

ISOLDE AND NEUTRON TIME-OF-FLIGHT
EXPERIMENTS COMMITTEE

Minutes of the sixteenth meeting
held on May 19th 2003

OPEN SESSION

The Chairman, Juha Äystö opened the meeting by pointing out the busy agenda, reflecting an active and positive community. Furthermore, he announced that the seventeenth meeting had been postponed one week to avoid collisions with the RNB-VI conference.

The ISOLDE Technical Coordinator, Mats Lindroos, described the now completed shutdown work done at the facility. Furthermore, he described the progress of the next generation of front-ends, the RFQ cooler for HRS and the off- and on-line tests done on the separators. The construction of a Class A laboratory for the handling of highly radioactive targets had been approved. A recent incident of an increased leak current of the HRS acceleration voltage had caused a cancellation of a run. The solution of this problem was at that time being attempted by an internal cleaning intervention.

Thomas Nilsson, the ISOLDE Scientific Coordinator, recounted the first few weeks of operation. He then concentrated on the experiments schedule for 2003, presenting a plan for the remainder of the year which depended, however, on an immediate solution of the previously mentioned leak current problem. This, together with a delay of the start-up of the PS complex lead to the cancellation of two scheduled runs, however, discussions are ongoing regarding a possible compensation through a prolonged running in November. The possible consequences of limited access and other disturbances during the upcoming G8-meeting were evoked, Claude Détraz commented that CERN would do its utmost to continue to provide beams and urged the experimental groups to make provisions to be able to take advantage of them.

The following proposals were then presented:

1. Measurement of Gas and Volatile Elements Production Cross Section in a Molten Lead-Bismuth Target; INTC-2003-014/P-171: L. Zanini.
2. Coulomb excitation of a neutron-rich ⁸⁸Kr beam-search for mixed symmetry states; INTC-2003-015/P-172: J. Iwanicki.

3. Parity non-conservation in nuclei: the case of ^{180m}Hf revisited; INTC-2003-016/P-173: J. Stone.
4. Study of the β -delayed particle emission of ^{17}Ne ; INTC-2003-017/P-174; L. M. Fraile.
5. Study of neutron-rich $^{124,126,128}\text{Cd}$ isotopes; excursion from symmetries to shell-model picture; INTC-2003-018/P-175: A. Jokinen
6. ^{204m}Pb : A New Probe for TDPAC Experiments in Biology Complementing the Well Established Probes ^{111m}Cd and ^{199m}Hg ; INTC-2003-020/P-176: W. Troeger.

In conjunction with the above presentation, the SPS/PS coordinator Michael Hauschild reported on a problem with a transformer at the PS, which was prohibiting the use of parasitic proton cycles for nTOF. The problem could diminish the total amount of protons for the facility by 25% in 2003.

CLOSED SESSION

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

Apologies: H. -J. Kluge, J. Suhonen

* Part-time

1. INTRODUCTION

The Chairman opened the session by reporting back on the 163rd meeting of the Research Board concerning INTC matters. In connection with this, the Committee noted with pleasure that an interim agreement had been reached between CERN and the ISOLDE collaboration concerning operation of REX-ISOLDE. The agreement will initially be valid for three years where CERN operates the device with funding from the REX-ISOLDE collaboration and is, conditional on a sustained scientific quality of the programme, renewable for an additional three-year period.

Claude Détraz warmly thanked the outgoing members J.-P. Duraud, K. -P. Lieb, E. Migneco, B. Rubio and W. Scobel on behalf of CERN for their invaluable contributions to the Committee. In this context, he evoked the question of the length of the mandate for the Committee members; traditionally this has been two years with an optional one-year prolongation. However, in the light of the enlarged scientific scope of the community since also encompassing the nTOF programme, the personal investment required by the members was considerable and could motivate a prolonged mandate period such as two years with an optional additional two-year.

The minutes of the fifteenth meeting were approved without changes.

2. DISCUSSION ON THE DELIVERED SCIENTIFIC AND TECHNICAL REPORTS

ISOLDE Technical report

The Committee took note of the ISOLDE shutdown and consolidation work. A discussion concerning the imminent high-tension problems encountered at the HRS followed. Mats Lindroos pointed out the risks related to the current CERN policy of not having spares for critical technical parts, Claude Détraz replied that though maintenance has a lower priority during times of LHC construction, a limited budget still exists and should be used based on a thorough risk analysis by the Accelerator Sector. The Committee noted with satisfaction that the Class A laboratory had been approved, being a crucial part of the infrastructure needed in assuring ISOLDE operation.

ISOLDE Scientific report

The Committee took note of the successful start-up and first experiments. It expressed support for a prolongation of the running period as compensation for time lost due to the PS magnet problems. The Research Board will take a decision on this matter, and Claude Détraz urged the scientific coordinators to follow up whether or not such a prolongation would be cost-neutral in view of the renewed electrical power contract. The progress of the REX-ISOLDE energy upgrade was discussed; this is largely following the provisions.

nTOF matters

Enrico Chiaveri reported on nTOF organizational matters; Alberto Mengoni had been nominated as deputy spokesperson for the collaboration and the organization of day-to-day work like data analysis and detector installation was under consideration. Claude Détraz informed the Committee that the nTOF MoU had been signed and repeated the need of an organizational structure upon which a strong scientific programme beyond the EU contract could be built. He recommended the nTOF community to consider its future plans; Enrico Chiaveri replied that a workshop with this aim was planned to take place after the summer. In this context, it was mentioned that the future CERN fixed-target programme is to be defined, with a **meeting in Cogne** to that respect in the autumn of 2004.

Michael Hauschild reported further on the possible consequences of the broken transformer where the provisions for repair were unclear. In case of a prolonged interruption, the lacking parasitic proton cycles would yield 15 – 25% less protons for nTOF in 2003 and put the programme in direct competition with the DIRAC experiment. Claude Détraz replied that he would in this case arbitrate between the requests for beam and Enrico Chiaveri stated that in this scenario the nTOF collaboration would have to reanalyse their priorities.

3. DISCUSSION ON THE OPEN SESSION

The presentations of the new proposals made during the open meeting were then discussed.

P177 (CERN/INTC 2003-021): *Measurements of Fission Cross Sections of Actinides*

This proposal concerns measurements of fission cross sections of transuranium elements, mainly motivated by feasibility studies for nuclear waste transmutation. The project was seen

as a straightforward continuation of the approved experiment nTOF-06 and well motivated. However, some concerns were expressed regarding the strong activity from the targets sealed inside the Fast Ionisation Chamber, possibly leading to deterioration of the detector gas and/or problems in discriminating fission fragments from the alpha activity. Tests of these effects prior to the experiments were recommended. Furthermore, it was highlighted that the selection of targets was determined by availability and handling parameters, but not exhaustive for the questions addressed. Thus, a strong theoretical support must be triggered to be able to extrapolate the experimental information to other relevant transuranium isotopes. The experiment will be **recommended** to the Research Board.

P-171 (CERN/INTC 2003-014): *Measurement of Gas and Volatile Elements Production Cross Section in a Molten Lead-Bismuth Target*

The proposal intends to measure production of gases and volatile elements in the MEGAPIE spallation target, to be used in the SINQ facility at PSI, by using an ISOLDE target unit filled with liquid PbBi. The measurements were seen important for high-power molten metal targets in general, although it was unclear whether the claimed accuracy in the cross-sections could be reached, and further simulations in parallel with the measurements were requested. Although the standard proton energies of 1.0 or 1.4 GeV from the PS Booster are adapted for future possible uses of such targets, the Committee highlighted the importance of reproducing as far as possible the operational parameters at PSI, having a 590 MeV proton beam. In particular the alpha-particle production is hard to simulate and extrapolate from higher energies. Thus, the Committee **recommended** 12 shifts for the measurements, out of which 6 shifts should be done with 600 MeV proton energy. In the discussion, it was made clear that the lower energy has been proven technically feasible, but that the PS Booster has to run in dedicated, single-user mode.

P172 (CERN/INTC 2003-015): *Coulomb excitation of a neutron-rich ^{88}Kr beam-search for mixed symmetry states*

The proposal envisages a measurement of so-called Mixed Symmetry states as predicted by the IBM-2 model in Coulomb excitation experiments with an ^{88}Kr beam from REX-ISOLDE. The Committee considered that gathering further spectroscopic data in the region would be of interest, but could not from the information given by the proponents judge whether the Mixed Symmetry states could be investigated in the current experiment. The proposal was thus **deferred** and the referees will seek further clarification from the spokesperson.

P173 (CERN/INTC 2003-016): *Parity non-conservation in nuclei: the case of $^{180\text{m}}\text{Hf}$ revisited*

The proposed experiment aims at probing the existence of a strong parity non-conserving effect in the nuclear gamma-decay of $^{180\text{m}}\text{Hf}$, indicated in an earlier experiment. The Committee reacted positively to a search on a similar level of accuracy as the existing data as a confirmation or disproof of the effect but perceived less urgency in a substantially improved accuracy. However, Helge Ravn spelled out serious doubts concerning the lifetime of the proposed target-ion system and thus the feasibility of the experiment. The Committee finally decided to recommend 4 shifts for dedicated target tests. Pending the outcome of which, the proposal was **deferred**.

P175 (CERN/INTC 2003-018): *Study of neutron-rich $^{124,126,128}\text{Cd}$ isotopes; excursion from symmetries to shell-model picture*

This proposal concerns the properties of neutron-rich even-even Cd nuclei, in particular excited two- and three-phonon vibrational states populated in the beta decay of Ag isotopes. The project was found scientifically interesting and with an excellent theoretical support, but the experimental feasibility and justification of requested beam-time of the most neutron-rich beam, ^{128}Ag , was not fully demonstrated. Thus, the Committee **recommended** an allocation of 20 shifts to the Research Board in order to pursue the measurements of the less neutron-rich species requested, including ^{126}Ag . It also **urged** the proponents to look for the best possible experimental set-up that could be made available.

P-174 (CERN/INTC 2003-017): *Study of the β -delayed particle emission of ^{17}Ne*

The physics case of this proposal, aimed at detailed studies of charged particles emitted in the decay of ^{17}Ne , was considered good. It uses an elaborate set-up that could substantially improve the knowledge compared to existing data with the possibility to access isospin mixing in the transition to the IAS in ^{17}F . The role of the experiment as a benchmark experiment for the newly commissioned ISOLDE Silicon Ball was highlighted. An allocation of 12 shifts will be **recommended** to the Research Board.

P-176 (CERN-INTC 2003-020): *^{204m}Pb : A New Probe for TDPAC Experiments in Biology Complementing the Well Established Probes ^{111m}Cd and ^{199m}Hg*

The proponents request to continue their earlier studies of the interaction of metals with biological macromolecules using radioactive probes and TDPAC (Time Differential Perturbed Angular Correlation). The Committee considered the proposed measurements very important for the understanding of biological processes and welcomed the extension to the use of the new ^{204m}Pb probe. However, the Committee expressed concern regarding too many topics present in the proposal and recommends concentrating on the metal-DNA interaction part. A two-year programme using in total 28 shifts will be **recommended** to the Research Board. A progress report is requested after the first year.

P-147 Add. 1 (CERN-INTC 2003-007): *High Accuracy Mass Measurement of the very short-lived Halo Nuclide ^{11}Li*

The recommendation of this addendum was postponed at the fifteenth meeting pending answers to questions put forward by the referees. A letter from the spokesperson had been submitted to clarify these points, to the satisfaction of the referees. Thus, an additional allocation of 9 shifts will be **recommended**.

P-170 (CERN-INTC 2003-010): *Coulomb Excitation of Neutron Deficient Sn-Isotopes using REX-ISOLDE*

The further approval of this proposal was postponed at the fifteenth meeting pending the outcome of an on-line test of a Ce_2S_3 -target. The results could represent a major step forward in producing a range of beams and eventually enlarge the physics potential of the proposal towards more neutron-deficient Sn-isotopes. The test had been performed with a negative result and was described in a letter from the spokesperson to the Committee. The Committee concurred with the conclusion that although still very promising, the target type would still

need a substantial development effort and concluded that the proposed measurements should not be further delayed but be performed with a LaC-target. The 19 shifts requested will be **recommended** to the Research Board. However, the Committee considered continued tests of Ce₂S₃ as a target material as highly desirable and **urged** the proponents to also take part in the future.

4. A.O.B.

The Chairman thanked personally the outgoing members, expressing his appreciation of their contributions to the Committee.

The next meeting is on **Monday September 29, 2003** and the deadline for submission of proposals is **Friday, August 29, 2003**.

The dates of the remaining INTC meeting is:

24-25 November 2003.

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