

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

Minutes of the eleventh meeting
on February 25th 2002

OPEN SESSION

The Chairman, Hubert Flocard opened the meeting by pointing out that 2002 promised to be an exciting however challenging year, in view of the recent start of REX-ISOLDE and the numerous successful developments at ISOLDE, which give it an unique position with respect to competing facilities. The same considerations apply for nTOF now that the background has been sufficiently reduced to allow the start of an experimental program. For both facilities, the challenges originate mostly from the reduced running period and other budget constraints associated with CERN financial problems.

The ISOLDE Technical Coordinator, Mats Lindroos, reported on the progress of the ongoing shutdown works. The high-voltage problems on the newly constructed GPS front-end had been further investigated outside the ISOLDE target area, showing further strong indices that the encountered current leak stemmed from an internal oil contamination. Furthermore, a chemical analysis had identified the oil as stemming from valve of the target unit. The front-end was now being cleaned with the prevision of installing it at the GPS before the end of March. The progress of the ISOLDE consolidation programme was then reported, including upgrades of the control system and power supplies, robot controls, adaptation of the HRS towards high-resolution mode and modifications to concur with the legislation concerning radioactive laboratories. The budget restrictions imposed on ISOLDE operation would, in addition to a 30% shortening of the running time, limit the number of targets that it is possible to construct. The only solution that could be envisaged was to attempt a more efficient use of each target unit, in addition to an efficient use of the time available by a “push-pull”-mode operation of both separators. The report also addressed changes in the manpower situation at ISOLDE, leading to an acute shortage of Engineers-In-Charge for the operation of the facility. Solutions to alleviate this situation within the restricted budget situation were presently under discussion. Finally, the successful process of extracting intense ⁷Be beams in an off-line mode from a target irradiated at PSI was recounted.

Thomas Nilsson, the ISOLDE Scientific Coordinator, briefly summarized the operational schedule of 2001, where finally 350 radioactive beam shifts had been delivered from the facility. The parameters for the 2002 operation were presented, together with a schedule

where an attempt had been made to maximise the scientific output of the facility towards a level comparable with 2001 in spite of the earlier mentioned operational restrictions. Thus, the schedule was based on an extensive “push-pull”-mode operation and occasional parallel operation of both the separators to increase the efficiency of the facility. In consequence, it was technically possible to attain more than 350 shifts even with the shortened running period, but the loss of flexibility and enlarged risk of disturbances for the users together with the increased load on the ISOLDE technical team was evident. The unfavourable situation experienced by the condensed matter physics community in 2001 due to the GPS problems had been partly balanced in 2002 by a scheduling where the requests of these groups were largely realized. He continued by pointing out the increased demand of the RILIS within the ISOLDE experiments, which was approaching half of the requested amount of beam time in 2002. This renders the RILIS equipment and manpower situation extremely critical for the success of the facility, and it was reiterated that the experimental groups are asked to contribute to the RILIS operation in any possible way.

The nTOF Technical Coordinator, Paolo Cennini, reported on the construction of additional shielding in the tunnel near the production target in order to reduce the production of ^7Be . Furthermore, he discussed the final version of the iron shielding replacing the temporary shielding that had led to an extensive reduction of the background from muon-induced reactions as reported in the tenth meeting. The plans for the shielding have been adapted to allow the possibility of a second measuring station upstream from the existing station, permitting parallel fission measurements. To achieve a maximal nominal neutron flux in this position without deteriorating the beam quality in the existing target station changed and additional collimators were envisaged together with further shielding. However, simulations of the background situation in both measuring stations in this scenario were needed before any interventions were made in the tunnel. Consequently, these could not be envisaged in the time remaining before the end of the shut down and will not concern the 2002 operation.

The Spokesperson of the nTOF collaboration, P. Pavlopoulos, presented a programme of measurements for 2002 within the constraints of the current facility and the number of protons available from the PS. With the additional shielding, a continuation of nTOF-02 was envisaged to characterize the beam in the current conditions, requiring 1×10^{18} protons on target, followed by nTOF-03 (3×10^{18} protons), P142 (2×10^{18} protons) and a not yet submitted proposal on ^{232}Th (1×10^{18} protons), adding up to the 7×10^{18} protons available in the 2002 PS operational period. In addition, $^{233,235,238}\text{U}$ fission measurements not directly associated with any specific proposal for an estimated amount of 5×10^{18} protons were planned in parallel with the above experiments.

As a part of the ongoing Audit of the ISOLDE Solid State Physics programme, the related ISOLDE community had produced an activity review document that was presented by Marc Dietrich. He briefly presented these activities within the ISOLDE scientific programme and described the organization of the document and the subsequent Audit process. The Chairman took the opportunity to acknowledge the remarkable work done by the authors.

The Director General, Luciano Maiani, conveyed a short message to the ISOLDE and nTOF communities regarding the difficult times in conjunction with the CERN budget problems. However, all studies had shown that the research programmes at ISOLDE, nTOF and AD should continue. He underlined the importance of the Solid State Physics Audit to show the

impact of this research in a broader context. He expressed satisfaction with the approach to solve the background problems in nTOF but indicated a strong wish that the facility now becomes operational, starting to produce results. Furthermore, through a coherent line of management, nTOF should now become a facility, operating within a structure and with methods comparable to that of ISOLDE.

The following proposals were then presented:

1. Study of the β -decay of ^{12}B ; INTC 2002-002/P148; Hans Fynbo.
2. Obtaining empirical validation of shape-coexistence in the mass 70 region: Coulomb excitation of a radioactive beam of ^{70}Se ; INTC 2002-003/P149; D. Jenkins.
3. Precision Study of the β -decay of ^{62}Ga ; INTC 2002-004/P150; J. Cederkäll.
4. Study of the neutron deficient Pb and Bi isotopes by simultaneous atomic- and nuclear-spectroscopy; INTC 2002-005/P151; J. Lassen.

CLOSED SESSION

Present: J. Äystö, P. Cennini, E. Chiaveri*, H. Flocard (Chairman), M. Hauschild, H.-J. Kluge, K. -H. Langanke, M. Lindroos, T. Nilsson (Secretary), H. Ravn, C. Rossi-Alvarez, J. -P. Riunaud, B. Rubio, D. Schinzel, W. Scobel, J. Suhonen, D. Warner

Apologies: C. Détraz, J.-P. Duraud, K. -P. Lieb, E. Migneco

* part-time

1. INTRODUCTION

The Chairman opened the session by welcoming Paolo Cennini, appointed nTOF Technical Coordinator, and Enrico Chiaveri, representing the SL-division with technical responsibility for nTOF operation. He then expressed his appreciation towards the leaving Committee member Carlo Rossi-Alvarez. The minutes of the tenth meeting were approved without changes.

2. DISCUSSION ON THE DELIVERED SCIENTIFIC AND TECHNICAL REPORTS

2.1 ISOLDE Technical report

The reduction in ISOLDE staff was discussed, and concerns were expressed that a sub-critical situation, dangerous for the facility, would be attained. It was remarked that the shorter running period and the consequently dense schedule lead to an increased vulnerability in case of technical problems. The Committee took note of the effort in getting the GPS back into operation and the work aiming at high-resolution operation of the HRS. It further took note of the attempt to achieve a scientific programme at a level on par with 2001 in spite of the shorter running period and decreasing resources. It **encouraged** CERN, although in times of

crisis, to maintain an appropriate staffing level of the facility related to the documented scientific productivity.

2.2 ISOLDE Scientific report

The discussion focussed on the presented operational schedule for 2002, attempting to compensate the shorter running period by alternating and parallel use of both the separators. The Committee encouraged the in-house groups to undertake any measures aimed at keeping the amount of the scientific output at its present level and **expected** the user community to show understanding whenever the tight schedule and the push-pull operation mode would generate collisions of priorities and other constraints. It furthermore **expressed satisfaction** that the beam times requested by the Solid State Physics community had largely been granted in the schedule.

2.3 nTOF Technical report

For 2002, the INTC considered that last year Monte Carlo simulations regarding the background and the supporting experiments with a provisional shielding situation provided sufficient confidence in the facility to commence a meaningful experimental programme when the improvements of the shielding presented by the nTOF Technical Coordinator have been performed. However, the Committee **regretted** that the large aperture collimator necessary for the fission experiments described in the EU funded program was not yet available. The impact of changing collimators on the planning was briefly discussed. In conclusion, the INTC was concerned that so little information on the progress of the construction of the large aperture collimator was presently available and **asked** the collaboration to present a design for such a device and the associated simulations. The Committee took note of the possibility of a more ambitious project with a new measuring station dedicated to fission experiments but considered that neither technical nor budget issues had yet been addressed sufficiently to justify further discussion. E. Chiaveri agreed to make a presentation in the May INTC meeting of the organization of CERN technical support to nTOF.

2.4 nTOF beam planning

For INTC the completion of nTOF-02 was seen as a prerequisite before the start of an experimental program. Therefore, it agreed to **recommend** the proposed scheduling and allocation of $1 \cdot 10^{18}$ protons to nTOF-02. It also **asked** the collaboration to prepare a document describing the characteristics of the facility as it will operate in 2002 and its performances as deduced from the results of nTOF-02. (This corresponds to a similar request made last year before the discovery of the unexpectedly large background changed the priorities.) The document is expected for presentation and discussion at the next September INTC meeting. Regarding nTOF-03, the Committee did not think that it had adequate information to evaluate whether the envisaged measurements on Mg isotopes were feasible with the current background. Thus, the INTC **decided** that the recommendation of approval of the scheduling ($3 \cdot 10^{18}$ protons) was conditional to a submission of report to the next INTC in which simulations of the impact of the background are presented and the mastering of the C_6D_6 detectors is demonstrated (thereby reiterating a request made in the tenth meeting). The Committee took note of the rest of the scheduling ($4 \cdot 10^{18}$ protons) but **decided** that it could not recommend the corresponding allocation of beam time. Indeed, it was associated either to an experiment submitted but not yet discussed (P142) or to proposals not even

submitted (Th capture and fission experiments with a small collimator). On the other hand, the Committee was surprised to note that the experiment nTOF-04 and the already discussed proposal P145 (positively evaluated whose recommendation is pending answers on technical questions) were not mentioned in the planning for 2002. For all these reasons, the INTC **considered** that the 2002 nTOF planning presented at the February meeting was not satisfactory and **asked** the collaboration to explain again its strategy at the next INTC meeting. Furthermore, in line with the recommendation of the Director General that nTOF turns into a user facility, the INTC asked the collaboration to function as ISOLDE and to make a distinction between the general managing of the collaboration and that of the individual proposals. Thus, the Committee **requests** that each of the already recommended and future proposals have a dedicated spokesperson in control of all the technical aspects of the proposed experiment.

2.5 Solid State Physics Audit

The Chairman updated the Committee on the ongoing Audit process. The scope and goals of the procedure were discussed.

3. DISCUSSION ON THE OPEN SESSION

The presentations made during the open session were then discussed.

P148 (CERN/INTC 2002-002): Study of the β -decay of ^{12}B

The proposed experimental investigations of excited three-alpha particle states in ^{12}C was considered highly interesting from a nuclear structure viewpoint, also in the light of recent theoretical advances. The quality of the method proposed will probably bring a break-through of the knowledge of such systems. Thus, an allocation of **15 shifts will be recommended**.

P149 (CERN/INTC 2002-003): Obtaining empirical validation of shape-coexistence in the mass 70 region: Coulomb excitation of a radioactive beam of ^{70}Se

The proposed challenging measurements of the sign of the quadrupole deformation in ^{70}Se were considered important to map out the phenomena of shape coexistence in this mass region. The opinion of the Committee was that the proposed experiment had the potential to yield direct experimental proof of the phenomenon instead of the indirect evidences presently available. Furthermore, it was considered suited for REX-ISOLDE, leading to a **recommendation of 15 shifts**.

P150 (CERN/INTC 2002-004): Precision Study of the β -decay of ^{62}Ga

This proposal aims at a precision study of the decay of ^{62}Ga , with the ultimate goal to improve the present knowledge of the V_{ud} element of the CKM matrix. In spite of the experimental challenges and the strong competition from other facilities, the Committee stated that ISOLDE had a good chance to be the first to make a major contribution in this case. The INTC expressed the view that clearing up issues of configuration versus isospin mixings had the highest priority. Therefore, it requested the proponents to concentrate on this point and to study the possibility to perform the lifetime measurements in parallel. For this project, **10 shifts will be recommended**.

P151 (CERN/INTC 2002-005): Study of the neutron deficient Pb and Bi isotopes by simultaneous atomic- and nuclear- spectroscopy

The proposal, which aims at investigating properties of heavy nuclei by combining laser spectroscopy in the ISOLDE RILIS with nuclear spectroscopy, brings together specialists from both communities. The scientific case for Pb isotopes in the mid-shell region was considered well documented and the experiments feasible. However, the case for Bi did not appear as strong. In addition, the Committee requested that the feasibility of the method be demonstrated for stable Bi in off-line tests before any shift allocation can be considered. Thus, **15 shifts will be recommended** for the measurements on Pb isotopes. Since the proposed experiments rely on an upgrade of the RILIS control system, the Committee noted the support offered by the proponents regarding these technical developments in line with the earlier discussion on the need for outside support for the RILIS source.

P136 Add. 1 (CERN/INTC 2002-001): Isospin symmetry of transitions probed by weak and strong interactions

The proponents had, as requested by the Committee, performed an on-line yield test to determine the most favourable production method for ^{58}Zn . Furthermore, a number of measures were proposed to minimize the occurrence of isobaric contaminants. The Committee repeated its support for the scientific case and will **recommended an allocation of 25 shifts** to the Research Board.

4. OTHER BUSINESS

H.-J. Kluge reported on the status and future plans of the ISAC radioactive beam facility at TRIUMF.

The next meeting is on **Monday May 13**, and the deadline for submission of proposals is **Friday, April 5, 2002**.

The dates of the remaining INTC meetings in 2002 are:

23-24 September

25-26 November

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