EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

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MEMORANDUM

Further Information concerning Addendum SPSC 2000-011/P264 Add.5

The NA49 Collaboration

In this memorandum additional information concerning the proposed continuation of the NA49 experiment with proton and pion beams (part II of addendum SPSC 2000-011/P264 Add.5) is provided. This information concerns a number of general boundary conditions, the list of participating institutions and collaborators, distribution of responsibilities, running costs and funding, computing, and requests on CERN.

1 General Boundary Conditions

The NA49 detector has been on the floor at the SPS for more than 5 years. Over this period of time it has operated in a smooth and reliable fashion not necessitating any major detector upgrades or repairs.

The proposed continuation of the NA49 experiment with proton and pion beams represents therefore a relatively straight-forward extrapolation of operational experience gathered over these past years. The modest yearly running time will allow a sizeable down-scaling of hardware expenses. On the software side the data processing of proton-induced events presents an almost negligible computing load compared to the impressive data volumes contained in the Pb+Pb data which will have been collected up to the end of this year.

Processing and physics analysis of these already available data will continue - involving all members of the original NA49 collaboration - for another 2 to 3 years at minimum. A welcome continuity concerning all aspects of experimentation and analysis will therefore be ensured.

Continued experimental exploitation of the NA49 detector will, on the other hand, be a decisive asset for the understanding and quality of the physics output of the collaboration in general.

This is especially true for the involvement of young physicists in the project: the running NA49 detector is a unique tool to bring them into contact with state-of-the-art experimentation at a time when the experimental programme at CERN suffers continued compression. In addition this aspect is of great importance for the majority of small groups from Eastern Europe who will have to carry the future activities.

Besides the physics motivation described in some detail in the preceding document CERN/SPSC 2000-011, the proposed initiative addresses also some very practical issues and boundary conditions inherent in the field of soft hadronic physics:

- the present state of understanding does not allow for a proper definition of priorities in the vast parameter space of elementary hadron+hadron and hadron+nucleus interactions.
- hence it is of prime importance to maintain the flexibility to be able to update this priority list for further data taking in the future closely following the evolution of physics analysis.

In this context we want to stress once more that this physics programme has to be regarded as completely complementary to the COMPASS experiment, the only other future activity concerning hadronic physics at the CERN SPS.

2 Participating Institutes and Collaborators

Below the list of participating institutes and collaborators is given. It represents a strong subgroup of the actual NA49 collaboration, which has already ensured to a large extent the running of the experiment during the past p+p and p+A data taking periods as well as the related data analysis.

Department of Physics of University of Athens, Athens, Greece
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KFKI Research Institute for Particle and Nuclear Physics, Budapest, Hungary
D. Barna, Z. Fodor, J. Gal, G. Jancso, P. Lévai, J. Molnár, G. Palla, F. Sikler, I. Szentpetery, J. Sziklai, D. Varga, G.I. Veres, G. Vesztergombi, J. Zimanyi

Institute of Nuclear Physics, Cracow, Poland
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Joint Institute for Nuclear Research, Dubna, Russia
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Fachbereich Physik der Universität, Frankfurt, Germany
L. Betev, A. Billmeier, R. Bramm, P. Buncic, M. Gaździcki, T. Kollegger, R. Renfordt, C. Roland, R. Stock, H. Ströbele, A. Wetzler

CERN, Geneva, Switzerland
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Fachbereich Physik der Universität, Marburg, Germany
V. Friese, C. Höhne, F. Pühlhofer

University of Sofia, Sofia, Bulgaria
M. Makariev, M. Mateev, B. Obreshkov, S. Stoynev

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Institute for Nuclear Studies, Warsaw, Poland
H. Bialkowska, B. Boimska

Institute of Experimental Physics, University of Warsaw, Warsaw, Poland
E. Skrzypczak

Institute of Particle Physics, Huazhong Normal University, Wuhan, China
G. Chen, Z. Li, F. Liu, L. Liu, Y. Wu,

Rudjer Boskovic Institute, Zagreb, Croatia
T. Anticic, S. Horvat, K. Kadija, T. Susa

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3 Responsibilities

Most of the institutes of the actual NA49 collaboration agree to continue the maintenance and eventual repairs of the detector components for which they have been responsible up to now. In cases where this was not possible the know-how and responsibility could be re-distributed among the participating collaborators. The responsibility of operating the experiment during the running periods as well as the DST production will be taken over by the participating institutes. As the running periods are on the level of only 1 month per year no problem should appear. A more detailed distribution of responsibilities is given below.

Operation of cryogenic systems for Vertex Magnets:	CERN-LHC/ECR
Operation of beam line equipment:	CERN-N49, CERN-SL/BI, Frankfurt
Operation of LH2-Target:	CERN-LHC/ACR, CERN-N49
Operation of TPCs:	CERN-N49, Frankfurt, Cracow
Operation of TOF-Right:	Marburg
Operation of TOF-Left:	Dubna
Operation of TOF-Grid:	Budapest
Operation of Veto-PCs:	CERN-N49, Budapest
Operation of Calorimeters:	Budapest
Operation of Slow Control:	Zagreb
Operation of DAQ and run control:	Budapest
Operation of DST production:	Frankfurt, CERN-IT

4 Running Costs and Funding

Here we give a breakup of running costs to be covered by the Common Fund of the collaboration, based on a yearly data taking period of about 4 weeks and on experience from the past five year's running.

Tapes, Tape Drive maintenance, Processors:	30 kCHF
Gas:	35 kCHF
Electronics Pool:	30 kCHF
Computing:	10 kCHF
CERN Magazine, Work Shops:	15 kCHF
Infrastructure/General:	10 kCHF
Total:	130 kCHF per annum

The collaborating institutions can provide a total contribution to the Common Fund of about 150 kCHF per year. This sum would contain a contribution from CERN of about 50 kCHF.

5 Computing

The NA49 experiment has a well developed computer cluster for raw data processing. The production hardware and software has been gradually built and upgraded since 1994 and consists currently of the following elements:

- a SONY robot and tape drive for raw data reading
- 1.4 TBytes staging disk and tape server

– a cluster of 48 dual processor PC computers running LINUX.

All individual elements, with the exception of the tape/disk server are owned by NA49. Production time estimates for p+p or p+A data on this cluster are about 6 weeks per year for 4 weeks of beam time. This load is small compared to the one to be foreseen for the coming years concerning the production of Pb+Pb data accumulated up to end 2000.

In 1999 NA49 has successfully implemented and tested Central Data Recording (CDR). By using CDR, the SONY tape recording and reading is bypassed in favour of using taping systems of the CERN Computing Center. The use of CDR is still under discussion concerning the break-even of increased taping costs and reduced maintenance and operation costs for the collaboration.

Physics analysis from DST for p+p and p+A data is mainly done on NA49-owned processors. All simulation work will be carried out in outside institutes.

6 Requests on CERN

In addition to the budgeting mentioned above the requests on CERN would be the following:

a) Continued full availability of the EP/N49 group (2 physicists, 1 technician).
b) Continued support for the two superconducting Vertex Magnets, i.e. operation and maintenance of the cryogenics installations ensured by the LHC/ECR group.
c) Continued support for the operation of the LH2 target provided by the LHC/ACR group.
d) Continued availability of the space occupied in the H2 beam line and auxiliary areas allocated to NA49 in the North Experimental Hall. No extension of space is to be foreseen.
e) As explained above and in the addendum CERN/SPSC 2000-011 we foresee a beam request of about 4 weeks of proton or pion beams at various energies as in the past without any need of special configurations.
f) Continued support for the NA49 cluster system administration and maintenance of the staging disk and tape server provided by IT division as well as continued access to the ion and ionlx Work Group Servers. In case of using Central Data Recording the support of the corresponding taping facilities at the CERN Computing Center would be required. In the context of computing we want to repeat that the processing time of p+p or p+A data corresponding to 1 month of data taking is on the level of 6 weeks only on the NA49-owned processor cluster. No additional investments towards CPU upgrades or network infrastructure via the COCOTIME budget are to be foreseen.