

**ISOLDE AND NEUTRON TIME-OF-FLIGHT
EXPERIMENTS COMMITTEE**

Minutes of the tenth meeting
on November 26th 2001

OPEN SESSION

The Chairman opened the meeting by briefly mentioning the recent LHC cost-to-completion review, showing a sizable budget shortfall. He evoked the possible implications for the INTC community and underlined that the success of LHC was important for everyone.

On the other hand, he pointed out that the activities of the ISOLDE and nTOF communities would be very beneficial to CERN by participating to keep it as a science producing place until the start of LHC. In that respect the current situation appeared especially favourable with the successful start of REX-ISOLDE and the final commissioning of nTOF well underway. He then reported on the ongoing audit of the ISOLDE Solid State Physics programme and emphasized its theinterest for CERN in demonstrating the contribution of this specific community and the significance of its research within the general field of Solid State Physics.

The ISOLDE technical Coordinator, Mats Lindroos, reported on recent events related to the ISOLDE facility. The replacement front-end, having been rapidly constructed to render the GPS operational again, had been completed and commissioned, somewhat behind schedule but in time to permit several runs in 2001. However, in the preparation phase of the first physics run on the recommissioned GPS, a time-delayed shortcut had been encountered, prohibiting applying high voltage. This was later concluded to have been provoked by a considerable amount of oil inside the front-end, which stemmed from the target unit. The thus necessary cleaning and repair actions prohibited the use of the GPS until the shut-down. He then turned to reporting on the ISOLDE consolidation project. An emittance meter device had been delivered which will permit characterization of target-ion source units, and the entrance porch of the ISOLDE experimental hall was nearing completion. Furthermore, progress on target and ion sources techniques were reported on. In the upcoming shutdown period, a major renovation of the ISOLDE control system and power supply will bring the facility on par with the hardware used elsewhere within the PS complex.

Thomas Nilsson, the ISOLDE scientific Coordinator, informed the Committee about the operation during 2001. The technical problems with the GPS meant that most runs had been rescheduled to use the HRS, with the severe limitation that the latter lacked relevant infrastructure for collections. The grave impact of this fact on the possibilities for the Solid

State Physics and Life Sciences communities was reiterated. However, the number of radioactive beam shifts delivered so far to approved experiments, developments and tests was 325, with a prevision of having delivered 340 shifts by the shutdown. The envisaged savings within the CERN budget was also to affect the operational period of 2002, with a shortened period of operation of the PS complex. To partly circumvent the negative effects on the ISOLDE scientific programme, an improved operation efficiency to be achieved by further parallel use of the two separators and increased usage of the target units was outlined. For the experiments, these constraints will translate into a pronounced decrease of the flexibility of the scheduling process. He then continued to show a large number of scientific and technical results obtained in experiments performed during 2001 where the outstanding example was the successful first post acceleration of a radioactive beam, ^{26}Na , in REX-ISOLDE made on Nov. 30th. Finally, the experiences of the pilot phase of web submission of proposals and letters-of-intention decided upon in the eighth meeting were recounted. The INTC community had in general reacted positively to this procedural change.

A. Ferrari then presented a technical report on nTOF, presenting the work on background reduction. After the status report presented in the ninth meeting, a working group had been set up under the leadership of the SL/EET group to address the background problem. A simulation of the whole facility had been made, confirming the hypothesis that the main component of the neutron background stemmed from capture reactions of muons from decaying pions originating from the spallation target. Furthermore, tests with a massive beam stopper had shown that ~90% of the background was not related to the neutron beam. A provisional iron shielding wall, in which gaps had to be left unfilled, had then been set up within the nTOF tunnel in order to stop these muons. The presence of this wall produced a reduction of the background by one order of magnitude, now rendering the beam-related background important. An amelioration of this iron shielding was foreseen for the upcoming shutdown. Finally, first ideas for a second experimental station upstream from the existing station were briefly evoked. This would permit fission studies to be done in parallel with capture experiments.

The following proposals were then presented:

1. Semiconductor Spectroscopy with Short Lived Isotopes; INTC 2001-033/P146; M. Deicher.
2. High Accuracy Mass Measurement of the very short-lived Halo Nuclide ^{11}Li ; INTC 2001-034/P147; D. Lunney.

CLOSED SESSION

Present: J. Äystö, C. Détraz*, H. Flocard (Chairman), M. Hauschild, K.-H. Langanke, K.-P. Lieb, M. Lindroos, E. Migneco, T. Nilsson (Secretary), C. Rossi-Alvarez, J.-P. Riunaud, D. Schinzel, W. Scobel, J. Suhonen, D. Warner

Apologies: J.-P. Duraud, H.-J. Kluge, H. Ravn, B. Rubio

* part-time

1. INTRODUCTION

The Chairman opened the session by considering the minutes of the ninth meeting. These were approved with the following changes in the paragraph on P-138 Add. 1: The title should read “Investigation of astrophysically relevant neutron-rich argon nuclei” and in the text, “spokesperson of P134” should be “spokesperson of P138”.

2. Subsequently, a discussion on the delivered scientific and technical reports followed:

2.1 ISOLDE Technical report

In relation to the encountered problems related to the GPS front-end, the Committee expressed its appreciation of the efforts done and encouraged the technical team to continue efforts to make the GPS available. The Committee was very satisfied that the good performance of the HRS had permitted a productive year. Concerns were expressed regarding the possible situation that the GPS front-end would not be available for the beginning of the 2002 running period. This was considered improbable. However, the precarious situation of having no available spare front-end unit was pointed out once more.

2.2 ISOLDE Scientific report

The Committee took note of the performance of the facility during 2001. Related to the provisions for the 2002 running period, it **supported** measures aimed at increasing the efficiency to compensate for the shorter operational period and anticipated that the user community should understand and show appropriate flexibility in the current situation. Regarding the reported experimental progress, the Committee estimated that the scientific productivity had been satisfying. It also expressed great satisfaction that REX-ISOLDE had commenced accelerating radioactive beam, acknowledged this major step and **congratulated** the community involved in the project. The electronic submission procedure was considered as functioning. However an interim period where INTC members will continue receiving paper copies of proposals still appears useful.

2.3 Technical report on nTOF

The Committee found that the background problem had been addressed systematically with simulations, experiments and shielding measures and expressed satisfaction with the results obtained by the SL/EET group with the help of the collaboration on the experimental aspects. It was pointed out that the reported tests lend confidence to the predictive power of the simulations. The Committee asked that further simulations be performed with the final shielding configuration to assess the impact on the experimental programme, for appraisal in the coming INTC meeting. The experiments nTOF3 and nTOF4 (whose approval by the Research Board is still pending in the absence of nominated spokespersons) were **requested** to re-evaluate their capacity to reach their physics goals in the light of the performance of the facility presently expectable for 2002. Furthermore, attention was drawn to the fact that the displayed experimental data did not comprise flight times corresponding to neutrons with energies above a few MeV and concerns were raised regarding a possible remaining negative influence of the background in this

energy range. In view of the neutron fluence measurements envisaged at these higher energies, a clarification on the capability was asked. In particular the INTC **requested** that this point be investigated in relation to P145 and reminded the collaboration that a further evaluation of this proposal was dependent on answering the questions asked after the September INTC meeting.

In the ensuing discussion, the SPS/PS Coordinator M. Hauschild briefly presented the provisions regarding protons for nTOF in 2002. The current schedule would permit the delivery to nTOF of an integrated number of protons amounting up to $7.07 \cdot 10^{18}$. The collaboration is thus **requested** to present plans for operation in 2002 taking this figure into account, as well as the PS schedule.

3. DISCUSSION ON NEW PROPOSALS AND LETTERS OF INTENT

The presentations of new proposals made during the open meeting, and two letters of Intent were then discussed.

3.1 **P146** (CERN/INTC 2001-033): Semiconductor Spectroscopy with Short Lived Isotopes

The scientific value of this broad experimental programme was acknowledged as such, addressing timely questions within semiconductor physics, and the methods proposed were seen as a unique way to fully exploit the potential of radioactive tracers available at ISOLDE. A discussion followed on the infrastructural resources requested in the proposal, a laboratory space for off-line experiment with short-lived radioactive probes, preferably within the future perimeter of the radioactive "Class C" area around the ISOLDE experimental hall. The proponents already requested such a laboratory several years ago and plans for its realization have been worked out. However, the financing remained unclear to the Committee, and the involved parties should discuss and **elaborate** possible solutions before the proposal is presented to the Research Board. With this reservation, the full allocation of 40 shifts was **recommended** for approval.

3.2 **P147** (CERN/INTC 2001-034): High Accuracy Mass Measurement of the very short-lived Halo Nuclide ^{11}Li

The proposed high precision measurement of the mass of the halo nucleus ^{11}Li was seen as scientifically highly interesting in view of the general interest focused on this original nucleus. Its precise impact on theoretical models is still difficult to assess due to the present state of these models. The experiment appeared well suited to the MISTRAL apparatus and ISOLDE. Therefore, an allocation of 12 shifts will be **recommended** to the Research Board.

3.3 **I-039** (CERN/INTC 2001-022): Production of a ^7Be sample for neutron-induced cross-section measurements

Even with the additional arguments furnished by the recent letter sent by the spokesman, the Committee was not convinced, based on the references given, that the scientific impact of the proposed measurements would be significant. Thus, even in the light of the diminutive resources required for this off-line test experiment, the Committee sees no reason to change its earlier decision not to support this Letter of Intent.

3.4 **I-040** (CERN/INTC 2001 032): Lifetime and g_J factor measurements on $^{226}\text{Ra}^+$

The Letter-of-Intention addresses experiments on parity non-conservation using Ra that could eventually complement high-energy searches for physics beyond the Standard Model. However, the interpretation needs a good knowledge of the atomic wavefunctions. The Letter of Intent aims at testing the limitations of atomic model calculations and was very **positively received** by the Committee.

4. OTHER BUSINESS

The Chairman recalled the ongoing Audit procedure of the solid state physics activities pursued at ISOLDE that should lead to a document to be reviewed in the February meeting. The research groups concerned with the Solid State Physics Audit had produced draft documents related to their activities. A discussion regarding the continued auditing process followed.

The next meeting is on **Monday February 25**, and the deadline for submission of proposals is **Friday, January 18, 2002**.

The dates of the INTC meetings in 2002 are:

13-14 May
23-24 September
25-26 November

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