

ISOLDE AND NEUTRON TIME-OF-FLIGHT
EXPERIMENTS COMMITTEE

Minutes of the 36th meeting of the INTC
Held on Thursday 4 and Friday 5 February 2010

OPEN SESSION

Thursday 4 February 2010 at 14:30 h, Main Auditorium

The Chairman of the INTC, Peter Butler, opened the meeting and announced the agenda.

ISOLDE Technical Report

The EN-representative for the INTC, Richard Catherall, gave an overview of the shutdown work including the exchange of the HRS front end. The consolidation of the vacuum system as well as the vacuum controls is ongoing. Good progress has been made so far: Old cables have been removed and the installation of new cables and vacuum gauges is nearly completed.

The shutdown work for REX-ISOLDE also covered the consolidation of the vacuum system, to improve the overall vacuum, the completion of the water cooling of the RF room with heat exchangers still to be installed, the commissioning of the new control system for the beam instrumentation, and the installation of new steering magnets. The REX-ISOLDE shielding is being completed as well with the installation of the shielding end-caps. A RF test for X-ray measurements is planned while interlocks remain to be installed. Furthermore, REXTRAP will be started in the second half of February to deliver stable beam to the WITCH experiment.

The RILIS group has received two new dye lasers from Sirah which will be tested in February. In March, the old copper vapour lasers will be removed to have more space for the new dye lasers. In addition, the installation of a new Ti:Sa laser is planned in the future.

In the experimental hall the recurring problem of condensation water has been tackled by reinforcing the water collection and diverting the excess water to drains. New hand-foot monitors have been put in place which can be logged/monitored remotely over the technical network. For the removal of the 22t magnet of MISTRAL the opening of the passage to the new experimental hall will be enlarged. The cutting of the wall is subject to a study of the influence on the support of the platform above the MISTRAL setup in relation to future use proposed within HIE-ISOLDE. The high-tension room has been cleaned and prepared for the work on the HRS Boris tube. In addition, the high-voltage power supply from Astec has been repaired.

The exchange of the front end #3 with the new front end #6 is still on schedule. The removal of the old target, which was stuck on the FE#3, was successful with a slightly higher taken dose than anticipated. However, the old front end was removed with a smaller collective dose than estimated. The old cables in the HRS Boris tube were removed and the inspection of the

insulator at the target side showed tracking across the insulator which most likely caused the breakdown of the HV at 60 kV during the 2009 operation. The new insulator arrived after some delays and was installed just before the INTC meeting which marks the completion of the phase 2 of the front-end exchange. The Committee was informed that the Boris tube of the GPS is in a better shape but a new coating is required to ensure 60 kV operation for 2010.

The phase 3 of the front-end exchange has started with the implementation of new cables. The new front end #6 is being further tested with stable beam to check the Faraday cup operation and also the vacuum system and interlocks. After reorientation of some vacuum equipment a final vacuum leak test has to be done. Furthermore, a 9-pin connector has been added to increase the possibilities for connections for future HRS target units.

The Committee was also informed on the status of the support groups. A supplementary radiation protection technician was hired for the shutdown period which turned out to be an excellent initiative. Furthermore, the target area upgrade project has been launched with an allocated budget. It aims at the replacement of the two target-zone robots. Two fellows will be hired for this project. In addition, several posts have been filled including a Safety Engineer.

The report was concluded with an overview on the HIE-ISOLDE project plan. It has been split into two stages: the first foresees the construction of the superconducting LINAC and the associated infrastructure to upgrade the energy of post-accelerated beams to 5.5 MeV/u in 2013 and the second aims at an increase of the energy to 10 MeV/u by 2014/15. In addition, a design study for the intensity upgrade is scheduled to start in 2011/2012. It will look into the technical feasibility of 10 kW operation once the LINAC4 and the refurbished PS Booster are online. A first layout of the beam lines and the different new buildings for the HIE-ISOLDE infrastructure were presented. A new cavity prototype is ready for a test to be performed at TRIUMF in March 2010. The cryomodule conceptual design is completed and the detailed design will start as soon as manpower is available.

ISOLDE Physics Report

The ISOLDE Physics Coordinator, Alexander Herlert, gave an overview on the running statistics of the 2009 campaign. The CERN accelerator schedule of 2009 comprised 223 days of on-line operation, i.e. protons from the PS Booster from April 14 until November 22. For the 2009 on-line schedule in total 662 RIB shifts were requested for 96 different beams, from which 627 RIB shifts were requested by 51 ISOLDE experiments. About 70% of the requested beams could be scheduled, i.e. 463 RIB shifts in total with 437 RIB shifts of 39 ISOLDE experiments (some with more than one beam) with in total 62 different beams (140 RIB shifts had been scheduled for 9 REX-ISOLDE experiments out of 273 RIB shifts requested). Additional shifts were reserved for target and ion-source development, letters of intent, and machine development for REX-ISOLDE.

Overall, the 2009 running period was very successful and most of the scheduled experiments obtained very good data. The main problems in 2009 include the usual start-up problems in the beginning of the running period, a broken controller card for the PISOMOVE system (no spare available), a breakdown of the PSB injection septum, a vacuum leak in the LINAC2, a failure of a vacuum seal of the 9-gap resonator of the REX-LINAC, a series of power cuts which led to a long stop of the ISOLDE vacuum system, a broken EBIS cathode, and problems with the HRS front-end at the end of the running period (problems to change targets). Two experiments, IS448 and IS478, could not run at all and some experiments did not get data or could only do some tests due to above mentioned problems, e.g. IS413, IS417, IS430, IS443, IS480, and IS485. Due to a large amount of CERN proton-beam users the quota for ISOLDE was lower than the usual

43% and many experiments had to run with less than 2 μ A average proton beam current on the targets. For many experiments it was also not possible to reach the desired 60 kV operation. In case of the HRS front-end, the high-voltage tripping was most likely due to ageing of the Boris tube insulator (burn marks visible). The insulator will be exchanged together with the HRS front-end during the 2009/2010 shutdown period.

From the PS Booster 6.65x10¹⁹ protons were delivered to ISOLDE, about 2.5x10¹⁹ on the HRS targets and 4.2x10¹⁹ on the GPS targets. This amounts to 350 RIB shifts that were delivered in 2009 with 288 RIB shifts (82.3%) for INTC experiments and 62 RIB shifts (17.7%) for target and ion source development, target tests, REX MDs, LOIs and other tests. The RIB shift distribution is as follows: Biology and medicine 2.6%, development experiments 1.7%, experiments using atomic physics techniques 19.7%, solid state physics 10.0%, weak interaction and nuclear physics 48.3%, target and ion source development and REX MD 12.1%, and the Coordinator's reserve 5.6%. The average of 1.6 RIB shifts per day is similar to the number of past years.

In total 27 target units were scheduled for the 2009 running period, including 4 old units from past years and 12 new uranium carbide targets. Two units could not be used due to technical problems. As in 2008, the request for uranium carbide targets and RILIS operation was very high. Again more than 60% of the RIB shifts were taken with UC targets and the RILIS was operated for more than 2100 hours (including off-line tests and set up). 20 ISOLDE experiments (in 13 runs) made use of the selective RILIS ionization with 152 RIB shifts for INTC experiments, which is about 52% of all INTC RIB shifts. The Nd:YAG RILIS pump lasers were used for all on-line runs. Elements addressed with RILIS schemes were: Mn, Be, Ga, Ag, Nd, Po, Mg, Sn, Zn, and Ni. For REX-ISOLDE 91 RIB shifts were delivered to 8 REX experiments (5 RIB shifts for development and tests), which are 32% of all INTC RIB shifts. This is less than the trend as observed over the last years. However, more than 30 shifts were lost due to technical problems.

The ISOLDE 2010 Physics campaign will be very similar to the one from 2009 with about 30 weeks of on-line operation. The accelerator schedule for 2010 foresees that protons will be delivered to ISOLDE on April 26, 2010, so experiments can start on April 29, 2010. The on-line operation for ISOLDE will end on November 22, 2010.

Finally, an update of the active ISOLDE experiments was given. In the last INTC meeting four new ISOLDE experiments were recommended for approval by the Research Board (IS495-IS498), with in total 76 RIB shifts. Five other experiments have been declared as completed: IS410, IS420, IS438, IS461, and IS470.

The following proposals were then presented:

1. **CERN-INTC-2010-001 and INTC-P-274**, *Collection of Rb-83 at low implantation energy for KATRIN*, Klaus Schloesser
2. **CERN-INTC-2010-003 and INTC-P-275**, *Emission Mössbauer spectroscopy of advanced materials for opto- and nano-electronics*, Haraldur Gunnlaugsson
3. **CERN-INTC-2010-004 and INTC-P-224-ADD-1**, *Laser spectroscopy of gallium isotopes using the ISCOOL RFQ cooler*, Bradley Cheal
4. **CERN-INTC-2010-007 and INTC-P-276**, *Study of single particle properties of neutron-rich Na isotopes on the “shore of the island of inversion” by means of neutron-transfer reactions*, Thorsten Kröll
5. **CERN-INTC-2010-008 and INTC-P-277**, *Coulomb excitation of ^{116}Te : a study of collectivity above the $Z = 50$ shell gap*, Tuomas Grahn
6. **CERN-INTC-2010-009 and INTC-P-216-ADD-1**, *Shape coexistence in neutron-rich Sr isotopes: Coulomb excitation of ^{98}Sr* , Emmanuel Clément
7. **CERN-INTC-2010-011 and INTC-P-278**, *Elastic scattering and reaction mechanisms in the collision $^8\text{B} + ^{64}\text{Zn}$ around the Coulomb barrier*, Alessia Di Pietro
8. **CERN-INTC-2010-012 and INTC-P-218-ADD-1**, *Emission channeling lattice location experiments with short-lived isotopes*, Ulrich Wahl
9. **CERN-INTC-2010-014 and INTC-P-279**, *Magnetic dipole moment of the doubly closed-shell plus one proton nucleus ^{49}Sc* , Takashi Ohtsubo

CLOSED SESSION

Friday 5 February 2010 at 8:30 h, room 60-6-002

Present: S. Bertolucci, J. Billowes, Y. Blumenfeld, H. Breuker, P. Butler (Chairman), R. Catherall, E. Chiaveri, H.-U. Habermeier, P.-H. Heenen, A. Herlert (Secretary), R. Julin, Y. Kadi, N. Orr, D. Ridikas, E. Rondio, P. Roussel Chomaz, Ch. Scheidenberger, V. Vlachoudis, U. Wahl

Apologies: H. Leeb, M. Doser

1. INTRODUCTORY REMARKS

The Chairman opened the meeting and announced the apologies from Helmut Leeb, who has sent his comments via email, and Michael Doser. Furthermore, he welcomed Yacine Kadi, who has been appointed project manager for HIE-ISOLDE and will therefore be ex-officio member of the INTC. It was also pointed out that at the next meeting on June 23-24 only letters of intent for future HIE-ISOLDE experiments and proposals for n_TOF will be examined.

2. MINUTES OF THE LAST INTC MEETING

The minutes of the 35th INTC meeting held on 16 and 17 November 2009 were approved without amendments. The matters arising will be covered by subsequent items in the agenda.

3. REPORT ON INACTIVE EXPERIMENTS

The ISOLDE Physics Coordinator, Alexander Herlert, gave a brief overview on the status of inactive ISOLDE experiments. From the six experiments that had been asked at the last INTC meeting to send a status report, five declared their status as **completed (IS410, IS420, IS438, IS461, and IS470)**. One status report (for IS431) was received after the submission deadline and will be presented and discussed at the November 2010 INTC meeting.

4. STATUS OF ISOLDE

Concerning the future HIE-ISOLDE facility it was pointed out, that it is not clear where the entrance for users and material will be. Richard Catherall confirmed that a gate for bringing in material is foreseen, but it is not decided for the moment where it will be installed and if it should be of the LHC type. The entrance for users will be of LHC type. Both aspects should be made more clear in future drawings.

It was noted with regard to the ISOLDE running statistics, that the different experiment categories like 'Solid State Physics' or 'Nuclear Physics and Weak Interaction' are somewhat arbitrarily chosen and that maybe a different way to present the various types of experiments should be looked into. In order to be able to compare the running periods of the last years the scheme has been continued but is probably subject to a change in the future.

5. REPORT ON N_TOF

Enrico Chiaveri presented the status of the ongoing work at the n_TOF experimental area, which has to be changed into a Work Sector Type A. To this end, a working group was set up in November 2009 in order to plan a complete transformation of the n_TOF experimental area. The layout as presented to the Committee is in agreement with DG/SCR requests and the present status is in line with the agreed schedule. In the beginning of February 2010, the experimental hall was ready for the final adjustments (resin installation on the floor ready to be done, holes for ventilation and cables prepared). The new layout foresees anti-fire doors, separate entrance doors for personnel and material, and a changing room for the Work Sector Type A.

In addition, the proton budget for n_TOF was presented. In 2009, the experiments nTOF12 and nTOF13 received protons from the PS. For nTOF12 2.7×10^{18} protons were used out of 2.45×10^{18} protons approved (due to technical problems more protons were needed). For nTOF13 4.16×10^{18} protons were used out of 1.8×10^{19} protons approved, almost equally shared between measurements on ^{56}Fe (2.37×10^{18} protons) and ^{62}Ni (1.79×10^{18} protons). For 2010 additional protons (1.09×10^{18} protons) are required for nTOF12 to conclude the commissioning and characterization of the new n_TOF target. Furthermore, it is planned to take protons for nTOF13 (neutron capture of Fe and Ni isotopes, 1.4×10^{19} needed to complete the programme), nTOF14 (1.5×10^{18} protons to complete the programme) and nTOF15 (8×10^{18} protons had been approved in May 2009 out of 1.4×10^{19} protons requested). In addition, new proposals will be submitted for the June INTC meeting, which will address the fission of actinides. The status of nTOF10 and nTOF11 shall be clarified until the next INTC meeting. At the moment both experiments are listed in the CERN data base as 'completed'.

In 2010 the total number of protons to be delivered to n_TOF will be similar to the one from last year. With the estimated $8\text{-}10 \times 10^{18}$ protons only part of the pending program can be performed. The possibility to use targets without a container (after having the Work Sector Type A operational) will improve the data taking but will not reduce the number of protons. The actinide targets seem to be ready for use, however, the Committee suggested to cross-check the status well before the scheduled experiment in order to avoid any surprises.

6. REPORT ON HIE-ISOLDE

The HIE-ISOLDE project manager, Yacine Kadi, gave an overview of the project schedule, the cost estimate, a layout proposal, and a resource loaded schedule. It was pointed out that the resources were not included in the last mid-term plan of CERN, however, the project has been approved. The HIE-ISOLDE project will concentrate on the construction of the superconducting LINAC and the associated infrastructure with the aim to provide post-accelerated radioactive ion beams up to 5.5 MeV/u in 2013 and up to 10 MeV/u by 2014/2015. A design study for the intensity upgrade is scheduled to start in 2011/2012 which should give information on the technical feasibility and the estimated costs if running with a 10 kW primary proton beam. The option for 30 kW operation will be studied at a later stage.

A first draft of the layout of the new experimental hall foresees three beam lines after the HIE-LINAC system. For a detailed study and further ion-optical calculations, additional information from the future user groups is required and a call for letters of intent is planned in order to address all the technical options and possible experiment layouts.

Based on the present project structure the overall cost estimate is in total 37.3 MCHF for materials and requires 143 FTEs (70 staff and 73 fellows or PhD students). These numbers include the resources already spent for the beam quality improvement (RILIS and ISCOOL) as well as for part of the LINAC design study and prototyping (4.8 MCHF and 6 FTEs). For the first stage up to 5.5 MeV/u about 20 MCHF for materials and 90 FTEs are required. The resource loaded schedule shows that a large fraction of the costs and manpower for the first stage are needed in 2011 and 2012. Further external funding is still required.

The project breakdown structure was presented which includes as main parts the project management, a safety coordinator, a steering committee, an external advisory board, and work package holders for the 35 different work packages, which still have to be defined in detail. Yacine Kadi will be the project leader with Matteo Pasini as technical coordinator. The design study will be coordinated by Richard Catherall, while the safety coordinator has not been appointed yet. The working groups include RF accelerating structures, beam dynamics, cryomodules, integration and infrastructure, safety, and the design study.

After a first failure of a sputtered prototype cavity a second prototype has been completed and is ready for tests at TRIUMF in March 2010. The cryomodule conceptual design has been completed as well and a detailed design will start as soon as manpower is available. A complete cavity configuration test at the SM18 facility at CERN is planned for the end of 2010.

The Committee showed concern on the fact that part of the FTEs is supposed to be funded by the CATHI proposal, which is a proposal for a European Research Training Network. The proposal has been submitted last year and the result of the evaluation is expected in March/April 2010. In case of a positive outcome, the search for fellows will start immediately. The CATHI proposal is a so-called mono-site proposal in contrast to the other 11 proposals from CERN. It has the required industrial link and has a strong training aspect.

Furthermore, the efforts towards the intensity upgrade were regarded as less intense. Especially the safety aspects related to the intensity upgrade have to be considered already at the first stage of the project and indeed, the planned design study will look into this issue. In general, the safety coordinator will take care of all safety aspects of the project and shall be included in all work packages.

Finally, the membership of the external advisory board was discussed and several suggestions were made by the Committee, e.g., to consider inviting an external nuclear physicist and a post-accelerator expert from TRIUMF.

7. DISCUSSION ON THE OPEN SESSION AND OTHER DOCUMENTS

The Chairman reminded the Committee that the proposals and letters of intent shall be evaluated with respect to their scientific content and motivation. In some cases the Committee can also give feedback to the standing group for the upgrade of ISOLDE and may suggest certain beam developments. About 20-25% of the available radioactive beam shifts are dedicated to these development runs and tests including letters of intent. The proposals presented during the open session, a letter of clarification, as well as letters of intent were then discussed:

CERN-INTC-2010-001/P-274, *Collection of Rb-83 at low implantation energy for KATRIN*

With the KATRIN experiment, which is a recognized CERN experiment, it is planned to measure the electron anti-neutrino rest mass in the decay of tritium. The experiment has shown to be able to reach its goal to further decrease the upper limit of the rest mass. However, a reference standard is needed to monitor the stability of the high voltage. It is envisaged to use the retardation spectrometer which was previously employed in Mainz for the anti-neutrino mass investigation. Conversion electrons from the decay of $^{83\text{m}}\text{Kr}$ will serve as a probe. In order to obtain a suitable source, ^{83}Rb from ISOLDE was implanted in several substrates at different implantation energies. The collection process has reached a status which allows the proponents to reproducibly produce a calibration source suitable for the application at KATRIN. Nevertheless, some further development with respect to the optimization of the source production is looked into. The collection of ^{83}Rb is technically feasible and just a few shifts are needed to produce the requested sources. The Committee thus decided to **recommend** for approval by the Research Board **5 shifts** and asked for a status report once first results have been obtained at KATRIN.

CERN-INTC-2010-002/I-084, *ASPIC2*

The ASPIC setup was inactive for several years and it was tried to find new users to continue the experimental programme. Recently, Kay Potzger from the Forschungszentrum Rossendorf, Germany, has shown interest to revive the setup and he has submitted a research proposal to

obtain funding. Meanwhile, the experiment and all equipment were taken over by the ISOLDE Physics group to bridge the gap until it is clear if the experiment will be reused or dismantled depending on funding. The main physics program is focused on surface studies, especially magnetism at surfaces and investigation of multilayers. The Committee regarded the physics motivation as very interesting as there is also a link to spintronics. Despite some technical questions, e.g. the removal of the deposition chamber and the idea to directly implant the radionuclides at lower beam energies, the Committee **endorsed** the physics case and supported the letter of intent. Nevertheless, it was pointed out that no funds from the ISOLDE Physics group will be provided. However, the proponents may ask for test beams as indicated in the letter, which shall be discussed with the ISOLDE Physics Coordinator once ASPIC is again operational.

CERN-INTC-2010-003/P-275, *Emission Mössbauer spectroscopy of advanced materials for opto- and nano-electronics*

This proposal is a continuation of the successful experimental program of the experiment IS443 which applied Mössbauer spectroscopy to radioactive ions. One of the main results obtained in the last years is a method which allows one to distinguish between ferromagnetism and paramagnetism in the studied samples. The idea is to extend the investigation to other systems. Furthermore, angular dependent measurements are envisaged. Besides the study of paramagnetic relaxations in compound semiconductors, the proponents also want to investigate vacancy diffusion in group IV semiconductors, doping of Si-nano-particles, and phase change mechanisms in chalcogenides. The Committee found the physics program too diverse and not coherent. The only common aspect is the applied Mössbauer technique. From the four different types of experiments, the first was regarded as sound and results can be expected. The second topic is more difficult to achieve, however, it is of high scientific interest. For the last two points it is not clear why the same physics cannot be done using other techniques instead of Mössbauer spectroscopy with radioactive ions. The Committee thus decided to **recommend** for approval by the Research Board **15 shifts** to address the first point of the experimental programme and to perform explorative studies for the second topic if shifts are left after completion of the first part.

CERN-INTC-2010-004/P-224-ADD-1, *Laser spectroscopy of gallium isotopes using the ISCOOL RFQ cooler*

This addendum to the experiment IS457, which is directed towards laser spectroscopy on gallium isotopes, aims at the neutron-deficient side after completion of the physics programme on the neutron-rich side. With two experimental runs, which suffered from technical problems, the proponents obtained very good results for the isotopic chain $^{67-82}\text{Ga}$. Nuclear spins, magnetic and quadrupole moments, and isotope shifts were deduced from the data. It was also a benchmarking run for the ISCOOL RFQ cooler, which enabled the reduction of background due to bunched radioactive ion beams. The main physics motivation for studying the neutron-deficient isotopes is the anomalous behaviour of Ga isotopes with respect to the matter radii, which show a monotonic increase with decreasing neutron number. This is attributed to the development of a proton skin, which should also be observed as a characteristic change of the mean square charge radii. The validity of the matter radii measurements from GANIL, which were presented in conference proceedings but never published in a refereed journal, was discussed at some length by the Committee, which agreed that it would be important to confirm such a behaviour through mean square charge radii measurements. The Committee took note on the scientific results as presented in the status report and found the physics case well motivated and therefore decided to **recommend** for approval by the Research Board **5 shifts** in addition to

the 4 remaining shifts to extend the experimental program to the neutron-deficient gallium isotopes.

CERN-INTC-2010-005/I-085, *Properties of neutron-rich lutetium and hafnium high-spin isomers*

This letter of intent aims at the investigation of hafnium and lutetium isotopes which exhibit many isomeric states. Especially the heavier hafnium isotopes are of interest as these nuclides show a complicated dependence of the shape on energy. However, it is not clear if the isomeric states will be populated in the production process. Nevertheless, besides the scientific interest, the Committee noted that it is planned to apply complementary techniques, i.e., laser spectroscopy and nuclear orientation. In order to address the physics case, radioactive ion-beam development is required. In case of the hafnium isotopes, which can be delivered as fluoride molecules, the RFQ cooler ISCOOL is planned to be employed for the break-up of molecules in order to deliver atomic ions. For the lutetium isotopes, optical pumping in the RFQ cooler is envisaged. Both techniques are of general use and not limited to these two elements. The Committee decided to **endorse** the letter of intent and to support the development of hafnium and lutetium beams, i.e. the standing group for the upgrade of ISOLDE shall consider the beam development with high priority.

CERN-INTC-2010-006/CLL-007, *Study of the onset of deformation and shape coexistence in ^{46}Ar via the inverse kinematics (t,p) reaction*

The original P-270 proposal aims to undertake a measurement of the (t,p) reaction using the T-REX setup coupled to the MINIBALL experiment to investigate intruder states in ^{46}Ar . In particular, the second 0^+ state, which is expected to exhibit a two-particle-two-hole character, should be identified. The Committee found that the Letter of Clarification better defined the physics case and motivations. It was also pointed out during the Committee's discussions that the results will be beneficial for studying the systematics of such intruder states in this region. The Committee decided to **recommend** for approval by the Research Board **30 shifts** for the experiment.

CERN-INTC-2010-007/P-276, *Study of single particle properties of neutron-rich Na isotopes on the "shore of the island of inversion" by means of neutron-transfer reactions*

This proposal is a resubmission of P-272, which was not endorsed at the last INTC meeting, primarily owing to the presence of an overwhelming contamination of the beam of interest, ^{27}Na , by ^{27}Al which would have rendered the experiment impossible. In the present case the proponents address the same physics case – namely the transition to the Island of Inversion around $N=20$ – using the (d,p) reaction. In the present proposal a ^{28}Na beam will be employed and the focus will be on negative parity states in ^{29}Na . The Committee considered the experiment to be very challenging but scientifically very interesting. It was not clear what level of beam contamination arising from ^{28}Al will be acceptable. In particular, it is expected, from similar work elsewhere, that such a near stable beam as ^{28}Al will produce a strong proton background arising from fusion-evaporation on the carbon in the CD_2 target. In this context the proponents are strongly encouraged to explore means to reduce the ^{28}Al beam contamination as well as to investigate techniques to 'veto' the fusion-evaporation reactions. Despite the experimental difficulties the physics case was considered to be very attractive and as such the Committee decided to **recommend** for approval by the Research Board **33 shifts**. It was stressed that the Physics Coordinator should endeavour to have a 'backup' experiment ready to run at

short notice in case the yield of ^{28}Na or the beam contamination precludes the experiment from running successfully.

CERN-INTC-2010-008/P-277, *Coulomb excitation of ^{116}Te : a study of collectivity above the $Z=50$ shell gap*

The proposal plans to study collectivity above the $Z=50$ shell gap by investigating neutron-deficient tellurium isotopes through Coulomb excitation using the MINIBALL setup. The main motivation behind the proposal is a set of experimental $B(E2)$ values which seem to contradict the expected parabolic behaviour for the very neutron-deficient cases. Although it is important to extend the measurements in this region, the Committee felt that the physics motivation was not well justified. In particular, it was pointed out that very recently improved data on ^{120}Te had been acquired at Yale and that more precise data should be obtained for ^{118}Te before measurements on nuclei with less neutrons are undertaken. The Committee therefore decided **not to endorse** the physics case and suggested that a more systematic proposal, including the recent data on ^{120}Te and a remeasurement of ^{118}Te , be prepared.

CERN-INTC-2010-009/P-216-ADD-1, *Shape coexistence in neutron-rich Sr isotopes: Coulomb excitation of ^{98}Sr*

This addendum of the experiment IS451 asks for additional shifts to complete the experimental program on the study of shape coexistence for neutron-rich strontium isotopes using Coulomb excitation at MINIBALL. The Committee found the physics case of interest and the proposal well written. However, it was also pointed out that the experiment will be difficult with respect to the measurement of the second 2^+ state. Since the Coulomb excitation data is well motivated and needed, the Committee decided to **recommend** for approval by the Research Board additional **10 shifts** for the investigation of ^{98}Sr .

CERN-INTC-2010-010/I-086, *Development of astatine ion beams with RILIS*

With this letter of intent the development of an astatine RILIS scheme is motivated. This development can only be done on-line since no stable astatine isotopes are available. The presented physics cases are all of high interest and the beam development is also relevant for future experiments at HIE-ISOLDE. It was pointed out that already tests with a negative ion source had been performed at ISOLDE. However, the application of negative ions would require tremendous changes in the ion optical elements of the beam line and also at the experimental setups, especially REX-ISOLDE. Therefore, the Committee regarded the development of a RILIS scheme as an important alternative. Nevertheless, some questions remain to be answered, e.g., how fast is the release of astatine atoms from the target or what are possible contaminations of the beams and what is the required purity for the experiments. The Committee decided to **strongly endorse** the physics case and asked the standing group for the upgrade of ISOLDE to give the first stage of the proposed astatine RILIS development high priority. The Committee also suggested that the proponents should submit proposals for the various cases after successful tests.

CERN-INTC-2010-011/P-278, *Elastic scattering and reaction mechanisms in the collision $^8\text{B} + ^{64}\text{Zn}$ around the Coulomb barrier*

The proposal aims to investigate elastic scattering and direct reactions in the $^8\text{B} + ^{64}\text{Zn}$ system in order to study the effects of the weakly bound proton halo. As such the proponents request the development of the ^8B beam. Although the group has an extensive record in such near barrier

scattering experiments with weakly bound nuclei (e.g. ^{11}Be), the Committee felt that the Physics case needed to be more strongly motivated. The Committee believed that while good quality data would be acquired the physics that would be extracted was not well justified. In particular, it was stressed that the proton halo character of ^8B is already well established and data on other halo systems exist. As such, the specific interest in such measurements using a ^8B beam remains to be detailed. The Committee thus decided to **not endorse** the physics case at present, taking also into account that no reliable information exists at the moment what the achievable yields for ^8B might be and whether the requested number of shifts would be appropriate and when boron beams might be available. Nevertheless, the development of boron beams was supported and the Committee suggested that a letter of intent, enlarged to include other physics opportunities, should be submitted in the future. For example, it was pointed out that ^8B is also of high interest as a β -NMR probe or for emission channeling experiments. The Committee suggested that the ISOLDE group leader would write to the community requesting that such expressions of interest be submitted.

CERN-INTC-2010-012/P-218-ADD-1, *Emission channeling lattice location experiments with short-lived isotopes*

This proposal is a status report and an addendum to the experiment IS453, which is dedicated to the investigation of lattice locations of short-lived isotopes like ^{27}Mg or ^{56}Mn in ZnO or GaN semiconductors. These investigations are rather challenging as not only the emission channeling experiments have to be performed on-line due to the short half-life of the nuclides, but also the low-energy electrons require special detectors and new detector development. The Committee took note on the successful runs and scientific results and regarded the proposed physics cases as of high interest. The Committee therefore decided to **recommend** for approval by the Research Board **22 shifts** to continue the experimental programme in the next 2-3 years.

CERN-INTC-2010-013/I-087, *New insights in Metal-Oxide junctions for nano-electronic applications*

With this letter of intent it is planned to perform first test measurements on metal-oxide junctions using perturbed angular correlation studies. The motivation is the possible future replacement of SiO_2 in MOS-FETs. In the present case the proponents want to concentrate on HfO_2 as an alternative. The Committee pointed out that there are ongoing efforts in theory and the disagreement with experiments shows the need for further data. The Committee thus decided to **strongly endorse** the physics case and encouraged the submission of a proposal after successful tests. However, it was not clear why ^{111}Ag and $^{197\text{m}}\text{Hg}$ should be the best-suited PAC probes in the Ag and Au layers since they are chemically identical or similar to the host atoms, respectively. The Committee therefore suggested that the proponents should also consider other PAC probes that might act as more efficient traps for defects such as vacancies or oxygen atoms.

CERN-INTC-2010-014/P-279, *Magnetic dipole moment of the doubly closed-shell plus one proton nucleus ^{49}Sc*

The proposal is directed towards the investigation of the shell closure at ^{48}Ca by measuring the magnetic moment of ^{49}Sc using the NICOLE setup and the nuclear magnetic resonance technique on oriented nuclei. It is expected that the results can be used to deduce effective g-factors around ^{48}Ca . The Committee pointed out that the nuclide ^{48}Ca is not a good core and the proposed measurements are important and necessary to understand the shell behaviour in that mass region. The Committee therefore decided to **recommend** for approval by the Research Board **12 shifts**.

CERN-INTC-2010-015/I-088, *BetaNMR as a novel technique for biological applications*

With this letter of intent the application of the very sensitive beta-NMR technique on biological samples is envisaged. It is planned to use the COLLAPS experiment, which is equipped with a beta-NMR setup, to investigate the interaction of metal ions bound to biological macromolecules. The nuclides will be polarized with lasers and need to be implanted in a liquid sample. To this end, differential pumping is needed to ensure a sufficiently good vacuum in the COLLAPS beam line. The main questions raised by the Committee were, whether a beam energy of 60 keV is sufficiently high in order to prevent a large fraction of the probes from being stopped in the rest gas and to what degree the polarization will be maintained during the transmission to the sample holder and after implantation. Many technical difficulties are expected. However, the COLLAPS Collaboration is a well established group at ISOLDE and also the biophysics group has meanwhile gained experience in on-line experiments at ISOLDE, so the Committee had not much doubt that the planned experiment has a good chance of success. Nevertheless, some of the obvious technical challenges have to be addressed, e.g., if an implantation at 60 keV will work as expected and if the differential pumping will be sufficient. To work with ice as a first step towards an aqueous solution was regarded as a good approach. The Committee thus decided to **endorse** the physics case and asked the proponents to discuss the technical details and obvious experimental challenges as well as the scheduling of tests with the COLLAPS Collaboration and the ISOLDE Physics Coordinator.

Out of the **183** radioactive beam shifts requested to the INTC a total of **132** have been recommended for approval by the Research Board.

8. A.O.B.

For the next INTC meeting only letters of intent related to HIE-ISOLDE will be discussed as well as n_TOF proposals. In contrast to standard INTC meetings, the letters of intent will be presented in the open session. A call for LOIs will be sent to the ISOLDE User Community end of February together with a template. The physics case and the experimental requirements shall be discussed in order to give information on the future layout of the HIE-ISOLDE experimental hall, beam lines, and modes of operation.

9. DATES OF NEXT MEETING

The next INTC meeting will take place on **Wednesday 23 and Thursday 24 June 2010**. The deadline for submission of documents is **Friday 21 May 2010**.

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