CERN/INTC 2001-013
INTC 7
21 March 2001

ISOLDE AND NEUTRON TIME-OF-FLIGHT EXPERIMENTS COMMITTEE (INTC)

Minutes of the Seventh Meeting on
Monday, 26 February 2001

OPEN SESSION

After a few words of welcome, the Chairman opened the meeting by noting that P79 Add. 2 (Magnetic Moment of ^{59}Cu) has been postponed to the next meeting on April 23, 2001. He then asked M. Lindroos, PS ISOLDE technical team, to present a technical status report on the ISOLDE facility.

Concerning the shutdown work, the new HRS front end and the HRS itself are operational in low resolution mode, and RILIS development work is now also in progress. However, the GPS front end has now reached its nominal lifetime, although a new spare one is expected in 2002. M. Lindroos also described various aspects of the ISOLDE safety and consolidation project.

The ISOLDE scientific status report was presented by Thomas Nilsson, the ISOLDE Coordinator. During 2000, 345 shifts were delivered, including 50 with the HRS. In T. Nilssson's preliminary schedule for 2001, 37 experiments are expected to receive 380 shifts of radioactive ion beams. Coordination with other proton beam users is being attempted.

V. Vlachoudis then presented a Status Report on the nTOF facility, describing successful work carried out up to the end of November 2000 on the first and second commissioning at 173.5 m, the third commissioning at 183 m, and results on target behaviour at high intensity. He also described the installation, improvement, and maintenance work taking place during the current shutdown and expected to be finished before the PS startup. Finally he described a list of tasks motivating a request for further 10-12 days of commissioning to take place at the beginning of April 2001. This list included a study of temperature and sound waves in the target, measurements of neutron fluences and evaluation of the performance of various detectors.

N. Pavlopoulos discussed the nTOF experimental planning for the year 2001. The planned measurements include experiment TOF-02 (Determination of the neutron fluence, the beam characteristics and the backgrounds at the CERN-PS TOF Facility) proposal P124 (The importance of ^{22}Ne(α,n)^{25}Mg as *s*-process neutron source and the *s*-process thermometer ^{151}Sm) presented in the May 2000 INTC meeting, and proposal P125 (The Re/Os Clock Revisited) presented at the present meeting. Further proposals are foreseen for several nuclides, most of them relevant to the ^{232}Th ^{233}U cycle. Year 2001 is crucial due to the reduced PS periods expected in 2002 and 2003. For the already submitted proposals, the total number of protons on target is 11.7×10^{18}. The additional proposal will increase this total by a further 10×10^{18}.

Presentations were then made of the following proposals:

P125 (INTC 2000-040): The Re / Os Clock Revisited.

P131 (INTC 2000-036): The structure of the heavy calcium isotopes and the effective interaction in the sd-fp shell.

P135 (INTC 2001-002): Beta-Decay study of very neutron-rich Cd isotopes with a chemically selective laser ion source.

P79 Add. 2 (INTC 2001-003), (IS358): Magnetic Moment of ^{59}Cu.

P98 Add. 1(INTC 2001-004), (IS368): Lattice location of transition metals and rare earths in semiconductors.

P119 Add. 1 (INTC 2001-005), (IS383): Laser spectroscopy studies in the Neutron-Rich Sn region.

P136 (INTC 2001-008): Isospin symmetry of transitions probed by weak and strong interactions.

P137 (2001-009): Nuclear binding around the rp-process waiting points ^{68}Se and ^{72}Kr.

P139 (INTC 2001-012): ^{31}Si Self-Diffusion in Si–Ge Alloys and Si–(B–)C–N Ceramics and Diffusion Studies for Al and Si Beam Developments

CLOSED SESSION

Present: J Aystö, C. Détraz, J.P Duraud, J. Eades (Secretary), H. Flocard (Chairman), J. Kluge, K. Langanke, M. Lindroos, H. Ravn, T. Nilsson, J-P. Riunaud, C. Rossi-Alvarez, B. Rubio, J-A. Rubio, W. Scobel, J. Suhonen, R. Voss, D. Warner.

Apologies: E. Migneco

The Chairman first welcomed D. Warner, whose mandate begins with the current meeting, to the Committee. He also announced that J-A. Rubio, leader of CERN's Education and Technology division (ETT) would henceforth join the Committee as an additional ex-officio member.

The minutes of the sixth meeting were first approved without change, after which the technical and scientific progress reports were discussed as follows:

1. ISOLDE Technical Report

The Committee took note with pleasure of the continued progress revealed in M. Lindroos' report.

2. ISOLDE Scientific Report

The Committee noted with satisfaction the successful year of ISOLDE operation recently terminated, and the expected continuation of the ISOLDE programme indicated in the report of T. Nilsson. It also remarked that despite the present backlog, the draft schedule presented by the Coordinator on the basis of requests for shifts from already approved experiments leaves openings in the summer and fall parts of the schedule. This situation gives the Coordinator the possibility to include additional shifts in the final schedule for 2001.

3. nTOF Technical report

Further satisfaction was expressed at the fact that the report presented by V. Vlachoudis showed the nTOF facility can be expected to work with the performances predicted by the Monte Carlo simulations, and that the technical questions associated with the nTOF target are well understood and appear to be under control. The further round of commissioning proposed for April 2001was accepted by the Committee with the proviso that this must be terminated within 10-12 days of the PS startup in order to allow experiment P123 (Determination of the neutron fluence, the beam characteristics and the backgrounds at the CERN-PS TOF Facility) to perform the evaluation of the performances of nTOF. The Committee furthermore expects that the nTOF commissioning group and the P123 collaboration will produce a joint status report by summer 2001. This status report will present an update of the technical specifications of the facility and of its performances as obtained from results gathered by P123 and the nTOF commissioning group.

4. nTOF Experimental programme

In discussing the report of N. Pavlopoulos, it was noted that the expected upper limit for the number of protons to be delivered to nTOF in the year 2001 is in the neighbourhood of 1.5×10^{19} while the requirement of the approved or expected experiments exceeds 2.0×10^{19}. This has a positive aspect in that it indicates that the plans presented makes full use of the protons available in 2001. On the other hand, this constrained situation points to the need for more information exchange with the PS Coordinator. The INTC would therefore greatly benefit from the participation of Michael Hauschild (EP) as an ex-officio member in its coming meetings, in order to help resolve similar discrepancies such as may arise in the future operation of the nTOF facility.

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

5. **P124** (INTC 2000-017): The importance of ^{22}Ne(α,n)^{25}Mg as *s*-process neutron source and the *s*--process thermometer ^{151}Sm.

While P124 was not on in fact on this meeting's agenda, its case had been pending since the INTC fourth meeting of May 2000. At that time a Memorandum based on the results of experiment P123 (Determination of the neutron fluence, the beam characteristics and the backgrounds at the CERN-PS TOF Facility) had been requested, which would provide answers to outstanding questions on the point mentioned in the title. The Committee agreed that in the meantime the results presented in the November 2000 TDR as well as the first indications on performances resulting from the commisioning had answered these questions sufficiently. As a consequence, P124 is encouraged to proceed and the final approval will be requested from the Research Board for a total of 3.3×10^{18} protons.

6. **P125** (INTC 2000-040): The Re / Os Clock Revisited.

It was agreed to recommend to the Research Board this interesting, high-visibility nTOF astrophysical proposal aiming at improving neutron capture data relevant for the evaluation of the age of the universe. The Committee supports the allocation of a total of 1.4×10^{18} protons.

In connection with both P124 and P125 it was also pointed out that no spokesperson or contactperson has so far been specified. The collaborations will be expected to rectify this situation before the proposals are presented do the Research Board.

7. **P131** (INTC 2000-036): The structure of the heavy calcium isotopes and the effective interaction in the sd-fp shell.

This proposal on the structure of heavy Calcium isotopes aims at understanding the mixing of sd and fp shells in this area of neutron-rich nuclei. Because the data is expected to

constrain matrix elements of recently developed nuclear microscopic models the experiment was thought to be worthwhile and will be recommended to the Research Board for the 15 ISOLDE shifts requested.

8. **P135** (INTC 2001-002): Beta-Decay study of very neutron-rich Cd isotopes with a chemically selective laser ion source.

   The case for the studies of n-rich Cadmium isotopes was thought to be sound and the allocation of the six requested shifts is recommended. Concerning the measurement of the single particle hole spectrum in ^{131}In, the Committee is convinced of its scientific interest. On the other hand, it decided to defer its final shift recommendation until a clarification in the form of a written report had been received on the relative merits of the two methods suggested for populating the interesting levels in ^{131}In, as well as the time required for each of them.

9. **P98 Add. 1** (INTC 2001-004): Lattice location of transition metals and rare earths in semiconductors.

   The proposal (8 shift request) was supported. On the other hand, it was the opinion of INTC that the collaboration should concentrate its efforts on the most actively investigated semiconductor materials like GaN and AlN among the several mentioned in the proposal.

10. **P119 Add. 1** (INTC 2001-005): Laser spectroscopy studies in the Neutron-Rich Sn region.

    It was agreed that the case for the laser ion source experiments (RILIS) had not been fully proved. Many of the tests involved appear possible with off line techniques. Thus, INTC did not support the corresponding six shift request. On the contrary, the report on results obtained for the isotope shifts of Sn isotopes below mass 132, were judged encouraging. It was therefore decided to support an allocation of 25 shifts with the suggestion that the effort should concentrate on gathering data on heavier isotopes beyond the magic shell.

11. **P136** (INTC 2001-008): Isospin symmetry of transitions probed by weak and strong interactions.

    The Committee considered that this proposal combining already available results (Osaka university) with beta decay experiments performed at ISOLDE would lead to a highly interesting test of isospin symmetry in nuclei. Nevertheless, the present proposal leaves open which method will be the most efficient for the production of the parent nucleus ^{58}Zn. INTC recommands that the three requested shifts for testing the ZrO2 target be found as part of the overall ISOLDE technical development programme. Following this, the collaboration should submit a written report indicating which method of production has been selected and what is the final beam time to be requested on the basis of the measured performances.

12. **P137** (INTC 2001-009): Nuclear binding around the rp-process waiting points ^{68}Se and ^{72}Kr.

    This proposal is concerned with the analysis of two waiting points along the rp process assumed to take place in the explosive burning in close binary star systems and to lead to the production of X-ray bursts. The case for the 7 shifts requested for the masses of $^{68-71}$Se and the 4 shifts for the mass of ^{72}Kr were considered well established in view of recent progress at ISOLTRAP. Although it was recognized that establishing decay properties of adjacent nuclei was a crucial ingredient, the Committee was concerned that the production rates might not be sufficient. It therefore decided to support only the 11 shift request on ^{69}Kr (associated with the first waiting point). Before deciding on ^{73}Sr the Committee will await the results on ^{69}Kr and the mass measurement of ^{72}Kr.

13. **P139** (INTC 2001-012): ^{31}Si Self-Diffusion in Si–Ge Alloys and Si–(B–)C–N Ceramics and Diffusion Studies for Al and Si Beam Developments.

The Committee will recommend that shifts be allocated for the Si-Ge Silicon self-diffusion experiments to the Research Board, but thought that the case for the studies of Ceramics had not been sufficiently well-established. As a consequence the approval from the Research Board will be requested for six shifts only.The Committee decided that the The 14-shift request for diffusion studies for Al and Si beam developments (presented jointly only because it used the same equipment) had to be considered on its own merits and disconnected from P139. The Committee thought that the clarification of performances related to Al and Si beams which can be expected is of interest and supports it to the extent that it can be fitted into the ISOLDE technical development programme.

OTHER BUSINESS

The Committee has received the following Letters of Intent:

I37 (INTC 2001-007): Study of the $^{7}Be(p,\gamma)^{8}B$ Reaction, With Very Low Energy ^{7}Be Beams.

The Committee took note of the LOI. The $^{7}Be(p,\gamma)^{8}B$ experiment plays an important role in the solar neutrino puzzle. The proposed experiment would complement the previous approaches and clarify some points related to the extrapolation to low energy. On the other hand, it was felt that the quality of the already available data on this specific reaction no longer makes it the central issue in the present status of the solar neutrino problem. Moreover, extrapolation of known nuclear data is considered more dependable than for other alternatives due to the external capture nature of the process. Taking further into account the many points which have to be clarified concerning difficult technical issues, (in particular the load on the ISOLDE facility, and the relationship of the proposed studies to similar ones at the HRIBF in Oak Ridge.

I38 (INTC 2001-010): Feasibility study of radioactive beam production by photo-fission.

This LOI aims at testing the photofission production of neutron-rich nuclei and comparing it with traditional mathods using neutrons. Clarifying such an issue is part of a task undertaken by the NUPECC Committee as part of the European-sponsored EURISOL programme. The INTC expressed strong support for this LOI which proposes to take advantage of the LEP shutdown, and to make the proposed one-week test with bremsstrahlung radiation induced by the 50 MeV electrons produced by the LEP injector while it is still available. The Committee encourages the collaboration to follow this possibility up further.

The next INTC meeting is on **Monday April 23**. Please note that exceptionally the Closed Session will be held in Building 160-1-009 (a map showing the location of the room will be sent to you with the agenda). The deadline for submission of proposals is **Friday, March 30, 2001**.

The dates of the remaining INTC meetings for 2001 are:

September, 24-25
November 26-27.

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