CERN-INTC-2024-075
November 12-13, 2024

ISOLDE AND NEUTRON TIME-OF-FLIGHT
EXPERIMENTS COMMITTEE

Minutes of the 77th meeting of the INTC
held on Tuesday and Wednesday, November 12-13, 2024

OPEN SESSION

The meeting was held in a hybrid format: all presentations were via Zoom with the Committee meeting in person. The chairperson of the INTC (Marek Pfützner) opened the meeting by introducing Giovanna Benzoni as a new member of the INTC committee.

The meeting began with the facility reports followed by presentations of the submitted proposals and addenda. Due to the full agenda, the facility reports were limited to 5 minutes followed by 5 minutes of questions. Presentations from the open session may be found at the following address: https://indico.cern.ch/event/1458700/

Facility reports

ISOLDE physics report (Hanne Heylen)

Hanne Heylen began the physics report by summarising the submitted documents for the INTC meeting. She mentioned that this round, only documents for low-energy physics at ISOLDE were accepted, resulting in twenty submissions requesting a total of 385.75 shifts. For the n_TOF facility, six documents were received, requesting 141 x 10^{17} protons.

She then highlighted three significant experiments conducted since June. The first was IS742, a HIE-ISOLDE run that measured the ^{132}Sn(d,p)^{133}Sn reaction at ISS, successfully observing all valence single-neutron orbitals outside the doubly magic ^{132}Sn for the first time. The second was the sensitivity record set by IS529, where collinear laser spectroscopy of ^{54}Ca was measured using the ROC technique at COLLAPS, despite the production rate being less than 1 ion/s. This measurement aims to clarify the magic nature of the N = 32 and N = 34 shell closures. Lastly, IS760 investigated single domain poled (SD) and periodically poled lithium niobate (PPLN) samples using ^{111m}Cd and the PAC technique, significantly enhancing the understanding of local phenomena critical for photovoltaic and nanoelectronic devices. It was emphasised that these were just a few examples, and many other runs were successful in obtaining their physics goals.

Despite these highlights, several problems were also presented. Like every year, various issues arose, which were relatively smoothly resolved thanks to the effort and expertise of the technical teams. However, a few problems had a significant impact on physics, including: two power cuts during the HIE-ISOLDE run, followed by several shifts to recover everything before runs could resume in good conditions; IS702 was cancelled before its start to problems to produce the ^{134}SnS beams; and the decision to temporarily pause runs in the GLM/GHM and 508 offline labs due to a series of incidents at the end of June. This was particularly affected solid-state physics community at CERN.

n_TOF physics report (Paolo M. Milazzo)

Paolo Maria Milazzo began the physics report with an overview of the ongoing 2024 campaign, which has been excellent so far. Thirteen experiments have been performed, including nine (n, γ), one (n, f), two (n, lcp), and one (n, n'γ). Notable advancements include new measurements with gas samples, inelastic scattering experiments, high radioactivity samples, and several detector developments.

Milazzo emphasized the first-ever measurement on a gas target at n_TOF using a 200 bar Argon gas cell developed by the n_TOF Collaboration, overseen by CERN safety authorities, including RP. He also mentioned the first ^{24}Mg(n, n'γ) inelastic scattering experiment, which paves the way for future measurements using this new reaction channel at n_TOF.

Additionally, he highlighted the "special" run of ^{88}Zr, which required careful coordination among three different laboratories. The material was prepared at Los Alamos, separated at PSI, and delivered to CERN on 15 August. This run was particularly challenging due to the low number of atoms (1.15×10^{16}) and the radioactive sample's short half-life, which caused the signal-to-background ratio to decrease over time. To address this, the PS team kindly agreed to provide 50% higher flux than usual, allowing the experiment to be completed in 20 days instead of 30, essential for achieving a signal-to-background ratio of 1.

Overall, it has been a good year, with a higher measured integrated proton intensity than expected, achieving 1.3×10^{17} protons on target per day. They estimate ending the year with 20% more than planned, enabling faster completion of experiments.

Finally, it was mentioned that an Expression of Interest was submitted to the SPS and PS Experiment Committee about establishing a neutron activation station near the SPS Beam Dump Facility. While the main focus remains on n_TOF, this would be a valuable addition.

Documents presented during the open session

	INTC ID	Title	Spokesperson(s)
1	INTC-P-550-ADD-1	Nuclear moments of excited states in neutron-rich Sn isotopes studied by on-line PAC	Heinz Haas, Georgi Georgiev
2	INTC-P-579-ADD-1	Probing the magicity and shell evolution in the vicinity of N = 50 with high-resolution laser spectroscopy of ^{81,82}Zn isotopes: Addendum: Laser-assisted decay spectroscopy of 75m,79mZn	Thomas Elias Cocolios, Xiaofei Yang
3	INTC-P-629-ADD-1	Measurement of (n,cp) reactions in EAR1 using an enhanced experimental setup	Styliani Goula, Luigi Cosentino, Gerardo Claps
4	INTC-P-673-ADD-1	Laser spectroscopy of neutron-deficient thulium isotopes	Bradley Cheal, Liss Vazquez Rodriguez, Reinhard Heinke
5	INTC-P-574-ADD-2	Weak interaction studies via beta-delayed proton emission	Bertram Blank, Nathal Severijns
6	INTC-P-710	The neutron capture cross section of ^{124}Sn and its impact on neutrinoless double β-decay searches	Aman Gandhi, Marian Boromiza

7	INTC-P-711	Fast neutrons inelastic cross section on ^{28}Si for space applications and fundamental research	Cristina Petrone, Michael Bacak
8	INTC-P-712	Investigation of the nucleon distribution on the surface of radioactive xenon nuclei using antiprotons	Lukas Nies, Frank Wienholtz
9	INTC-P-713	Comparison of bulk and interfacial diffusion of ^{8}Li in solid-state battery materials with beta-NMR spectroscopy	Gregory Rees, Amy Sparks
10	INTC-P-714	Investigating the origins of the kink in charge radii at N=28	Magda Kowalska, MarkBissell
11	INTC-P-715	Precise mass measurements of light and heavy neutron-rich noble-gas isotopes for nuclear structure studies	Daniel Lange
12	INTC-P-716	Mass measurements of neutron-rich Ag and In isotopes for r-process nucleosynthesis studies	Paul Florian Giesel, Maroua Benhatchi
13	INTC-P-717	Measurement of the neutron capture cross section of ^{87}Sr	Frank Gunsing, Emilio Maugeri
14	INTC-P-718	beta-decay studies of neutron-deficient gallium isotopes with Lucrecia	Victor Guadilla
15	INTC-P-719	Laser spectroscopy of neutron-rich Ni with PI-LIST	Jordan Reilly, Michail Athanasakis-Kaklamanakis, Katerina Chrysalidis
16	INTC-P-720	Exploring octupole collectivity in neutron-rich A=217-226 astatine and radon nuclei, using decay-tagged in-source laser spectroscopy	James Cubiss, Andrei Andreyev, Daniel Lange
17	INTC-P-721	New high-resolution measurement of ^{56}Fe(n,γ) at n_TOF-EAR1 for Nuclear Astrophysics and Nuclear Technology	Adria Casanovas
18	INTC-P-722	First online laser spectroscopy study of promethium isotopes	Katerina Chrysalidis, James Cubiss, Julius Wessolek, Andrei Andreyev, Daniel Lange
19	INTC-P-723	Shell evolution in Ge isotopes with N>=50 investigated via fast-timing methods	Luis Mario Fraile, Jaime Benito, Andrés Illana
20	INTC-P-724	Collinear resonance ionization of neutron-deficient indium: closing up on N = 50	Jessica Warbinek
21	INTC-P-725	Branching Ratios from a Triaxial Superdeformed "beta-band" in ^{162}Yb	Robert Bark
22	INTC-P-726	Measurement of the inelastic scattering cross section of neutrons on ^{19}F by γ-ray spectroscopy	Giuseppe Lorusso, Tobias Wright

CLOSED SESSION

Present:
Giovanna Benzoni, Joaõ Pedro Esteves De Araujo, Bogdan Fornal, Sean Freeman, Hanne Heylen (scientific secretary), Anu Kankainen*, Jose Antonio Lay Valera, Roberto Mantovan*, Alberto Mengoni*, Paolo M. Milazzo, Marek Pfützner (INTC chair), Zsolt Podolyak, Robert Page, Sebastian Rothe, Simon Stegemann, Julien Taieb*

(*) Online

The minutes of the 76th meeting of the INTC were approved.

Discussion of the facility reports

The chair of the INTC started the closed session explaining that the facility reports were short due to the busy agenda but that a full report will follow in February.

ISOLDE report
The INTC congratulates the ISOLDE teams for achieving many interesting new results, as shown during the presentation. It recognises that 2024 is a challenging year, with an estimated 20% fewer shifts delivered than in 2023. It appreciates and thanks the technical team for their efforts and expertise in solving most issues quickly. It particularly acknowledges that the suspension of runs in the GLM/GHM area and the 508 offline labs in the second half of the year has impacted many groups in the solid-state physics community and beyond. The INTC wishes ISOLDE luck for the last few weeks of physics in 2024.

Regarding LS3, the Committee discusses the preferred option of stopping physics for ISOLDE by the end of 2025 and restarting in 2028, as opposed to running until August 2026 and only restarting in 2029. This decision is pending confirmation. The INTC supports ISOLDE's priority to refurbish cryomodule 1, which is only feasible under the first option but not currently guaranteed. The Committee realises that there is unfortunately no alternative time period in the near future for such refurbishment and reemphasises the importance of bringing the linac back to the design specification as the current situation is limiting physics.

n_ToF report
The INTC also congratulates the n_ToF teams on their successful year. Thirteen experiments have been conducted, and they will end the year with around 20% more protons than initially expected. The Committee highlights the impressive work on ^{88}Zr, noting the challenge due to its short half-life and the radioactive build-up of its daughter. This experiment, which involved a very small sample and collaboration among three labs, stands out as a significant achievement. Additionally, the INTC supports the idea to install a new activation station at the SPS Beam Dump Facility, seeing it as a valuable addition for the n_ToF community at CERN. Finally, it was noted that the start of LS3 for the n_ToF facility is independent from ISOLDE, and the facility will also run in 2026.

Commented [gb1]: would it make sense to remind that n-TOF could run even if ISOLDE stops earlier than LS3?

Discussion and recommendations for received Proposals

INTC-P-710 The neutron capture cross section of ^{124}Sn and its impact on neutrinoless double beta-decay searches (2x10^{18} protons requested)

This proposal aims to measure the neutron capture cross section for ^{124}Sn, which is crucial for the search for neutrinoless double beta decay. Using sTED detectors on EAR2 with a highly enriched tin target, the experiment focuses on refining measurements of neutron-induced γ cascades in ^{124}Sn, particularly targeting the second and third resonances at 579 eV and 950 eV. This will enhance the understanding of neutron capture probabilities and γ cascades, aiding in background subtraction for future double beta decay experiments. The INTC considers the proposal well-motivated and thoroughly designed, with simulations and various target thicknesses to achieve optimal resolution. The Committee supports the proposal, highlighting the potential for significant improvements over previous measurements and the good prospects for confirming the remaining resonances.

The INTC recommends the approval of 2x10^{18} protons by the Research Board.

INTC-P-711 Fast neutrons inelastic cross section on ^{28}Si for space applications and fundamental research (2x10^{18} protons requested)

This proposal aims to measure the neutron-induced inelastic cross section of silicon-28 from threshold to 50 MeV, with a particular focus on energies above 15 MeV, where existing datasets show a discrepancy of about 15%. The motivation for this research is driven by the critical role of silicon in space exploration and electronics, where neutron-induced soft errors pose significant challenges. In addition, the proposal seeks to explore the Giant Dipole Resonance in ^{28}Si using neutrons as a novel probe. The INTC acknowledges that the proposal is well-motivated, and that the use of lanthanum bromide detectors is deemed appropriate. While the expected statistical uncertainty of around 7% is at the limit for resolving the discrepancy between the datasets, the INTC fully endorses the proposal, recognising the importance of this measurement.

The INTC recommends the approval of 2x10^{18} protons by the Research Board.

INTC-P-712 Investigation of the nucleon distribution on the surface of radioactive xenon nuclei using antiprotons (31.5 shifts requested)

The proposal aims to measure the neutron-to-proton annihilation ratio of captured antiprotons in xenon atoms, focusing on the nuclear matter distribution's tail along the Xe isotopic chain. This novel experiment, the first to use antiprotons to study the nuclear structure of short-lived radioactive nuclei, seeks to provide valuable insights into how the neutron skin develops in and help constrain the equation of state for neutron-rich matter. The INTC finds the proposed experiment very interesting but technically challenging. Additionally, concerns were raised regarding the feasibility of completing two runs before LS3. The Committee recommends approving the first run for 18 shifts, with the condition that it is completed and analysed before proposing the second run. The decision on whether to focus on neutron-rich or neutron-deficient cases is left to the proponents.

The INTC recommends the approval of 18 shifts by the Research Board.

INTC-P-713 Comparison of bulk and interfacial diffusion of ^{8}Li in solid-state battery materials with beta-NMR spectroscopy (27.25 shifts requested)

The proposal aims to investigate lithium-ion diffusion in solid-state battery (SSB) materials, focusing on interfacial conductivity, a key limitation to improving charge/discharge rates. Using β-NMR spectroscopy, the experiment will study lithium transport in three different electrolyte materials, measuring properties such as Larmor frequency, relaxation times, and resonance width across a range of temperatures and depths. The INTC acknowledges the strong scientific case and the research group's expertise but recommends reducing the original request from 27 shifts to 18.5 shifts, concentrating on two electrolytes instead of three. Since distinguishing between the Cl-containing electrolytes with small stoichiometric variations could be challenging, the Committee suggests focusing on a comparison between the Li_7PS_6 system and one chlorine-containing electrolyte.

The INTC recommends the approval of 18.5 shifts by the Research Board.

INTC-P-714 Investigating the origins of the kink in charge radii at N=28 (30 shifts requested)

The proposal aims to study the kink in the charge radii of neutron-rich isotopes around N=28, a feature that most nuclear models cannot explain. Specifically, the proposal seeks to measure the magnetic moments of $^{47\text{-}49}$K using beta-NMR and determine precise hyperfine structure constants with laser-rf double resonance spectroscopy. This would provide insights into the Bohr-Weiskopf effect and its role in nuclear structure. While the physics case is strong and well-motivated, the INTC raised concerns regarding the uncertainty in theoretical calculations and questioned whether such precise measurements would yield meaningful results given the limitations of current theory. The Committee endorses the beta-NMR measurements (twelve shifts) but finds the timeline before LS3 for the laser-rf spectroscopy too ambitious at this stage. The Committee therefore only endorses the nine offline shifts for setup commissioning for this part.

The INTC recommends the approval of 21 shifts by the Research Board.

INTC-P-715 Precise mass measurements of light and heavy neutron-rich noble-gas isotopes for nuclear structure studies (20 shifts requested)

The proposal aims to measure the masses of the neutron-rich noble-gas isotopes ^{49,50}Ar and ^{230,231}Rn using the ISOLTRAP mass spectrometer to study nuclear structure evolution and neutron separation energies. The measurements of ^{49,50}Ar focus on probing the N=32 sub-shell closure and its persistence in neutron-rich nuclei, with implications for understanding the sub-shell closure in calcium isotopes. The measurements of ^{230,231}Rn aim to expand the emerging trend of two-neutron separation energies above the closed-shell lead isotopes. The INTC found the argon measurements scientifically worthwhile, though concerns were raised about the lack of theoretical predictions. Nonetheless, the Committee agreed that the data on ^{49,50}Ar would help address key questions. However, the motivation to measure the radon isotopes was unclear, and the Committee believed that little impact would be made on the S_{2n} systematics. Therefore, it did not grant shifts for this part of the proposal.

The INTC recommends the approval of 17 shifts by the Research Board.

INTC-P-716 Mass measurements of neutron-rich Ag and In isotopes for r-process nucleosynthesis studies (32 shifts requested)

The proposal aims to measure the masses of neutron-rich silver ($^{124-129}$Ag) and indium ($^{124-135}$In) isotopes using the ISOLTRAP Penning trap and the Phase Imaging Ion Cyclotron Resonance (PI-ICR) technique, with the goal of improving understanding of nucleosynthesis in the r-process by providing precise mass measurements and isomeric-to-ground state ratios for these isotopes. The INTC found the scientific motivation unconvincing due to insufficient justification of the experiment's impact on r-process modelling and concerns about achieving the required precision in isomeric-to-ground state ratios, which are crucial for accurately unfolding the fission component of γ-ray spectra from neutron star mergers (NSM). Additionally, many of the proposed isotopes have already been measured with good precision at other facilities. For the unmeasured cases, such as ^{135}In and $^{126-129}$Ag, the half-lives are likely too short for PI-ICR measurements. However, the proposal failed to discuss the feasibility of MR-TOF measurements. Given all these concerns, the Committee does not support the requested shifts.

The INTC recommends the approval of 0 shifts by the Research Board.

INTC-P-717 Measurement of the neutron capture cross section of ^{87}Sr (3.6x10^{18} protons requested)

This proposal aims to measure the neutron capture cross section of the ^{87}Sr nucleus, following a previous attempt in 2011 that was delayed due to target degradation. The first part, which involved gamma-ray spectroscopy using C_6D_6 detectors, was completed successfully and published, but the second part, focused on neutron capture cross section measurements, was not feasible at the time due to sample issues. With the sample now reconditioned, the experiment can proceed. The proposal also includes a second component focusing on γ-ray spectroscopy in EAR2. While the physics case is strong, the INTC expressed concerns about the lack of details for the second part. Nevertheless, the Committee recognises the significance of the proposed measurements for the s-process and the ^{87}Rb/^{87}Sr cosmochronometer, and recommends approval of the full proposal, with the expectation that successful spectroscopy in EAR2 could pave the way for other experiments in the future.

The INTC recommends the approval of 3.6x10^{18} protons by the Research Board.

INTC-P-718 beta decay studies of neutron-deficient gallium isotopes with Lucrecia (17 shifts requested)

The proposal aims to measure the beta decay of $^{61-63}$Ga using the Lucretia Total Absorption Spectrometer (TAS) to test the conservation of the vector weak current and accurately determine the V_{ud} matrix element of the CKM quark mixing matrix. The study will leverage pure gallium beams and TAS's ability to determine complete beta intensity distributions as well as direct ground state to ground state branches. The INTC finds the proposal scientifically interesting, noting that while much is known, these measurements can provide important new information on the pandemonium effect for ^{62}Ga and achieve a ten-fold increase in precision for ^{61}Ga. The beamtime request is well-justified, and the INTC supports the full proposal.

The INTC recommends the approval of 17 shifts by the Research Board.

INTC-P-719 Laser spectroscopy of neutron-rich Ni with PI-LIST (24 shifts requested)

The proposal aims to perform in-source laser spectroscopy of the neutron-rich nickel isotopes from ^{69}Ni to ^{74}Ni using the LIST and PI-LIST techniques, with the goal of investigating the ground-state and isomeric properties of these isotopes to understand the role of multiparticle-multihole cross-shell excitations and shape coexistence around N=40. This would represent the lightest element studied with PI-LIST to date. While the Committee recognised the scientific value of the proposal, concerns were raised about the lack of strong theoretical support. There were also uncertainties related to yield losses with the PI-LIST method, particularly for the more exotic isotopes (^{73}Ni and ^{74}Ni). Given the strong competition for ISOLDE beam time, the INTC supports 14 shifts for the measurement of the isotopes ^{69}Ni to ^{72}Ni. Since the loss factor considered in the proposal appears conservative, it is possible that some of these exotic cases may still be addressed within the current beam time allocation.

The INTC recommends the approval of 14 shifts by the Research Board.

INTC-P-720 Exploring octupole collectivity in neutron-rich A=217-226 astatine and radon nuclei, using decay-tagged in-source laser spectroscopy (24 shifts requested)

The proposal aims to study neutron-rich $^{217-226}$At isotopes using high-resolution in-source laser spectroscopy to derive electromagnetic moments and mean-square charge radii, as well as decay spectroscopy of excited levels in $^{223-226}$Rn. The goal is to investigate the onset of quadrupole and octupole collectivity in the ground and isomeric states of these isotopes and test predictions from density functional theory. In the opinion of the INTC, the proposal is well-written, and the science is considered interesting. Given the strong track record of the collaboration, it seems realistic that valuable results will be obtained. However, given the strong competition for ISOLDE beam time, the Committee decided to focus the scope solely on the laser spectroscopy measurements of the more neutron-rich isotopes. As a result, the remeasurement of moments for ^{217,218,219}At, as well as the decay spectroscopy component, were deemed less critical, leading to a reduction of six shifts overall.

The INTC recommends the approval of 18 shifts by the Research Board.

INTC-P-721 New high-resolution measurement of ^{56}Fe(n,γ) at n_TOF-EAR1 for Nuclear Astrophysics and Nuclear Technology (3x10^{18} protons requested)

This proposal aims to measure the neutron capture cross section of ^{56}Fe, a key reaction for the weak s-process in nucleosynthesis and for modern nuclear reactor applications, where the core is surrounded by a large steel mantle. By utilising four C_6D_6 gamma ray detectors at the EAR1 experimental station, the experiment seeks to reduce the current uncertainty in the Maxwellian-averaged cross section (MACS) at temperatures relevant to the weak s-process. The proposal explains why a previous attempt at n_TOF failed to achieve the required accuracy and outlines how these challenges will be addressed in the current experiment. Despite the significant background and challenging resonance measurements, the INTC acknowledges that the proposal is well-prepared and has a realistic chance of success, particularly with the improved control over neutron flux uncertainties. Given the importance of the research for both astrophysics and nuclear technology, the Committee endorses the requested protons to achieve the desired accuracy.

The INTC recommends the approval of 3x10^{18} protons by the Research Board.

INTC-P-722 First online laser spectroscopy study of promethium isotopes (23 shifts requested)

The proposal aims to conduct the first online, in-source laser spectroscopy study of promethium isotopes from ^{132}Pm to ^{153}Pm, with the goal of extracting changes in nuclear charge radii and electromagnetic moments. These measurements will provide valuable insights into shape transitions, octupole collectivity, and the potential existence of triaxial and octupole degrees of freedom in this mass region. While the INTC acknowledges the importance of addressing gaps in experimental knowledge, concerns were raised about the relevance of old theoretical models provided and whether the experimental signatures of octupole collectivity will be sufficiently strong. Given the strong competition for ISOLDE beam time and the view that the proton-rich side is the most scientifically significant, the INTC recommends removing 6.5 shifts for the neutron-rich isotopes $^{148–153}$Pm. The proposed reduction in shifts is viewed as beneficial for the feasibility of the run, especially considering the observed degradation of the target/ion source, though the long half-lives of the isotopes involved make this less critical.

The INTC recommends the approval of 16.5 shifts by the Research Board.

INTC-P-723 Shell evolution in Ge isotopes with N>=50 investigated via fast-timing methods (22 shifts requested)

The proposal aims to investigate the neutron-rich isotopes $^{83−86}$Ge, populated via β-decay and β-delayed neutron emission of neutron-rich Ga isotopes, using the ISOLDE Decay Station and fast-timing techniques with LaBr detectors. The goal is to extend the level schemes and measure sub-nanosecond lifetimes of excited states in these isotopes, particularly to study the predicted coexistence of spherical and γ-soft shapes, and the potential for triaxiality around the N=50 shell closure. The INTC recognises the value of the experiment, which could provide crucial data for understanding the evolution of nuclear shapes and magic numbers in the region. However, the Committee notes that the proponents have not provided clear predictions for lifetimes. Additionally, the yields for ^{86}Ge and ^{87}Ge, may be challenging to achieve. As a result, the INTC recommends approving thirteen shifts for the measurement of ^{83,84}Ge, and ^{85}Ge, while removing eight shifts for the exploration of the most exotic ^{86,87}Ge isotopes.

The INTC recommends the approval of 13 shifts by the Research Board.

INTC-P-724 Collinear resonance ionization of neutron-deficient indium: closing up on N = 50 (24 shifts requested)

The proposal aims to investigate the nuclear ground-state properties of the neutron-deficient isotopes ^{99,100}In, located near the doubly magic nucleus ^{100}Sn, using Collinear Resonance Ionisation Spectroscopy at CRIS. The study will measure magnetic dipole and electric quadrupole moments, nuclear spins, and changes in mean-square charge radii, providing key insights into the evolution of nuclear structure with a single proton hole in the Z=50 shell closure. These results are expected to benchmark state-of-the-art nuclear models and enhance their predictive power in this critical region of the nuclear chart. The INTC recognises the scientific relevance of the proposal and acknowledges that while the ^{99}In measurements will be challenging, the significant potential gains justify the endorsement of the requested shifts.

The INTC recommends the approval of 24 shifts by the Research Board.

INTC-P-725 Branching Ratios from a Triaxial Superdeformed "beta-band" in ^{162}Yb (12 shifts requested)

The proposal aims to investigate the nature of the second 0^+ state in ^{162}Yb, which was initially believed to be a vibrational β band but may instead be a triaxially-deformed or super deformed state, based on recent theoretical investigations. To achieve this, the proposal outlines two experiments: the first, which involves Coulomb excitation and Recoil Distance Doppler-Shift measurements and was approved as proposal P-708, and the second, which is this proposal, focusing on measuring the branching ratios of intra-band transitions within the β-band using β-decay. While the proposal's physics case is well-supported, the INTC concluded that it should not be approved at this time. The proposal should be resubmitted after the successful completion of P-708, as the decay measurements are not considered interesting without the Coulomb excitation part. The LoI268 remains open to address the uncertainty surrounding the yields, which could impact the measurement of one of the two states proposed to be measured.

The INTC recommends the approval of 0 shifts by the Research Board.

INTC-P-726 Measurement of the inelastic scattering cross section of neutrons on ^{19}F by γ-ray spectroscopy (2x10^{18} protons requested)

This proposal aims to measure the neutron inelastic cross-section on ^{19}F at the EAR1 experimental station. Fluorine, a key component of the molten salt FLiBe (Li_2BeF_4), is essential for both fusion and fission reactors due to its superior tritium breeding performance, as well as its role as a moderator and coolant. Current measurement data for ^{19}F show discrepancies below 1 MeV and lack information above a few MeV. The proposed experiment will address these discrepancies and extend the measurement range to several tens of MeV, utilising LaBr3 detectors to detect γ-rays from $^{19}F^*$ de-excitation states. This will improve the accuracy of the tritium breeding ratio and neutron flux calculations for fusion reactors, as well as reactivity calculations for fission reactors. The INTC was impressed with the proposal's preparation and motivation, particularly the sensitivity studies, and expressed its strong support.

The INTC recommends the approval of 2x10^{18} protons by the Research Board.

Discussion and recommendations for received Addenda

INTC-P-550-ADD-1 Nuclear moments of excited states in neutron-rich Sn isotopes studied by on-line PAC (7 shifts requested)

The proposal is an addendum to P-550, which aims to measure the nuclear moments of excited states in neutron-rich Sn nuclei using the Perturbed Angular Correlation (PAC) technique. This involves offline PAC measurements from the decay of long-lived Sb sources and online PAC measurements from short-lived In isotopes. Despite obtaining significant new data in 2021 and 2023, the analysis indicates that additional measurements could greatly enhance the precision of the magnetic and quadrupole moments. The INTC notes that the addendum is difficult to follow and requires clarification on the following points:

1. The original proposal allocated 4 shifts to measure the 5^- isomer in ^{130}Sn. During the presentation, it was mentioned that this was not measured due to the lack of narrow-band laser ionization. Please explain why this measurement is no longer included in the current proposal as the narrow-band laser mode could be requested?

2. During the presentation, it was stated that the quadrupole moments were determined with high precision already. What additional value will further measurements bring? Specifically, why is it necessary to measure 24 samples for ^{116}Sn and two samples for ^{118}Sn (see table p. 6 of proposal)?
3. What can be gained by measuring the same properties of ^{119}Sn($3/2^+$) from both ^{119}Sb offline and ^{119m}In online implantation? The addendum suggests that comparing these with existing measurements for ^{116,118}Sn will result in high precision measurements, but this needs further justification.
4. It is argued that the magnetic moments of the 5^- isomeric states would benefit from additional measurements. But what are the expected theoretical values, what do the shell model calculations predict for example?
5. Given the significant overhead to set up RILIS for just one shift of indium, please clarify if surface ionisation (yielding around 5 pA of beam) is a feasible alternative.
6. Provide more details on how measurements in liquids are performed to allow for a proper risk assessment from a radiological protection (RP) standpoint.
7. If ^{119}In requires laser ionization, specify whether a narrow or broad-band laser is needed (in the light of point 1).

The INTC recommends the submission of a letter of clarification.

INTC-P-574-ADD-2 Weak interaction studies via beta-delayed proton emission (24 shifts requested)

The proposal aims to uncover beyond-the-standard-model (BSM) physics by studying β-delayed proton decays of ^{32}Ar. In particular, it will measure the β–ν angular correlations and the Fierz interference term, using the kinematic shift technique at WisArd. The addendum is a continuation of several previous runs, including a 2024 experiment where data could only be collected for three out of eight days due to target/ion source issues. In the opinion of the INTC, the physics motivation remains strong. However, the Committee expressed concerns that the proponents cannot provide a quantitative estimate of the systematic uncertainty at this stage, making it difficult to justify whether additional statistics would be worthwhile. Given that five days of beam time remain from previous run, the Committee endorses three additional shifts for target/ion-source development as well as offline work to improve the target's reliability and yield. The Committee also suggests waiting to perform the experiment until the analysis of the 2024 data clarifies whether more statistics are needed.

The INTC recommends the approval of 3 shifts by the Research Board.

INTC-P-579-ADD-1 Probing the magicity and shell evolution in the vicinity of N = 50 with high-resolution laser spectroscopy of ^{81,82}Zn isotopes: Addendum: Laser-assisted decay spectroscopy of ^{75m,79m}Zn (17 shifts requested)

The proposal is an addendum to P-579, building on the successful IS682 campaign which focused on high-resolution laser spectroscopy of neutron-rich zinc isotopes near N = 50. The addendum aims to use the CRIS setup to selectively ionise either the ground state or the isomer in ^{75}Zn and ^{79}Zn and sending the selected state to the CRIS decay spectroscopy station. In the opinion of the INTC, the scientific motivation is strong, as little is known about the spins and parities of these states, which are key for understanding nuclear structure. However, the Committee requests a clarification on the requested shifts.

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1. The yield estimates are based on the 178 keV gamma-ray transition counts for ^{75}Zn and the 802.5 keV gamma-ray transition counts for ^{79}Zn. The Committee asks why these specific transitions were chosen.
2. The proponents should clarify the shift request based on an estimate of the isomeric yield ratio, which should be available from the first experiment.
3. Could you comment on whether it would be an option to measure the total (ground state + isomer) at the ISOLDE Decay Station with much higher statistics? Why is it necessary to measure both the ground state and the isomer separately at CRIS?

The INTC recommends the submission of a letter of clarification.

INTC-P-629-ADD-1 Measurement of (n,cp) reactions in EAR1 using an enhanced experimental setup (1.5x10^{18} protons requested)

The addendum proposes to repeat a ^{12}C(n,cp) (charged particle) measurement at the n_TOF facility using two newly developed detector setups. The initial experiment faced significant challenges, including excessive background noise and sub-optimal experimental conditions due to Mylar windows and incorrect target positioning, which hindered the measurement of low-energy alphas. The proponents aim to address these issues by optimising the setup, including a windowless configuration and an improved GEMpix detector. The INTC acknowledges the significant developments in this addendum compared to the original experiments. However, to avoid similar issues encountered previously, the Committee requests a letter of clarification that includes a detailed Monte Carlo simulation to account for all potential background sources. Additional mitigation strategies should also be presented if necessary.

The INTC recommends the submission of a letter of clarification.

INTC-P-673-ADD-1 Laser spectroscopy of neutron-deficient thulium isotopes (18 shifts requested)

The addendum seeks to continue high-resolution laser spectroscopy of neutron-deficient thulium isotopes, ultimately aiming to study the proton emitter ^{147}Tm, although this is not a goal of the current proposal. Following the INTC-P-673 proposal in November 2023 (13 of the 21 requested shifts granted), the team measured ground and isomeric states of ^{154}Tm and ^{153}Tm, observed the ^{152}Tm ground state, and conducted initial scans of ^{151}Tm, with clear peaks identified in the spectra. Further measurements were hampered because of the observed target degradation. The current addendum proposes to complete the collinear laser spectroscopy measurements of ^{152m,151g,151m,150}Tm using COLLAPS, and to extend studies to ^{149}Tm and beyond using PI-LIST and IDS, with ISOLTRAP for mass measurements and diagnostic purposes. In the opinion of the INTC, the physics motivation is compelling enough to warrant this addendum. However, it raised concerns about the feasibility of a prolonged run due to rapid target degradation. Therefore, the Committee recommends approving 15 shifts, excluding the 3 shifts for exploration of ^{147}Tm.

The INTC recommends the approval of 15 shifts by the Research Board.

Discussion and recommendations for received Letters of Intent

INTC-I-280 Production of ^{169}Yb for calibration of a transition-edge sensor for precision x-ray spectroscopy of antiprotonic atoms (4 shifts requested)

The letter of intent outlines an experiment under the PAX (antiProtonic Atom X-ray Spectroscopy) project, which aims to test bound-state quantum electrodynamics (BSQED) through high-precision X-ray spectroscopy of antiprotonic atoms. Utilising advanced transition-edge-sensor (TES) technology, the project seeks to measure X-rays in the 30–200 keV range with eV-level precision. To enable this, the proponents propose producing and utilising ^{169}Yb as a calibration source for TES detectors, specifically for targeting X-rays in the 100–200 keV range. The INTC recognises the scientific value of the proposed measurements and recommends conditional approval of the shift request, contingent on the acceptance of the related AD/TELMAX experiment. Additionally, the Committee notes that, given the long setup time compared to the actual runtime and the constraints of scheduling within the AD experiment timeline, it cannot guarantee that the experiment can be accommodated. Finally, it notes that while the shift request is modest, the proponents should have submitted a full proposal rather than a letter of intent.

The INTC recommends the approval of 4 shifts by the Research Board.

INTC-I-281 Quantum emitters in diamond containing octupole-deformed nuclei for electric dipole moment experiments (7 shifts requested)

This letter of intent aims to develop experimental techniques to study CP-violation through permanent electric dipole moment (EDM) measurements in solid-state systems, using actinide isotopes such as ^{229}Pa, ^{229}Th, and ^{227}Ac embedded in diamond. The proponents propose to create quantum emitters (colour centres) in diamond, which are expected to exhibit large nuclear Schiff moments due to their octupole deformation. The study will use emission channelling and radiotracer photoluminescence to investigate the structure and optical properties of these defects, with the goal of enhancing EDM measurement sensitivity. The INTC acknowledges the uniqueness and interdisciplinary nature of the proposal. Given the innovative nature and potential scientific impact, the Committee endorses the request for seven shifts.

The INTC recommends the approval of 7 shifts by the Research Board.

Discussion and recommendations for received Letters of Clarification

INTC-CLL-059 Collinear Laser Spectroscopy of $^{223\text{-}226,228}$Ra^{+} (13 shifts requested + 1 shift for pre-irradiation of target)

The original proposal aimed to conduct laser spectroscopy on the D1- and D2-like transitions in $^{223-226,228}$Ra^{+} using COLLAPS to investigate symmetry violation in fundamental interactions. The INTC is of the opinion that the questions remaining after previous submission have sufficiently been addressed in this clarification letter. It has been confirmed that these measurements must be conducted with a pre-irradiated target due to francium contamination (question 1). The irradiation requirements have also been addressed as requested (question 2).

To ease constraints on the timing of these irradiations, the INTC recommends removing two shifts for ^{224}Ra due to its short half-life. From a physics perspective, the INTC agrees that measurements of differential charge radii for Ra isotopes are likely relevant for constraining nuclear theory in studies of the PT-violating Schiff moment (question 3), although the provided calculations could have been more compelling.

The INTC recommends the approval of 11 shifts + 1 shift for irradiation by the Research Board.

INTC-CLL-060 Employing ROC to explore astrophysics milestones: nuclear structure of the N = Z nucleus ^{76}Sr (8 shifts requested)

The original proposal aimed to explore neutron-deficient strontium isotopes near the proton drip line, with a particular focus on determining the charge radius of the N = Z nucleus ^{76}Sr. This study is relevant for nuclear theory and astrophysics, as it could provide insight into the structure of N = Z nuclei and help refine models of astrophysical processes. However, even after receiving the clarification letter, the INTC remains unconvinced that the measurements will significantly impact the physics question. While the Skyrme forces used in the proposal are reasonable, their predictions differ substantially. Additionally, no uncertainties are provided, making it unclear what the experiment might conclusively reveal. Furthermore, the interpretation of results for a self-conjugate nucleus like ^{76}Sr may be complicated due to the (sub)shell closure or enhanced pairing effects. Finally, as long as the yields and contamination are not measured, it remains uncertain the experiment is feasible.

The INTC recommends the approval of 0 shifts by the Research Board.

AOB

The INTC extended its sincere gratitude to departing member Anu Kankainen for her valuable contributions and dedication.

The next meeting of the INTC will be on 5-6 February 2025. The deadline for proposal submission is on 8 January.

Minutes taken by Hanne Heylen.