CERN RESEARCH BOARD

MINUTES OF THE 155th MEETING OF THE RESEARCH BOARD
HELD ON THURSDAY, 15 NOVEMBER 2001


Apologies: L. Evans

Items
1. Procedure
2. Reports and matters arising from the INTC Meeting of 24 September 2001
3. Reports and matters arising from the LHCC Meeting of 3-4 October 2001
4. Reports and matters arising from the SPSC Meetings of 30 October 2001
5. Incidence of the LHC budgetary problems on the Research Programme
6. Any other business
1. PROCEDURE

The Director General welcomed M. Calvetti, the new Chairman of the LHCC and G. Roy the new representative of the Staff Association.

The Minutes of the Research Board held on 13 September 2001 [1] were approved with the following change:
Page 5 line 29: ….will be available in 2002.

2. REPORTS AND MATTERS ARISING FROM THE INTC MEETING OF 24 SEPTEMBER 2001

H. Flocard reported on the INTC meeting held on 24 September 2001. He first presented proposal P143, Charge Breeding of Radioactive Ions in an ECR Ion Source [2]. It aims to compare, under the same conditions, two schemes to increase the charge of ions: the Electron Cyclotron Resonance Ion Source and the Electron Beam Ion Source schemes. The beam intensity, the breeding time and the efficiency of the charge state would be compared. This comparison can only be made at ISOLDE. In view of this and of the interest of the proposal the INTC recommended to the Research Board the allocation of the 15 shifts requested. The Research Board concurred with this recommendation. The new experiment will be known as IS397.

The next presentation was of P144, Studies of Beta-Decay of Sr nuclei on and near the N=Z line [3]. This experiment proposes to study the deformation of nuclei along the N=Z line. The deformation parameter, $\beta_2$, changes rapidly as a function of atomic number and can be either positive (prolate nuclei) or negative (oblate nuclei). The study of the Gamow-Teller strength distribution allows the determination of the sign of this parameter. The INTC concluded that information on nuclear shapes could indeed be deduced from this experiment and recommended it for the requested 13 shifts. The Research Board concurred with this recommendation. The new experiment will be known as IS398.

Proposal P134 Add. 1, Exploring the Dipole polarizability of $^{11}$Li at Rex-ISOLDE [4] was discussed next. This experiment proposes to measure this polarizability using the elastic scattering of $^{11}$Li off lead. The angular distribution, especially in the backwards direction, is a function of the polarizability. The proposal is expected to improve on the precision of existing measurements by about a factor of four. The INTC therefore recommended an allocation of 24 shifts. In the ensuing discussion, J-P. Delahaye pointed out that there are no resources in the PS Division to operate Rex-ISOLDE. In reply Flocard mentioned that the Collaboration had committed itself to participate in the operation. The Research Board took note of this potential operation problem. The Research Board concurred with the INTC recommendation. The
new experiment will be known as IS399. The last proposal presented by Flocard was P138 Add. 1, Investigation of Astrophysically Relevant Neutron-Rich Ar nuclei [5]. The relative concentration of $^{48}$Ca and $^{46}$Ca is found to be as much as five times larger in the Allende meteorite than on earth. In some interpretations the meteorites are relics of a Super Nova explosion and concentrations found in them could be representative of the isotope mix at that time. The proposed measurements are intended to clarify the dependence of this relative abundance on, in particular, the half life of $^{48}$Ar. Following a letter of clarification on background suppression the INTC recommended the proposal for approval for 12 shifts. The Research Board concurred with this recommendation. The experiment will be known as IS400.

The Chairman of the INTC then reported on the status of nTOF. Severe background conditions were encountered during the nTOF02 running which was intended to perform calibrations and instrumentation checks. This background was 100 times larger than expected resulting in nTOF being no better than the competition. The background intensities, spatial distribution, time structure as well as its impact on various detector components were studied at length. However the Status Report presented by the Collaboration [6] did not identify the source of the background and hence its remedy. The INTC therefore requested a study of the impact of the background on the nTOF programme and, in particular, on nTOF03 and nTOF04, of the source of the background through simulations and experimental tests and a proposal for remedies. Since then, based on the result of a preliminary simulation, most of the background was found to originate from muons penetrating the shielding and producing photons and neutrons. An almost complete concrete and iron shielding wall was installed, resulting in a decrease of the background by a factor of 20. Further reduction of the background is still needed and various schemes will be investigated, such as a possible reduction of the proton energy. The Research Board took note.

3. REPORT AND MATTERS ARISING FROM THE LHCC MEETING OF 3-4 OCTOBER 2001

M. Calvetti reported on the LHCC meeting held on 3-4 October 2001. He first presented the LHCb Vertex Locator (VELO) TDR [7]. The prerequisite of this subdetector is to reconstruct tracks with at least 3 hits/track down to 15 mrad. The design is complete and satisfies this and other requirements of the experiment. The detector has an $r$-$\phi$ geometry. It uses double-metallization, has regions of fine pitch, strips of varying length and large and non-uniform irradiation. Using simulations it has been determined that the occupancy
per channel is always less than 1%. The impact parameter resolution for most B decay tracks is less than 50 μm and the primary vertex resolution is 42 μm. The decay time resolution is 40 fs. Due to the shape of the secondary vacuum container the material in front of the first measured point amounts to 3.8% of a radiation length. The LHCC noted that LHCb is in the process of an extensive re-optimization of the tracking system motivated by the significant amount of material traversed by secondary particles. The VELO design may therefore evolve. Any change in this design will have to be communicated to the LHCC and approved before construction commences. The LHCC, given that the design of the VELO meets the requirements of the experiment, recommended general approval of the LHCb Vertex Locator TDR. The Research Board approved the submitted TDR, under the LHCC formulation, which allows the Committee to monitor further progress of this project through the implementation of schedules and milestones listed in the ancillary document.

The Chairman of the LHCC then presented the LHCb Muon System TDR [8]. It consists of five planes of detectors. It must provide good muon identification (90%) from tracks in the general tracking system, a robust transverse momentum trigger, and a reliable bunch-crossing identification. The technologies chosen for this detector are RPC’s for the outer regions and MWPC’s for the intermediate regions. No technology has yet been chosen for the innermost regions of the detector amounting to 1% of the total area. The LHCC requested that it be informed of and approve any change in the design of the muon system resulting from the re-optimization of the tracking system mentioned above. The LHCC was satisfied that the proposed design meets the requirements of the experiment and recommended general approval of the LHCb Muon System Vertex TDR. The Research Board approved the submitted TDR, under the LHCC formulation, which allows the Committee to monitor further progress of this project through the implementation of schedules and milestones listed in the ancillary document.

In the ensuing discussion Blaising asked whether the vertex locator would be protected from excessive radiation. Myers replied that this would be done through a beam dump system provided by the machine group. Zalewska pointed out the importance of minimizing the material near the vertex locator as was proven by HERA-B. It was also pointed out that the use of inclined straw tubes to determine 3-D coordinates of particles was difficult in high multiplicity environments.

The CMS Comprehensive Review [9] will be discussed at the next Research Board.
4. REPORT AND MATTERS ARISING FROM THE SPSC MEETING OF 30 OCTOBER 2001

K. Königsmann reported on the meeting of the SPSC held on 30 October 2001. He first reported on the status of NA48. The drift chambers have been repaired and the Collaboration was congratulated for its very precise result on $\epsilon'/\epsilon$. It is hoped that systematic uncertainties will be reduced even further following the latest running. The tight schedule for the new drift chamber read-out to be used in 2002 by NA48/1 is worrisome. NA48/2 should run in 2003 on rare charged kaon modes.

HARP has run in 2001 and, because of a late commissioning of some of its components, has been approved for a further 20-week run in 2002. The Committee has requested an update on the data collected.

The Research Board confirmed the approval of the proton running requested by NA60. DIRAC now has a measure of the $\pi^+\pi^-$ atom lifetime with a 22% precision. Using the 2001 data the precision should improve to 14% and with the 2002 data to 10%.

COMPASS has been forced to give up on the OI magnet at least for the time being, following repeated quenches, and has installed and made use of the SMC magnet. The SMC magnet provides acceptances ranging from 50% to 100% of the OI magnet values depending on the reaction. COMPASS will therefore be able to collect physics data in 2002 albeit with reduced statistics.

Königsmann expressed the concern of the SPSC about ageing equipment and missing resources for maintenance in the PS. It was also pointed out that beam time for LHC detector tests is often cancelled at the last moment. The SPSC encouraged better use of test beam time.

During the discussion the possibility of closing down West Area beams was evoked, although it was recognized that moving the GI facility would not be possible and that finding additional test beam areas in the North Area was not easy. The running time needed by COMPASS to complete its muon programme was also discussed.

The request by CMS for 25ns bunch spacing running at the SPS in 2002 was presented. It was decided to shift this running to early 2003 unless CMS provided evidence that items on the critical path would be delayed as a consequence.
5. INCIDENCE OF THE LHC BUDGETARY PROBLEMS ON THE RESEARCH PROGRAMME

L. Maiani reported on the LHC cost overrun. How to finance it was under discussion but it was evident that a sizeable fraction of it would have to be found in the CERN budget. This would entail the reallocation of resources to LHC. However, it was inconceivable to turn off all our other instruments of Research, in particular because this would affect outside users.

The problem is twofold. The more immediate problem is to identify sufficient savings in expenditure for the 2002 budget to be approved at the December Council session. This time-scale necessarily means implementing cuts in the scientific programme without having them approved through the normal scientific committees channels. On this the Management asks for an indication from the Research Board in real time. The second problem concerns the longer time-scale. Five internal task forces have been set up to suggest savings in various areas of CERN activities. Each task force includes an external member. One of these task forces is directly concerned with quantifying savings in the Research sector. Interim reports are expected by the end of November and the final reports in February. Based on their findings a Long Term Plan will be elaborated and presented to Council starting from March 2002. The scientific committees and the Research Board will be consulted following a normal, albeit accelerated, procedure.

The Director General then listed a series of actions to be undertaken:

- A reduction of 25-30% in accelerator time in 2002. This will allow the approved experiments to collect data albeit with a corresponding reduction in statistics. No compensation for this loss of beam time is foreseen.
- A similar reduction in running time is foreseen for CAST, with corresponding savings on cryogenics.
- Experiments will be declared terminated one year after the end of data collection, although LEP experiments will continue until the end of 2002. This entails the closure of CHORUS at the end of 2001.
- Experiments approved to run in 2003 will be reviewed by the corresponding scientific committees, early in 2002.
- The cost of CNGS and the participation of CERN in OPERA will be reviewed in January 2002.

The savings resulting from the proposed reduction in beam time amounts to about 2.5 MCHF and 3.5 FTEs for a 4-week cut. These latter are immediately redirectable to other tasks as they represent operators who, in any case, are already involved in such tasks 50% of their time.
There will be a reduction in accelerator R&D to switch manpower to the LHC.

Calvetti cautioned that halting all research activities at CERN, other than LHC, would result in an unhealthy monoculture. In reply the Director-General replied that a lot of very important research activities such as LEP and $\epsilon'/\epsilon$ had been protected. One is now discussing savings on a very much reduced programme. Even a few MCHF per year savings spread over many years would add up to a significant fraction of the total savings one is looking for, a sizeable fraction, NOT the full cost overrun.

Blaising suggested that reducing the top energy of LHC beams to 6.3 TeV would be a significant saving. However it was pointed out that this would lead to a drastic redesign of the machine lattice and would result in a delay of several years. In addition this would compromise the physics of what will be the highest energy machine for a long time.

Königsmann pointed out that stopping all fixed target activities would actually adversely affect LHC since it would reduce the number of trained students eventually joining the LHC programme.

Cashmore reminded the Research Board that at the time of LHC approval there had been very little planned in the fixed target programme for the present time.

Calvetti also pointed out the loss of credibility that CERN would incur if it halted experiments that were already approved.

Zalewska, having studied the Comprehensive Reviews of LHC experiments, expressed her worry that additional problems could emerge since some components were still at the prototyping stage.

After a lengthy exchange of views the Research Board went on to discuss the accelerator schedules for 2002. The schedules presented include the savings requested by the Director General. They were approved by the Research Board with the following provisos:

- Since the heavy ion run was cut proportionately less than the proton run, the start of this run will be rediscussed after monitoring the progress of NA60
- The 25ns bunch spacing run will not take place provided postponing it does not affect critical path items in CMS.
- A one week run of “beam scrubbing” at 26 GeV to reduce the electron cloud effect will take place before the SPS physics startup.

The schedules are appended to these minutes.

6. ANY OTHER BUSINESS

The next meeting of the Research Board will take place on Thursday, 7 February 2002.
ENCLOSURES

[1] Minutes of the 9th INTC meeting held on 24 September 2001 (INTC 2001-019/INTC 9)

[2] Minutes of the 54th LHCC meeting held on 3-4 October 2001 (LHCC 2001-031/LHCC 54)


[4] PS and SPS schedules

REFERENCES


[2] Charge breeding of radioactive ions in an electron cyclotron resonance ion source (ECRIS) at ISOLDE (INTC 2001-023/P143).

[3] Studies of the beta-decay of Sr nuclei on and near the N=Z line with a total absorption gamma ray spectrometer (INTC 2001-024/P144).


