CERN/INTC 2002-026
INTC-012
28 May 2002

ISOLDE AND NEUTRON TIME-OF-FLIGHT EXPERIMENTS COMMITTEE

Minutes of the twelfth meeting
on May 13th 2002

OPEN SESSION

The meeting was opened by the chairman, Hubert Flocard, who announced a reordering of the dense agenda.

The ISOLDE scientific coordinator, Thomas Nilsson, briefly recounted the experiments performed so far at the ISOLDE facility. Both the HRS and the GPS separator had been used for several physics runs since the start-up on April 18th, indicating that the GPS was now fully back in operation after the problems related to the front-end in 2001. An ongoing combined commissioning and first physics run involving REX-ISOLDE and the full first phase of the MINIBALL Ge-detector array was highlighted. The updated schedule for ISOLDE was then presented, covering the full operational period of 2002.

Mats Lindroos, ISOLDE technical coordinator, reported on the concluded shutdown work at ISOLDE. He took the opportunity to thank Erich Kugler, soon retiring, for having coordinated these works successfully for many years and having made major contributions to the facility. During the shutdown, major consolidation work had been performed on the power supplies, control system and the target handling robots. Furthermore, the new GPS front-end had been made operational.

Paolo Cennini, the nTOF technical coordinator, summarized the execution of the additional shielding as presented in the eleventh meeting. This was expected to diminish the background originating from muons by an additional factor ~10, rendering this effect secondary with respect to other sources of background. The planned exchange of the second collimator at 174 m from 1.8 cm diameter to 8 cm for fission measurements was discussed; the time estimated for such an exchange was one week and could be done during the 2002 running period. C. Detraz underlined that, due to the additional shielding and earlier measures taken, the background had now been reduced by more than two orders of magnitude, and reiterated the need for a reference document defining the nTOF capabilities as mentioned in the eleventh meeting.

The beam-time planning for nTOF in 2002 was presented by Alberto Mengoni. The planning had been based on the availability of $7\ 10^{18}$ protons during the operational year and comprised of nTOF-02, nTOF-03 (partly), P142, a fraction of the programme of P154 (^{232}Th) and of P145, the latter after changing the second collimator. The execution of nTOF-04 and the part concerning Mg-isotopes of nTOF-03 had been postponed. The planned number of protons for capture experiments had been adjusted for the exchange of the C_6D_6 detectors for units that are more efficient.

The following proposals were then presented:

1. Neutron Cross Sections for the Pb Isotopes Implications for ADS and Nucleosynthesis; INTC 2001-020/P142; F. Kaeppeler.

2. Measurement of the neutron capture cross sections of ^{232}Th, ^{231}Pa, ^{234}U and ^{236}U; INTC 2002-013/P154; F. Gunsing.

3. An Energy Upgrade of REX-Isolde to 3.1 MeV/u and Acceleration of Heavier Masses up to A=150; INTC 2002-009/P152; D. Habs - O. Kester. subdivided into a presentation on the Scientific Case for increased REX-ISOLDE energies by D. Habs and the Technical Case by O. Kester.

4. Laser spectroscopy study on the neutron-rich and neutron-deficient Te isotopes; INTC 2002-011/P153; B. Roussière.

5. Fusion Reactions at the Coulomb Barrier with Neutron-rich Mg Isotopes; INTC 2002-014/P155; P. Reiter.

6. Evolution of single particle and collective properties in the neutron-rich Mg isotopes; INTC 2002-020/P159; H. Scheit.

CLOSED SESSION

Present: P. Cennini, E. Chiaveri, C. Détraz, H. Flocard (Chairman), M. Hauschild, H. J. Kluge, M. Lewitowicz, M. Lindroos, E. Migneco, T. Nilsson (Secretary), E. Radermacher (replacing D. Schinzel), J. -P. Riunaud, B. Rubio, W. Scobel, J. Suhonen, D. Warner

Apologies: J. Äystö, J. -P. Duraud, K. -H. Langanke, K. -P. Lieb, H. Ravn, D. Schinzel.

1. INTRODUCTION

The Chairman opened the session by welcoming Marek Lewitowicz, GANIL, as a new member of the committee. He then informed the committee that his mandate as a chairman had been prolonged by six months, until the end of the year. The minutes of the eleventh meeting were approved without changes.

2. A DISCUSSION ON THE REPORTS AND PROPOSALS RELATED TO nTOF FOLLOWED:

nTOF Technical report

The committee was pleased to note the progress made and had the general impression that the facility is ready to start the experimental programme. Some concern was raised regarding the availability of the planned larger second collimator and its installation as well as the status of the DAQ. P. Cennini reassured that these issues would be solved. In the ensuing discussion, the importance of a defining document was repeated. Such a document is expected to be submitted to the September INTC meeting and should include results obtained within nTOF-02. At the same meeting, E. Chiaveri also agreed to present the CERN based part of nTOF organization and report on the status of the MoU.

P142 (CERN/INTC 2001-020): Neutron Cross Sections for the Pb Isotopes Implications for ADS and Nucleosynthesis

The scientific case for this proposal that concerns both the physics of the ADS and the s-process around the magic nucleus ^{208}Pb was considered convincing. All technical and experimental questions raised by INTC and the two external referees had been satisfactory answered by the spokesperson. It will therefore be recommended to the Research Board.

P154 (CERN/INTC 2002-013) Measurement of the neutron capture cross sections of ^{232}Th, ^{231}Pa, ^{234}U and ^{236}U

The proposed measurements were seen as highly relevant for the Th-reactor cycle. On the other hand, the possible extension towards parity violation would have to wait for the availability of polarization. The availability of targets, in particular ^{231}Pa, was discussed and a clarification is needed which could be the subject of an addendum. Thus, INTC considered only the remaining programme and relying on its own evaluation and that of the two external referees decided that it should be recommended to the Research Board for approval.

P145 (CERN/INTC 2001-025): Measurements of Fission Cross Sections for the Isotopes relevant to the Thorium Fuel Cycle

This proposal had been presented in the ninth meeting (September 2001). The scientific case had then been considered interesting. Thus, a recommendation for approval was adopted pending however the answers to questions raised then, a solution to the background problem and the construction of an 8cm collimator. INTC considered that the answers to these questions provided by the community are now satisfactory given the present incomplete knowledge of the facility. The handling of the fission targets was considered feasible if sealed before taken to CERN since the infrastructure (Class A laboratory) for open handling does not exist on-site. Thus, the proposed measurements will be recommended to the Research Board. The committee took note that while this experiment is being performed, beam time will also be used to test a fission chamber in parasitic mode.

nTOF beam planning

The committee approved the beam time planning as presented in the open session and took note of the fact that the more difficult measurements on Mg (nTOF-03) had been postponed. In the discussion, M. Hauschild pointed out that the proton previsions for 2002 were still uncertain due to a pending problem of a power supply, limiting the number of pulses that can be delivered to the East Hall. If the problem persists, the number of proton pulses available for nTOF and ISOLDE in 2002 would increase. The nTOF Collaboration Board should then discuss the use of these extra protons with the INTC Chairman and the Research Director.

3. A DISCUSSION ON ISOLDE MATTERS FOLLOWED:

ISOLDE Technical and Scientific report

The committee took note of the reports, expressing satisfaction with the shutdown works, the timely start-up of the facility and the so-far positive experience of the push-pull mode operation. The issue of target production within the restricted operational budget was raised. The smaller number of target units available is partly compensated for by a stricter scheduling with fewer target changes and an extensive reuse of units that have already been operated. The committee congratulated the personnel involved for their effort and encouraged the community to display understanding and commitment to help the ISOLDE staff maintain the scientific output.

P152 (CERN/INTC 2002-009) An Energy Upgrade of REX-Isolde to 3.1 MeV/u and Acceleration of Heavier Masses up to A=150

The physics opportunities opened up by an energy upgrade of REX-ISOLDE to 3.1 MeV/u and later 4.3 MeV/u together with the envisaged developments to enable acceleration of heavier ions generated enthusiasm within INTC. The committee noted that the upgraded REX-ISOLDE will become a worldwide unique facility in terms of available beams and energy range. It therefore considered that the allocation of the requested beam time for such developments that will put REX-ISOLDE in the forefront of ISOL facilities was a high priority. INTC is convinced that this energy upgrade is bound to have a dramatic impact on the ISOLDE user base. Thus, the 15 shifts of beam requested for R&D will be recommended to the Research Board. The issue of REX-ISOLDE operation, now done by the REX-ISOLDE collaboration, was considered at some length. M. Lindroos highlighted that although this task was well within the competences of the PS-division, no resources from this division could be presently allocated to it. The committee will consider this issue further as well as how the INTC will be working with respect to the anticipated changes in the ISOLDE scientific programme associated with the increased importance of REX-ISOLDE.

P153 (CERN/INTC 2002-011) Laser spectroscopy study on the neutron-rich and neutron-deficient Te isotopes

The committee raised some questions regarding the urgency of the proposed measurements and expressed its wish for a clarification of some points discussed in the scientific case. On the other hand, the value of having solid numbers for the ground state properties of exotic Te-isotopes was readily acknowledged. In conclusion, while the overall scientific background was considered in a globally positive way, the committee decided to defer a decision on the beam time and to reconsider the experiment once the proponents have shown the feasibility of the source with off-line tests and have clarified some of the scientific aspects.

P155 (CERN/INTC 2002-014): Fusion Reactions at the Coulomb Barrier with Neutron-rich Mg Isotopes

The scientific questions addressed by the proponents were seen as highly interesting, but the committee expressed concerns regarding the implications of deducing the fusion cross-sections indirectly instead of by direct measurements. This is a consequence of the time structure of the RIB extracted from the REXEBIS. The proponents were urged to calibrate the method by either known stable beams or a direct measurement with stable ^{26}Mg, if possible using REX-ISOLDE in an off-line mode, before proceeding to radioactive species. The requested allocation of 9 radioactive shifts for ^{28}Mg will be recommended to the Research Board.

P159 (CERN/INTC 2002-020): Evolution of single particle and collective properties in the neutron-rich Mg isotopes

This proposal on heavy Mg-isotopes was considered to have a strong physics case, attracting a considerable theoretical interest. Although theories agree on deviation from the shell model in this region, details differ and the proposed measurements could clarify the experimental situation. Being within the original scope of the REX-ISOLDE project, the proposed experiment is well-adapted to the present facility and the requested 21 shifts will be recommended to the Research Board.

I-041 (CERN/INTC 2002-012): Determination of ^{44}Ar(n,g)^{45}Ar and ^{46}Ar(n,g)^{47}Ar reaction rates by (d,p) transfer reactions

The scientific goals were positively appreciated by the committee, which recommended that tests and developments are pursued with the aim of accelerating beams of noble gases in REX-ISOLDE and urged the proponents to actively take part in this process. In view of the second step of the planned REX-ISOLDE energy upgrade, reaching 4.3 MeV/u, the proponents were asked to consider whether this energy would be more favourable than the 3.1 MeV/u mentioned in the LoI.

I-042 (CERN/INTC 2002-019) Post acceleration of rare earth isotope beams for radiotracer DLTS on SiC

Due to the unexpected absence of the two INTC members having expertise within Solid State Physics, the physics case of this LoI could not be properly evaluated. The evaluation was thus postponed. The chairman will request a written report from these two members. Depending on their answers, a decision could be reached before next INTC meeting.

I-043 (CERN/INTC 2002-016) A study of the r-process Nuclides ^{137,138,139}Sb using the enhanced Selectivity of RILIS

The proposed measurements on the heavy Sb-nuclei were judged interesting both from the point of view of nuclear structure and astrophysics. Consequently, the committee expressed its support for the needed beam developments.

Solid State Physics Audit

The Report of the Audit Commission was discussed, focussing on the boundary conditions for performing these experiments at ISOLDE. In conjunction with the discussion of the need for better laboratory space pointed out by the auditors, M. Lindroos pointed out that the community and the ISOLDE collaboration were now attempting to each allocate one third of the needed resources for an enlarged Solid State Physics laboratory.

4. OTHER BUSINESS

The chairman raised the issue of a better workload distribution between the INTC meetings and the need for evaluation time of old decisions. To achieve this, changes in the meeting structure were considered.

The next meeting is on **Monday September 23**, and the deadline for submission of proposals is **Friday, August 16, 2002**.

The dates of the remaining INTC meeting in 2002 are:

25-26 November.

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