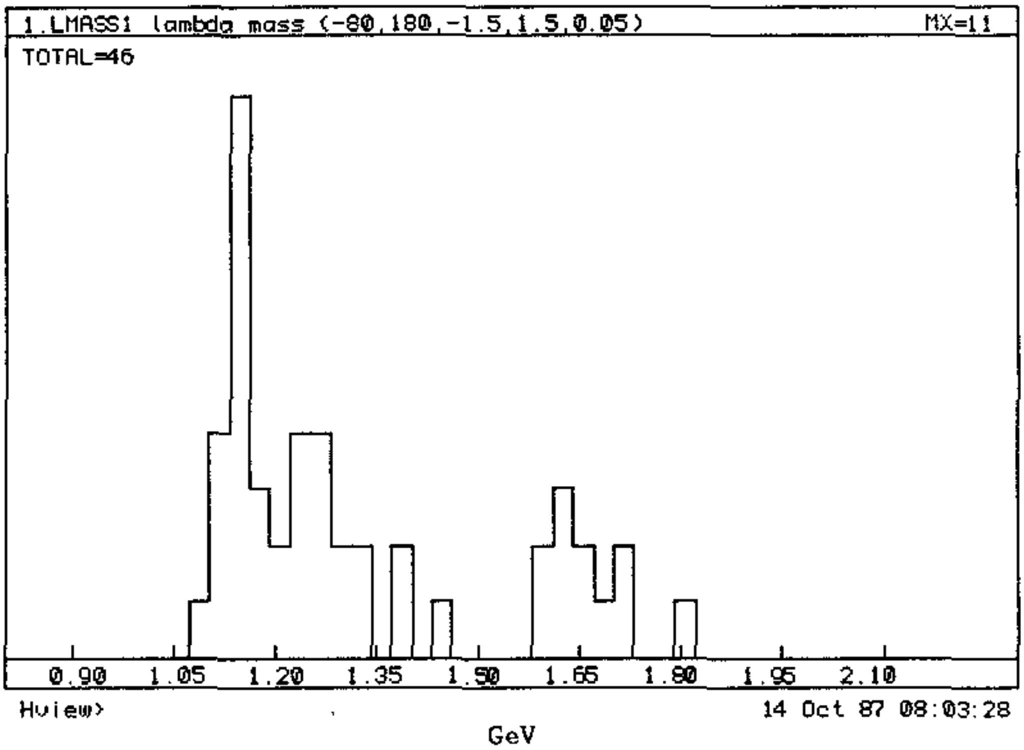

figure 4: Preliminary Λ mass distribution.

A second portion of the V^0 analysis is tied to connecting the decay products viewed in the TPC to track extensions in the external tracking. This is a very difficult task in light of the high multiplicities. The connected tracks are expected to have somewhat better momentum values. First results have shown that the tracks can be connected in the majority of the cases. This aspect has yet to be folded into the mass analysis.

Hanbury-Brown-Twiss analysis

The resolution of the TPC is sufficient to do HBT correlations. The high statistics data taking and analysis capability of NA 36 is expected to prove advantageous.

Cross sections:

Inelastic cross sections:

Inelastic cross sections for collisions of nuclei contain a term corresponding to production of secondary particles (σ(prod)) plus terms due to hadronic or electro-magnetic fragmentation (σ(hadr fr), σ(el-magn fr)) of the nuclei. For oxygen projectiles we determined inelastic cross sections from the rates of oxygen ions passing through targets of various thicknesses, hence fragmentation is included. This is probably why our published cross sections for oxygen – gold collisions exceed those measured by NA 35 for particle production. In the case of sulphur projectiles we therefore attempted to measure σ(prod) directly. Based on information from all NA 36 calorimeters the preliminary cross-sections σ(prod) in figure 5 were obtained. They are in good agreement with expectations e.g. from the IRIS Monte Carlo.

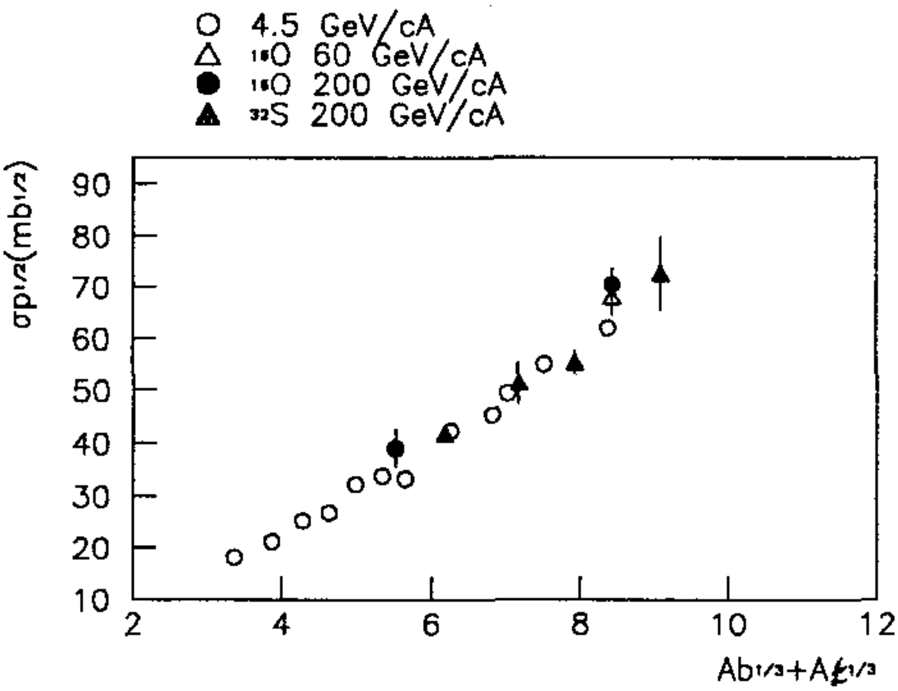

figure 5: Preliminary cross-sections.

table 5: Preliminary cross-sections.

Sum over $\sigma(\Delta Z)$, $\Delta Z \geq 1$

Interaction	cross-section (barn)
S-Al	1.86 ± 0.02
S-Fe	2.88 ± 0.03
S-Cu	3.11 ± 0.16
S-Ag	4.42 ± 0.15
S-Pb	8.28 ± 0.09

Some cross-sections for electromagnetic dissociation.

Interaction	cross-section (barn)
S-Ag → P + x	0.24 ± 0.13
S-Pb → Si + x	0.52 ± 0.16
S-Pb → P + x	1.00 ± 0.20

Projectile fragmentation cross sections:

Based on the capability of the Forward Cerenkov counter to identify the charges of projectile fragments (see figure 6) "charge changing" cross sections $\sigma(\Delta Z)$ for removing ΔZ charges from the incident sulphur ion were determined (table 5).

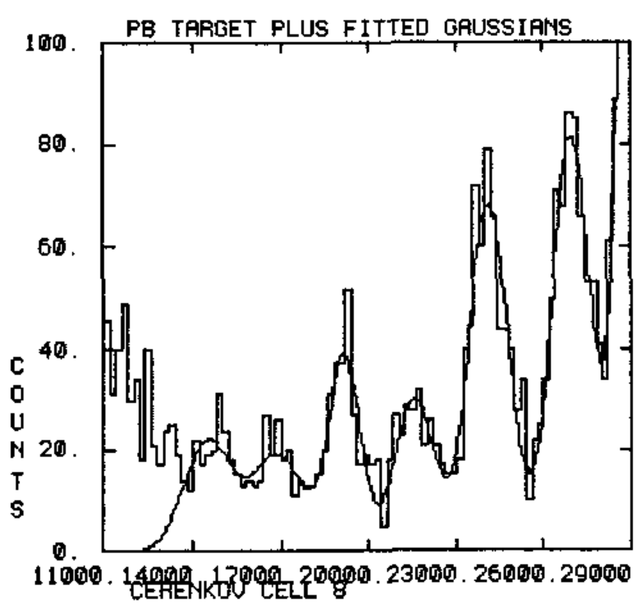

figure 6: Projectile fragment spectrum vs. Z^2 for sulphur projectiles.

They represent a good approximation of σ(inel), i.e. they contain the fragmentation cross sections. Subtracting the measured cross sections σ(prod) (figure 6 on page 11) and also the contribution from hadronic fragmentation, which can be calculated assuming "strong factorization", one is left with a very preliminary estimate of σ(el-mag fr) in table 5 on page 11. The electro-magnetic component seems to exhibit the expected dependence ($\approx Z_t^2$) on the charge Z_t of the target nucleus. Also the absolute magnitude is in the predicted range. The predictions depend on rather limited data on photonuclear reactions. Related calculations are in progress.

It might be possible to even estimate the amount of coherent production which is predicted by Glauber theory to increase with energy and atomic weight.

Data acquisition.

The present NA 36 data acquisition system is based on a combined FASTBUS/CAMAC arrangement as shown in figure 7.

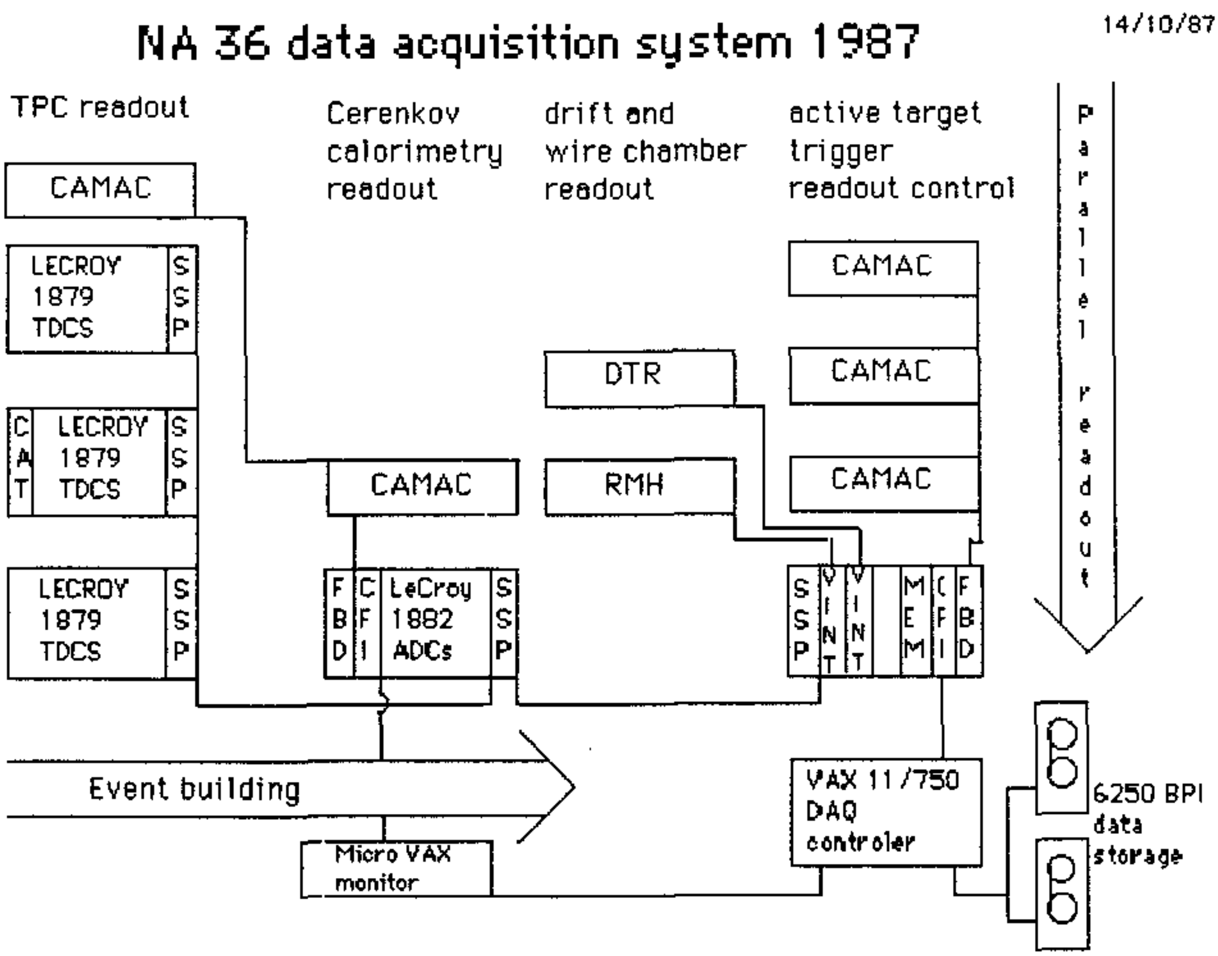

figure 7: The NA 36 data acquisition system.

The TPC read-out is managed by three crates of LeCroy 1879 TDC's; the calorimetry is read out by LeCroy 1882 ADC's in a fourth crate, and the drift and wire chambers by purpose built interfaces taking data from RMH and DTR into a fifth FASTBUS crate. A variety of low volume CAMAC devices are also read out by means of a FBD 320's into the fourth and fifth crates. Each crate has a SSP (SLAC Scanning Processor - a fast 32 bit crate computer based on bit-sliced micro-processor technology) as a crate master and sub-event builder which ensures that the channels in each crate are read-out simultaneously, and in parallel, into the local data memory of each SSP. The SSP in the fifth crate is the overall event-builder and is responsible for reading out the partial event from each of the four others SSPs in turn. It then constructs the final, complete event which is then transferred to a LeCroy 1892 4-Megabyte buffer memory. The trigger logic is then released for the acquisition of the next event.

When the end-of-spill is signalled, the VAX 11/750 is prompted to begin the read-out of the LeCroy 1892 memory by means of a CERN CFI. The event buffers are written directly to tape without any further processing being necessary. Some of these are written via an Ethernet link to a MicroVax II which executes the main monitoring software for the experiment.

CHANGES FORESEEN FOR THE 1989/1990 RUN.

Our motivation for the 1989/1990 ion run is to achieve the physics proposed originally by NA 36 and therefore consider only small modifications in the experiment which enhances this aim. The changes in the experiment which are under discussion are briefly presented here along with the reasons for the change.

Beam transport.

It is intended to add either a vacuum pipe or a helium bag along the beam path whereever possible in order to reduce beam induced backgrounds. The path under the TPC has a high priority for such a change.

Targets.

The idea of an active target has advantages when an experiment uses a low-intensity beam. This can be the case when a particularly selective trigger is used. For this reason one of the NA 36 collaborating institutions will continue developments in this area, also in view of future Pb experiments.

Single targets of the order of 1% interaction lengths (Pb, Ag, Cu, S) will be used otherwise.

TPC.

Small modifications of the TPC end cap are under discussion. The operating gas P-9 (91% Ar, 9% CH_4) if changed to gas having a cooler transport is expected to yield better two track resolution by as much as a factor of 5. This in turn would allow NA 36 to take data with the target as close as 10 cm from the TPC (compared to the present 100 cm). This would give some advantage in terms of acceptance (see table 6 and table 7. In order to achieve this advantage minor modifications in the construction of the endcap are required.

The modifications anticipated are as follows:

1. 50 micron focusing wires at present pitch

2. 20 mm long anode wires at present pitch

3. well separated high voltage lines to focusing wires

4. use of slow transport gas

5. a slower clock frequency would be used for the 1879 TDC's (The same electronic chain from the anodes would be used)

6. 256 channels of Aleph TPD would be added to monitor the focusing wires

Wire chambers.

No change in the present external tracking system is anticipated other than normal maintenence. However the possibility of improving the multi-hit capability by using a slower gas is under consideration.

Calorimetry changes for the 1989/1990 run.

The NA 36 Forward Neutral Calorimeter (FNC) was designed according to the type of experiment in preparation with the European Hybrid Spectrometer (EHS). In this context the neutral shower reconstruction, localization and energy measurement were the only outputs expected for this detector.

A specific ultra-relativistic ion-A experiment design would have ended up with a very similar detector. Indeed, the transverse cell size (15×15 cm^2) allows a good inclusive energy flow and transverse energy measurement.But in these experiments a precise and independent measurement of the energy at 0^0 has proven to be very profitable as far as a central interaction trigger is concerned. The central cells of the FNC are included in the whole detector as any of the 200 cells and thus, due to the lateral extension of hadronic showers, the 0^0 energy measurement may be somewhat increased by the edges of surrounding showers. Central collisions having low 0^0 energy are of course particularly sensitive to this effect.

In order to improve the 0^0 performances of our calorimetry the following modifications are under study:

- Opening of a hole in FNC at the beam spot position.

- Installation of 16 spare FNC cells behind this hole to make an independent 0^0 calorimeter fully containing the forward energy.

On top of a better understanding of the trigger selection of central collisions these modifications should lead to a more precise energy flow measurement in the forward hemisphere as well as a better determination of the transverse energy. This latter parameter gives access to the energy density which was reached during the collision; the more precisely measured it is, the more fruitful its comparison with the strangeness production features will be.

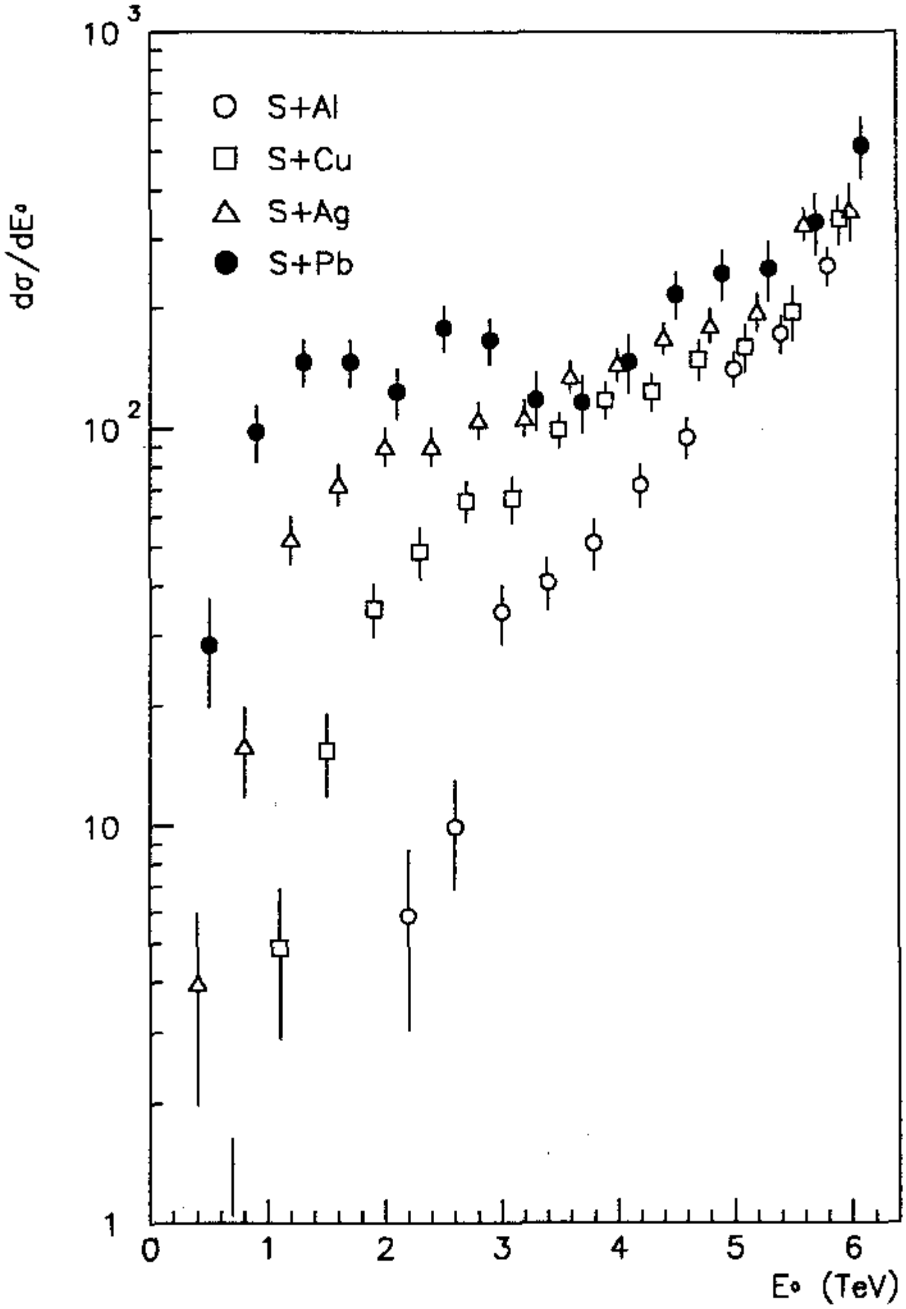

figure 8: 0^0 energy flow.

The energy flow at θ(lab) (0.3 degree is supposed to be dominated by projectile fragments, therefore the relevant angular range is given by Fermi motion. A non-negligible contribution may be due to secondary mesons. The energy spectrum for nuclear spectators at $\theta(\mathrm{lab}) \approx 0^0$ was determined from the measured energy deposit in the 4 central FNC blocks. A contribution from secondary particles was estimated from the surrounding 12 FNC blocks, this was subtracted. The (preliminary) energy flow thus obtained is shown in figure 8. The relative normalization for the various targets reflects the respective cross sections. Energy resolution was not unfolded (corrections were estimated to be less than 30% for 0.4 (E(0^{0}) < 2 TeV).

Whereas e.g. Al targets do not slow down the incident sulphur ions substantially, heavy targets (Pb) do so; this is partially a geometric effect. Similar trends were found for oxygen projectiles (not shown).

Data acquisition.

The present data taking rate is driven by 3 factors. These are

1. the duty cycle of the SPS which at 200 Gev/c is 4 seconds of beam followed by a 10 second gap;

2. the characteristics of the CERN CFI which compel the event readout from the FASTBUS buffer memory to take place during the beam off period for efficient data transfer;

3. the transfer speed between FASTBUS, through a VAX 750, to the 6250 bpi tape drives.

The combination of these three factors result in an instantaneous read-out of the detectors to FASTBUS buffer memory, of 1 Megabyte/sec (during the 4 seconds of the beam pulse), followed by a transfer rate of 400 kilobytes/sec to the tape (during the 10 seconds of beam off). The maximum rate of tape writing is limited by the linear speed of the tape -125 inches/sec - and unavoidable tape overheads, to about 620 kilobytes/sec. Our rate of 400 kilobytes/sec is below this theoretical maximum due to the characteristics of the CERN CFI, which is the interface between FASTBUS and the VAX.

In order to translate this event rate from megabytes/sec to triggers/sec it is necessary to use an average event size of about 20 kilobytes. (A central collision event would be about 40 kilobytes in size and sometimes more.) This figure is a variable depending on trigger definitions, target mass and so on. This gives an approximate trigger rate of 50 per second.

The mark/space ratio of the beam at 60 Gev/c is approximately 1:1 which imposes a more severe condition on data taking than at 200 Gev/c since more data are accumulated during the 7 seconds of spill and a reduced time is available for the events in the LeCroy buffer memory (or memories) to be transferred to tape.

We are planning to improve the data acquisition system in two respects. Firstly, we intend to replace the CERN CFI as an interface to the tapes (through the VAX) with a purpose built FASTBUS module which will act as a combined buffer memory and tape controller. Thus as events are constructed by the principal SSP in the system, they are transfered to this new buffer memory instead of the LeCroy 1892. The data are then written directly to a Storage Technology Corporation 6250 bpi tape drive connected to the module. The inefficient path to the tapes through the CERN CFI and the VAX 11/750 will thus be removed. A small sample of data will also be written to the LeCroy memory in the normal way and then via a CFI directly to the MicroVax II for monitoring purposes. Our previous data rate (to tape) of 400 kilobytes/sec (in the beam gap) averaged over 14.4 seconds of the SPS cycle yields an overall average rate of 280 kilobytes/sec. By means of this new tape controller/memory we will be able to transfer data to tape during the whole 14.4 second spill at between 500 and 600 kilobytes/second thus doubling the capacity of the read-out system.

Secondly, we wish to replace the wire-wrapped SSPs with a newer version which is constructed as a multi-layered board and has increased memory. There is a very considerable body of NA 36 software that is in use with the SSPs, and this route is seen to be a cost-effective method at this time. The Aleph event-builders are clearly a very powerful alternative to the SSPs and careful consideration is being given to their use. This is a question not merely of overall cost, but of time taken for software development to incorporate a radically different event-builder into our system for the next ion-run.

Finally, the system will be extended to allow us to incorporate four Aleph TPD's for use with the modified endcap that is envisaged for the TPC.

BEAM REQUEST FOR 1989/1990.

NA 36 requests 34 days of sulphur beam split equally between 60 GeV/cA and 200 GeV/cA. 17 days proton running prior to the ion run and 17 days proton running after the ion running are requested for calibration and comparison data.

NA 36 would also request that CERN continue its operation and maintenence of the M1 magnet and the present level of maintenence of the wire chambers.

It should be noted that the ion community deferred the 60 GeV/cA running to 1989(SPSC/M434).

EXPECTED RESULTS FROM THE 1989/1990 RUN EXTENSION.

An extrapolation of the sulphur October '87 run is used to determine the expected results from the 1989/1990 run extension. It is assumed that the experiment will take data with about 66 percent efficiency, losses due to beam tuning and accelerator problems. Therefore we assume 12 "good" days of running at each energy. This is twice the "good" days we had in the 1987 ion run. It is anticipated that the DAQ upgrade will allow twice the data to be stored to tape per unit time. Since in 1987 we took 1.8 M triggers in 6 "good" days it is expected to take 7 M triggers at 200 GeV/cA and about 10 M triggers at 60 GeV/cA in 1989/1990.

Using the geometric acceptances of table 2 on page 5 for the 1989/1990 ion run the acceptances for strange hadrons are calculated assuming 10^5 minimum bias sulphur on lead collisions (table 6). A comparison with the accepted strange hadrons given in table 3 on page 5 shows the results of the modifications improving the acceptances.

table 6: Estimated geometrically accepted strange hadrons.

Sulphur 1989/1990 run, 10^5 minimum bias events on Pb target.

particle	200 GeV/cA	60 GeV/cA
K^0_S	11054	11500
Λ	8325	8470
$\bar{\Lambda}$	1520	345
Ξ	420	105
Ω	38	8

The combined effects of improvements in acceptance and data acquisition performance along with twice the running time will yield about a factor of ten in statistics for the heaviest strange baryons (table 7). Note that even at 60 GeV/cA four times the 1987 statistics are anticipated. Correlations in rapidity and P_t for massive strange baryons are expected to be very sensitive to the existence of the quark-gluon plasma. A high statistics experiment is essential if these correlations are to be measured with confidence.

table 7: Estimated geometrically accepted strange hadrons.

Sulphur run 1989/1990.

particle	200 GeV/cA 7 M trigger all targets	60 GeV/cA 10 M trigger all targets
K^0_S	850 k	1250 k
Λ	640 k	921 k
$\bar{\Lambda}$	117 k	38 k
Ξ	33 k	12 k
Ω	3 k	1 k

COMMENTS ON PLANS FOR THE LEAD BEAM ERA.

NA 36 continues to discuss the potential merger of the WA 85/NA 36 interest into one experiment as was presented to the April lead beam meeting. A letter of intent is anticipated to be formulated in the fall of 1988. Long range thoughts are also being directed to a possible experiment in a "Super Omega" high flux facility which would follow in the latter 1990's. The idea being to plan and construct a second phase experiment after some benefit of initial experience with lead beams. It is clear that if the lead beams were to be postponed to as late as 1993 a rethinking of the experiment priorities would be needed.