

ISOLDE AND NEUTRON TIME-OF-FLIGHT  
EXPERIMENTS COMMITTEE

Minutes of the fourteenth meeting  
on November 25<sup>th</sup> 2002

**OPEN SESSION**

Hubert Flocard, the Chairman, opened the meeting and presented the agenda.

The ISOLDE Technical Coordinator, Mats Lindroos, showed the operational statistics for 2002 operation. The number of protons taken and the number of hours running the separators in 2002 were the largest achieved since the construction of PSB-ISOLDE, in spite of the shorter running period compared to earlier years. As mentioned in the previous meeting, this was made possible by operating the separators in the alternating, “push-pull” mode. Generally, the operation was successful, but some procedures still need to be updated to better suit this running mode. A technical problem in the form of a slow recovery of the pulsed high tension of the separators was encountered when a high-intensity beam impinges on the converter target. This leads to large losses of short-lived nuclei which are damaging to some experiments. Solutions are being studied by the PS division. He then continued by showing a list of planned shut-down and development work.

Thomas Nilsson, the ISOLDE Scientific Coordinator, commented the success of the 2002 operation with a total of 375 shifts of radioactive beam delivered to approved experiments, tests and developments. The distribution of beam time to the different subfields was shown, highlighting that the allocation to the ISOLDE Solid State Physics programme had returned to earlier values after a decrease in 2001 related to the GPS front-end problems. The backlog of approved shifts was below 400 with a majority of them approved since 2000. He went on to show several results as an illustration of the scientific output of the facility.

Paolo Cennini, the nTOF Technical Coordinator, gave an update on the nTOF operation in 2002. The last part (September-October) was dedicated to fission measurements using the larger second collimator (8 cm diameter). A draft version of a Collaboration document describing the facility and its performance has been made available to the INTC. It is organized in three main sections: I. Technical description; II. Safety (updated documents) and III. Performances. The information contained in the largely novel last section is based on the results of experiment nTOF-02.

Alberto Mengoni explained how nTOF beam time in 2002 had been shared between capture and fission experiments. All the initially planned projects have been addressed. He then showed a number of experimental results. His conclusion was that the facility is now fully operational. He continued by showing a planning for 2003 where  $7.0 \times 10^{18}$  protons were to be used for capture measurements and  $7.2 \times 10^{18}$  protons for fission. The discussion then returned to the performance report and Claude Détraz remarked that a comparison to the initial proposal regarding fluences, resolution and background were still missing. The Chairman recommended that the Collaboration provides this information as well as a comparison with other facilities in a separate document. Furthermore, C. Détraz urged the Collaboration to start planning ahead, beyond the existing contract with the EU. On a question whether nTOF could be using consecutive PS proton pulses with 1.2 s spacing, it was confirmed that the earlier bottleneck in the DAQ prohibiting this had been removed.

The following proposals were then presented:

1. Report on experiment IS381 and request for additional beam time: Isospin mixing in  $N \approx Z$  nuclei; INTC 2002-032/P116 Add. 1: N. Severijns.
2. Advanced Time-Delayed coincidence studies of  $^{31,32}\text{Mg}$  from the  $\beta$ -decays of  $^{31,32}\text{Na}$ ; INTC 2002-033/P162: H. Mach.
3. Neutron capture cross sections of Zr and La: Probing Neutron Exposure and Neutron Flux in Red Giant Stars; INTC 2002-034/P163: M. Heil.

## CLOSED SESSION

Present: J. Äystö, P. Butler, P. Cennini, E. Chiaveri, C. Détraz, H. Flocard (Chairman), M. Hauschild, H.-J. Kluge, K.-H. Langanke, M. Lewitowicz, K.-P. Lieb, M. Lindroos, E. Migneco, T. Nilsson (Secretary), E. Radermacher, H. Ravn, J.-P. Riinaud, B. Rubio, W. Scobel, D. Warner

Apologies: J.A. Rubio, J. -P. Duraud, J. Suhonen

## 1. INTRODUCTION

The Chairman opened the session by welcoming Juha Äystö, INTC Chairman from 1 January 2003. The minutes of the twelfth and the thirteenth meetings were approved without changes.

## 2. DISCUSSION ON THE SCIENTIFIC AND TECHNICAL REPORTS

### ISOLDE Technical and Scientific report

The Committee noted with pleasure that 2002 had been the best year ever for ISOLDE at the PSB as anticipated in the thirteenth meeting. It reiterated its congratulations to the ISOLDE team. However, it was noted that 2003 will be a difficult year since the period when protons are available for ISOLDE is shorter: 181 days compared to 192. The Committee expressed its deep appreciation of the quantitative and qualitative scientific output achieved by ISOLDE groups over 2002.

In the ensuing discussion, C. Détraz and the Chairman reported on the presentation of the Solid State Physics Audit Report to the Research Board. The Board was pleased that the Audit stressed the interest of the SSP-ISOLDE programme and the quality and dedication of the teams. On the other hand since the Audit report raised definite questions and made recommendations to answer them, the Research Board asks the INTC to monitor progress along the suggestions of the Audit Board.

### nTOF Technical and Scientific report

The Committee received the draft version of the performance report positively, and considered it an important document for CERN. The structure is clear, although some information in part I and II has not yet been updated from previous documents. Furthermore, a section summarizing those basic parameters of the facility most important for potential outside users should be added in which in particular the attainable flux, resolution and accuracy are given. It was also asked that the nTOF Collaboration prepares an internal document comparing the performances reached with those of the original proposal nTOF-01 as well as with those of competing facilities. The Committee was satisfied with the dedicated experiments performed to determine these parameters. It was also pleased to see the good agreement with Monte-Carlo simulations indicating that the latter may have predictive power concerning new effects. However, some concern was expressed regarding the knowledge of the absolute neutron flux. Indeed the calibration experiments with various reference standards and detectors do not overlap to better than 10-20%. This may not be sufficient in view of the accuracy looked for in some nTOF experiments. Further analysis of this point is requested. In summary, the nTOF team should be commended for its effort in preparing the performance report draft. The Committee understood that the document would be subject to updating as the facility improves. Still, it **recommended** that a final version of the present document be prepared before the next INTC, taking into account the feedback from the INTC referees. In the future, proposals submitted to the INTC are expected to base their accuracy analysis on the information contained in this reference document.

### 3. DISCUSSION ON THE OPEN SESSION

The presentations of the new proposals were then discussed.

**P116 Add.1** (CERN/INTC 2002-032): *Report on experiment IS381 and request for additional beam time: Isospin mixing in  $N \approx Z$  nuclei*

This proposal concerns isospin mixing in nuclear beta decay with the aim to provide further input to CVC tests in superallowed Fermi transitions. The Committee was uncertain as to whether the proposed measurements were really at the level of accuracy needed to bring a significant additional contribution to the CKM unitarity question. Nonetheless, INTC considered the proposed measurements would provide very valuable constraints to the theoretical models used for the calculation of nuclear corrections. Thus, the requested allocation of 24 shifts will be **recommended** to the Research Board.

**P162** (CERN/INTC 2002-033): *Advanced Time-Delayed coincidence studies of  $^{31,32}\text{Mg}$  from the  $\beta$ -decays of  $^{31,32}\text{Na}$*

This proposal is motivated on the one hand by a study of the first excited  $2^+$  state in  $^{32}\text{Mg}$  and on the other hand by a study of the excited states in  $^{31}\text{Mg}$ . The Committee noted that the first point had been addressed already by several experiments and would also compete with an already approved complementary study using REX-ISOLDE. The originality of the present proposal lies thus more in the nature of the experimental method than in the expected accuracy. On the other hand, INTC found the second part of the proposal both original and interesting and expressed its strong support. Since the two measurements will be performed in parallel, using the same radioactive beam, the Committee saw no reason to cut the beam time. It thus will **recommend** a 24 shift allocation to the Research Board.

**P163** (CERN/INTC 2002-034): *Neutron capture cross sections of Zr and La: Probing Neutron Exposure and Neutron Flux in Red Giant Stars*

The proposed investigations were considered important for further understanding of the s-process, especially regarding its evolution in cold stellar regimes where cross sections at low neutron energies are needed. The importance of a good accuracy of the s-process knowledge was further highlighted in conjunction with the r-process, where the products from the former have to be subtracted to pin down the latter. The experiment was considered feasible and will be **supported** at the Research Board for the requested beam time.

**P160** (CERN/INTC 2002-021): *High precision mass measurements of exotic nuclei with ISOLTRAP*

Following a Committee request in the thirteenth meeting, the spokesperson had provided a list of priorities where both the physics interest and the needed instrumentation development effort had been taken into account. The Committee **concurred** with these priorities and **supported** an allocation of 53 shifts over two years for the high-priority part of the proposal.

### nTOF beam planning

The Draft planning of nTOF activities in 2003 shown by A. Mengoni, totalling  $14.2 \times 10^{18}$  protons, was discussed. It was pointed out that the available amount of protons for nTOF could be influenced by a possible extension of the DIRAC experiment to be submitted to and discussed by the SPSC on 14 January 2003 and the following Research Board on 6 February 2003. However, M. Hauschild, the SPS/PS Coordinator informed the INTC that a possible further running of DIRAC would be based on proton sharing, so that a value between  $12 - 14 \times 10^{18}$  for nTOF could be counted on whatever the decision on DIRAC. The proposed planning appeared reasonable in view of the 2002 achievements by nTOF. It was thus **approved** by the INTC **pending the full approval** of the already discussed proposal P163 and the result of an evaluation of a proposal on fission cross sections for trans-uranium elements (still to be submitted). However, for the not yet evaluated experiments listed on the 2003 planning, the Committee stressed that getting the material necessary for these difficult targets, achieving their fabrication and organizing their safe integration into nTOF experimental area was a very **challenging** task for the nTOF Collaboration to perform over such a very limited period.

### Position document on the future of REX-ISOLDE

M. Lindroos presented a document which outlines a programme whereby REX-ISOLDE is to change its status from an experiment into an open facility. This transition would involve a several year interim period during which REX is operated as a facility managed by externally funded CERN personnel. Thereafter, REX-ISOLDE would become an integral part of the CERN complex. The INTC considered that the additional manpower and operational budget described in the document are appropriate for a project of this size. The opinion of the Committee was that the physics case which is sketched in this text to motivate the energy upgrades and the transformation of REX-ISOLDE into a facility, is of first quality. It is also very much in line with that presented in other more detailed documents written by the European and US communities in order to support the construction of post-accelerated RIB facilities. The INTC agreed that the already approved and proposed technical developments are timely and will definitely make REX-ISOLDE into a forefront facility and a crucial node in a future network of European RIB facilities. It was reported that this point is also stressed in a soon-to-come-out NUPECC report. The Committee expressed **a strong support** to the transformation of REX-ISOLDE into a facility and **endorsed** the position document.

In this context, the proposal to form a Standing group for ISOLDE facility development was reported. This group has a mandate from the Directors of accelerators and fixed-target physics to monitor developments concerning ISOLDE. Its members are experts from the AB-, EP- and TIS-divisions, the INTC Chairman, the immediate past and present ISCC Chairmen and the REX-ISOLDE Collaboration spokesman. Claude Détraz underlined the importance of the group which will report to the CERN Management. The INTC will be informed and invited to express its opinion on the relevance of the considered actions.

#### 4. OTHER BUSINESS

Hubert Flocard took the opportunity in his last meeting as Chairman to tell the present Committee members the pleasure he had to work with them and to thank them for the invaluable support they and their colleagues gave him along his term. Then, Claude Détraz commended the Chairman for the essential and efficient work he had performed during a period which saw the ISC transformed into the INTC with a broadened mandate and in which the watchfulness of INTC was requested on several important points: the construction and start of operation of nTOF, the reshaping of the shift backlog at ISOLDE, the start of REX-ISOLDE operations and the audit of the ISOLDE Solid-state Physics. Détraz concluded that Hubert Flocard's Chairmanship had been most fruitful, and thanked him on behalf of the CERN management.

The next INTC meeting is on **Monday February 24, 2003** and the deadline for submission of proposals is **Friday, January 24, 2003**.

The dates of the remaining INTC meetings are:

19-20 May  
22-23 September  
24-25 November

Thomas Nilsson  
Tel.: 73809-75828 (Mobile 160985)  
Thomas.Nilsson@cern.ch