Nuclear Structure 2026

Abstracts: Posters

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Contribution ID: **7**

Beta-delayed spectroscopy at the proton drip line with RCMP at TRIUMF

Nuclear β-decay is a simple and selective approach to populate excited states and obtain precise spectroscopic information. If the imbalance between proton and neutron number is large, levels in the daughter nucleus can be populated above the proton (or α) separation energy, leading to single or multi-particle emission. These decay channels provide an opportunity to study nuclear structure at high excitation energy [1], correlation of multi-particle emission, nuclear astrophysics processes [2] and fundamental symmetries.

Detecting the particles emitted after β-decay with a high efficiency becomes necessary to obtain the full decay path information. The Regina Cube for Multiple Particles (RCMP), a new ancillary detector for the GRIFFIN HPGe γ-ray spectrometer at TRIUMF [3], was developed in this context, to explore β-decay at the proton drip line. RCMP is a set of six double-sided silicon strip detectors (DSSD) arranged in a cubic geometry, allowing to measure the energy of charged particles emitted after β-decay. Added to GRIFFIN, this state-of-the-art setup is the most efficient to date in order to perform this type of study.

RCMP was commissioned at TRIUMF-ISAC, where beams of ^{20}Mg and ^{21}Mg were produced with the highest statistical yield measured to date. Corrections such as energy add-back, cross-talk and energy loss have to be taken into account to retrieve the correct physical quantities. This work presents a study of these correction factors and how they affect the obtained results for ^{21}Mg β-delayed proton emission. My co-worker, Sydney Plante, will continue by presenting the analysis of the ^{20}Mg β-delayed spectroscopy.

[1] M.V. Lund et al. "Systematic trends in beta-delayed particle emitting nuclei: The case of $\beta p\alpha$ emission from ^{21}Mg" Phys. Lett. B 750 (2015)

[2] M.V. Lund et al. "Beta-delayed proton emission from ^{20}Mg" Eur. Phys. J. A 52.10 (2016)

[3] A.B. Garnsworthy et al. "The GRIFFIN facility for Decay-Spectroscopy studies at TRIUMF-ISAC" Nucl. Instrum. Methods Phys. Res., Sect. A 918 (2019)

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Session Classification: Poster Session

Contribution ID: **10**

Chiral doublet bands in ^{110,112}Rh

High spin states of ^{110}Rh have been reinvestigated by analyzing the high statistics γ-γ-γ and γ-γ-γ-γ coincidence data from the spontaneous fission of ^{252}Cf using Gammasphere. A partner band with linking transition to the existing yrast band has been observed. Spins and parities are tentatively assigned according to the systematic comparison. Theoretical calculations have been performed to study the possible chiral doublet band structure in ^{110,112}Rh.

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Session Classification: Poster Session

Contribution ID: **15**

The Refined Bohr-Mottelson Model for the Description of Collective Motion in Atomic Nuclei

A nuclear system consisting of A nucleons is described in terms of $3A$ independent coordinates. Three coordinates are used in the transformation to the centre of mass frame, three Euler angles are used to set the nucleus in the body-fixed frame, and three variables ρ, β, and γ define the size, orientation, and shape of the nuclear inertial ellipsoid. The remaining $3A - 9$ coordinates are generalized Euler angles characterizing the internal nucleon motion. A microscopic derivation of the kinetic energy of a nucleus is carried out from first principles resulting in expressions of the kinetic energy contributions from vibrations, rotations, intrinsic motion, and the Coriolis coupling (see also [1]). The derived rotational energy operator depends on the hydrodynamic moments of inertia and the angular momentum operators along the body-fixed axes, which arise naturally from the derivation procedure.

Additionally, the Refined Bohr-Mottelson (RBM) model is introduced, proposing an adjustment to the definition of the nuclear surface of the Bohr-Mottelson model. This redefinition takes into account the constant density of the incompressible nucleus and, by construction, conserves the volume of the nucleus with arbitrary deformation. The obtained collective Hamiltonian is a sum of the monopole and quadrupole Hamiltonians. For small deformations ($\beta \ll 1$) the latter coincides with the Bohr Hamiltonian. We established the relation of our refined deformation parameter β_r, which ensures constant nuclear volume at arbitrary deformation, with the conventional parameter β.

The derivations and results will be presented and discussed.

[1] A.Ya.Dzyublik, K.Starosta, Z.Yu, and T.Koike, Phys. Rev. C 110, 014325 (2024).

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Session Classification: Poster Session

Contribution ID: **18**

Development and characterization of SCIGA for direct reaction experiments at RAON

Direct reaction experiments in inverse kinematics are one of the best suited tools to probe a broad range of nuclear properties, providing great insight into the nuclear structure of exotic nuclei. However, the inverse kinematics approach impose constraints in the experimental detection systems: charged-particles are emitted over a large angular range, hence large solid angular coverage is required. In addition, beam intensity limitations for most exotic beams are often compensated with the use of thicker targets at the expense of the excitation energy resolution derived from charged-particles. Measuring gamma-rays in coincidence will much improve the excitation energy resolution, enabling direct reaction studies for nuclei where the level density is too high to distinguish excited states with charged-particles alone.

A large amount of effort was devoted at the Center for Exotic Nuclear Studies (CENS) to develop nuclear detection instruments especially intended for experiments with direct reactions in inverse kinematics at RAON. With the aforementioned constraints in mind, SCIGA (Silicon-CsI-GAGG Array) was designed as a large solid angle array of Silicon-CsI telescopes for charged-particle detection and an array of GAGG scintillator crystals for highly efficient observation of gamma-rays in coincidence. The GAGG crystals provide better resolution than NaI crystals while offering higher intrinsic efficiency than HPGe detectors and more flexibility due to the lack of cooling. SCIGA modular design allows to be used with self-supporting targets or gas cell targets.

This contribution will present SCIGA detailed specifications, performance and current status, including preliminary in-beam commissioning results. Ongoing development efforts and upcoming SCIGA experiments will also be discussed.

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Session Classification: Poster Session

Contribution ID: **24**

Investigating the boundaries of enhanced octupole collectivity in the rare-earth region

Atomic nuclei which exhibit a reflection-asymmetric shape are of considerable interest for the understanding of nuclear structure. These “pear-shaped” nuclei are expected to occur in the regions of the nuclear chart where the octupole degree of freedom is enhanced. Strong octupole correlations manifest when the Fermi surface lies close to single-particle orbitals with quantum numbers $[l, j]$ and $[l-3, j-3]$ giving rise to the octupole magic numbers $N, Z = 34, 56, 88$ and $N = 134$. Atomic nuclei in these regions can exhibit enhanced particle-hole interactions from the octupole component of the nucleon-nucleon interaction. The electric-octupole (E3) transition rate provides the most unambiguous signature of octupole collectivity, however such measurements are often extremely challenging as E3 transitions compete very weakly against other allowed transitions.

The region around $Z = 56, N = 88$ possesses the most complete set of B(E3) values across the nuclear chart with the largest values observed in ^{148,150}Gd however spectroscopic data for the dysprosium isotopes is largely missing. Within the N=82 chain, increasing B(E3) strength is observed with increasing proton number from ^{136}Xe (Z=54) to ^{146}Gd (Z=64) however it remains unknown whether this trend continues at ^{148}Dy (Z=66) and beyond.

To investigate whether enhanced octupole collectivity is present in dysprosium isotopes and extend or constrain the boundaries of enhanced octupole collectivity, we performed a direct measurement of the B(E3) value in 148-Dy. A beta-decay study of ^{148}Ho was performed at the TRIUMF facility using the GRIFFIN spectrometer. The mean lifetime of the 3^- state was measured using fast-timing methods with LaBr detectors and the absolute γ-ray branching ratio of the $3^- \rightarrow 0^+$ was obtained enabling a direct measurement of the $B(E3; 3^-_1 \rightarrow 0^+_1)$ value.

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Session Classification: Poster Session

Contribution ID: **28**

Octopi: A Portable Versatile Gamma-ray Spectrometer

Studies to probe the internal structure and interactions of nuclei often require precise measurement of radiation emitted from nuclear reactions or decay. Any particular modern nuclear experiment requires unique experimental conditions, creating a demand for versatile radiation detection arrays that can meet a wide variety of experimental needs, with minimal adjustment of physical hardware. The Octopi system, designed and implemented at Simon Fraser University (SFU), provides a digital data acquisition system for up to eight Compton-suppressed high-purity germanium gamma-ray detectors and up to four auxiliary detector channels. Real-time event filtering by a user-controlled logic module enables raw signals from detector subsystems to be accepted or rejected based on user-selectable coincidence logic. All triggering parameters are also computer-controlled for versatility. A subsection of the system was recently deployed at TRIUMF to measure muon-induced fission probabilities of U-238. In the near term, the Octopi array will be used at SFU's Nuclear Science Laboratory for measuring meta-stable radioisotopes produced on a D-T neutron generator.

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Session Classification: Poster Session

Contribution ID: **32**

FIMP: A Novel Active Implanter for Decay Spectroscopy

Decay spectroscopy at DESPEC requires an active implanter for reliable implantation–decay correlations under cocktail-beam conditions, at high rates, over a large dynamic range, and in strong background conditions. In the current DESPEC setup, AIDA serves as the workhorse implanter, but its decay-event time resolution exceeds 1 μs, and its implantation/decay-pair efficiency in real experiments is typically 25–35%, which limits fast-timing applications. To address this, the Fibre IMPlanter (FIMP) is being developed as a scintillator-based alternative to conventional DSSSD implant detectors.

FIMP is based on orthogonal layers of 0.5 × 0.5 mm² scintillating fibres read out by SiPMs, forming a highly segmented three-dimensional active volume with 2 × 2 × 2 mm³ voxels. Its key novelty is the combination of active stopping, fine 3D segmentation, timing information relevant for implantation–decay correlation studies, and the possibility of charged-particle tracking of implanted ions, β particles, α particles, and secondary fragments. This is particularly attractive for complex cocktail beams, where high granularity and tracking can support isotope identification, background suppression, and improved correlation efficiency. For this geometry, the single-layer detection threshold is of the order of 100 keV, while the effective voxel size is expected to be about 3–4 mm for 1 MeV β particles.

Prototype studies, simulations, and in-beam tests in 2024 and 2025 validated the active-stopping concept, demonstrated detector response to heavy fragments and correlated β/α signals, and guided the next detector iteration. In the July 2025 test, FIMP was operated with fragments ranging from 132Sn to 225Th in four settings, with stable detector performance under beam conditions. Current development is focused on improving detector sensitivity and reducing the β-detection threshold. FIMP thus represents a realistic active implanter for future fast decay-spectroscopy experiments at DESPEC/FAIR.

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Session Classification: Poster Session

Contribution ID: **41**

High-spin intruder structures in 32Si and 29Al

In sd shell nuclides near the N=20 'island of inversion', shell evolution is indicated by the energies of negative parity states which primarily arise due to single neutron excitation to the higher lying fp orbitals. These intruder states often have high spin (due to the participation of the $0f_{7/2}$ orbital) and can therefore be preferentially populated using fusion-evaporation reactions. Nuclear isomerism can also occur when these intruder states are at similar energies to positive parity states of similar spin.

We have investigated the high spin structures of ^{32}Si (N=18) and ^{29}Al (N=16) using ^{12}C + ^{22}Ne fusion evaporation reactions at TRIUMF/ISAC-II, with the TIGRESS clover array and a spherical CsI(Tl) array used for gamma ray and charged particle detection/identification, respectively. In ^{32}Si, the properties of both the yrast 4^+ state and a 5^- isomer resulting from neutron cross-shell excitation have been disputed [1, 2]. We investigated these and other high-spin states, placing the 5^- isomer at 5504.88(13) keV and identifying the 4^+ state at higher energy [3]. A comparison to shell model calculations suggests that this inverted ordering of yrast states is influenced by the Z=14 subshell closure. Several newly observed high-spin states and accompanying transitions were also identified. In ^{29}Al, we have identified several new negative parity states, including a rotor-like band based on the first $7/2^-$ state [4]. Our future plans in this region will also be discussed, including on-going side channel analysis and an upcoming experiment to study intruder states in ^{34}Si.

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Session Classification: Poster Session

Contribution ID: **42**

The N=126 Factory at Argonne National Laboratory's ATLAS Facility

Precision nuclear data, including nuclear masses, neutron capture cross sections, and β-decay half lives, are needed throughout the r-process path in order to properly model nucleosynthetic pathways. One key region of the nuclear landscape which remains relatively unexplored is neutron rich nuclei surrounding the $N = 126$ shell closure. This is due to the difficulty in producing these nuclei using conventional methods such as fragmentation reactions or fission. Multi-nucleon transfer (MNT) reactions between two heavy ions provide an alternate method for producing nuclei near the $N = 126$ shell closure with relatively large reaction cross sections.

At Argonne National Laboratory, the N=126 Factory is being developed to employ MNT reactions to produce these neutron rich nuclei near the $N = 126$ shell closure. At the N=126 Factory, MNT products are captured in a large volume gas catcher and converted into a low energy beam, which is then accelerated through a dipole separator magnet ($R \sim 10^3$), cooled and bunched, and finally tuned through an MR-TOF system ($R \sim 10^5$). The result is an isotopically pure bunched beam which can be directed towards experimental substations including the CPT high-precision mass spectrometer, a new laser spectroscopy setup, and the RACCOONS decay station. In this presentation I will give an overview of the N=126 Factory and discuss the ongoing commissioning of the facility.

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Session Classification: Poster Session

Contribution ID: **48**

Direct measurement of single-neutron strength of 12C up to 22 MeV using the 11C(d,p) reaction.

The single-nucleon energy levels and configurations of 12C are fundamental to our understanding of nuclear structure, yet they remain primarily defined by theoretical models and parameters extrapolated from neighboring systems. As a semi-closed shell nucleus featuring complex α-cluster states, direct measurements of the excited single-particle configurations in 12C are essential for refining nuclear models and informing nucleosynthesis pathways in astrophysics. We report on the first direct measurement of single-neutron strength in 12C for states up to Ex ≈ 22 MeV. The experiment was performed in inverse kinematics using the 11C(d,p) reaction at 10 MeV/u with the HELIOS spectrometer at Argonne National Laboratory. This setup allowed for high-resolution particle spectroscopy of the ejected protons, enabling the extraction of spectroscopic factors and orbital angular momentum transfers. The experimental configuration, data analysis methodology, and preliminary results regarding the distribution of single-neutron strength are presented.

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Session Classification: Poster Session

Contribution ID: **50**

Re-emergence of identical bands phenomenon at normal deformation

The rare-earth nuclei around N ~ 90 and A ~ 160 continue to present fascinating as well as challenging physics issues spanning a wide range of angular momenta. Among the many exotic phenomena characterizing nuclei in this mass region, the identical band (IB) phenomenon became a topic of intense research and discussion in the nineties. It was first identified in excited superdeformed (SD) bands of ^{150}Gd and ^{151}Tb [1]. Thereafter, many low-spin IBs were also reported both at intermediate (ID) and normal deformation (ND) [2]. However, further exploration of this surprising phenomenon was hindered by the lack of a global explanation valid across the entire periodic chart for all values of deformation.

The subject of "identical high-K bands"at normal deformation in isotopes of a particular isotopic chain has never been investigated through dedicated measurements or theory. Following a recent measurement using a alpha beam and a moderate-size array of eleven Compton-suppressed clover HPGe detectors plus one LEPS (INGA) at the Variable Energy Cyclotron Centre (VECC), Kolkata, India, a new high-K band structure was identified in the ^{162}Er nucleus (the first-ever) above its $K^\pi = 7^-$ isomer [3]. The remarkable similarity between this two-quasiproton structure and the corresponding excitation in ^{164}Er up to the highest observed spin is intriguing [3]. Further, this finding, when discussed in combination with the two-quasiproton $K^\pi = 6^+$ identical high-K bands in ^{174}Hf and ^{178}Hf (first recognized in the present work using data from the literature), extends the observation of this phenomenon at ND in pairs of even-even nuclei in the Er and Hf isotopic chains. However, when comparing the properties of the IBs in these two isotopic pairs, it must be concluded that proposed earlier explanations in terms of a delicate cancellation between changes in deformation and pairing do not hold for the Er isotopes [3].

Hence, the present observations call for further experimental and theoretical work. On the one hand, it is important to rule out that the identicality in the present instances is accidental by searching for additional cases, while, on the other, pursue further efforts to develop a single theoretical framework able to account for the occurrence of IBs at all deformations (ND, ID and SD) across the nuclear chart.

The INGA collaboration is gratefully acknowledged. A. C. and S. M. acknowledge the financial assistance received from DAE-BRNS, Govt. of India (Project Sanction No. 37(3)/14/17/2016-BRNS). This work was supported in part by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics, under Grant DE-FG02-97ER41041 (UNC), and DEFG02-97ER41033 (TUNL).

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Session Classification: Poster Session

Contribution ID: **51**

Study of shape coexistence in Sr-96 via Coulomb excitation experiment

In recent years, shape coexistence in atomic nuclei has been recognized as ubiquitous across the nuclear chart [1]. The structure of nuclei exhibiting shape coexistence reflects an intriguing interplay between microscopic and macroscopic nuclear effects, the understanding of which is one of the greatest challenges of modern nuclear theory. This interplay manifests in the $A \approx 100$ region with neutron number N=60, with the Sr and Zr isotopes exhibiting the most rapid onset of ground-state deformation observed across the nuclear landscape. In this context, ^{96}Sr represents a transitional nucleus located at the precipice of the region of deformed ground-state shapes. From a structural point of view, the observed sudden onset of deformation can be explained by an inversion of coexisting regular and "intruder"configurations (multiparticle-multihole excitations) where the former possesses a spherical shape, and the latter is deformed. This interpretation is supported both by theoretical calculations [2,3,4] and experimental data for Sr [5,6]. Notably, the γ-ray decay transition probabilities of the 2^+_1 state in ^{96}Sr and the 2^+_2 state in ^{98}Sr, and the spectroscopic quadrupole moments of these states measured in a Coulomb-excitation study [5,6], were found to be consistent with the $0^+_1(^{96}Sr) \leftrightarrow 0^+_2(^{98}Sr)$ inversion scenario. On the contrary, there is still lack of experimental evidence for the correspondence of the low-lying 0^+ states in ^{96}Sr to the ground-state configuration 0^+_1 of ^{98}Sr. A neutron-transfer reaction was performed at TRIUMF [7] and spectroscopic factors were measured for the excited 0^+ states. Combining these results with the extremely large $\rho^2(E0; 0^+_3 \rightarrow 0^+_2)$ value of 160(40) [8] led to a suggestion of triple shape coexistence occurring in ^{96}Sr, with a weakly deformed ground state and two excited 0^+configurations: a deformed and a spherical one, which undergo strong mixing.
Our new experimental study of ^{96}Sr aims to shed light on the inversion scenario via the measurement of transition probabilities in a Coulomb excitation experiment performed at TRIUMF. The ^{96}Sr radioactive ion beam was produced and delivered by the ISAC-II facility. The γ rays from Coulomb-excited states in ^{96}Sr were detected by the TIGRESS spectrometer [9], while the scattered beam ions were detected by the S3 detector of the BAMBINO array [10]. An increase of two orders of magnitude in the statistics of the $2^+_1 \rightarrow 0^+_1$ transition was achieved compared to the previous Coulomb-excitation experiment performed at ISOLDE [5,6]. The population of several states in ^{96}Sr was observed, including the 4^+_1, 0^+_2 and 3^-_1 ones. Finally, our Coulomb-excitation experiment provided as well high-quality data on ^{96}Y, allowing a distinction to be made between single-particle and core-coupled states.
Preliminary results of the ongoing data analysis will be presented.

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Session Classification: Poster Session

Contribution ID: **55**

Ab initio study of 7Li with coupled mass partitions

Lithium plays an important role in nuclear astrophysics, fusion energy generation, and nuclear technology. From a theoretical point of view, the nucleus ^{7}Li presents a remarkable challenge, as its bound states and resonances can be understood as being formed by a ^{4}He and ^{3}H pair, or simultaneously, a single neutron/proton coupled to a ^{6}Li/^{6}He core. In light of this complexity, a consistent description of ^{7}Li bound-state and continuum properties in a unified model presents a significant advancement towards a predictive theory of nuclear structure and reactions. Towards achieving such a predictive description, we carried out calculations for ^{7}Li within the *ab initio* no-core shell model with continuum (NCSMC), which is capable of describing both bound and scattering states in a unified framework, taking into account the mass/charge partitions ^{4}He + ^{3}H, ^{6}Li + n, and ^{6}He + p in a single coupled-channels calculation, using chiral nuclear forces as input. These calculations are the first ever application of the NCSMC with three coupled partitions. I will show the effects of the coupling of the partitions on the spectrum of ^{7}Li and present cross sections of charge-exchange and nucleon-transfer reactions, calculation of which is allowed by the coupling.

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Session Classification: Poster Session

Contribution ID: **56**

Beta-Delayed Charged-Particle Emission from 20Mg

One of the most important nuclear reactions in astrophysics is the 15O(α,γ)19Ne(p,γ)20Na reaction, which provides a possible breakout pathway from the hot CNO cycle in stars. Studying this reaction directly in the laboratory is challenging, instead, an indirect study using β-decay proton and α decays of 20Mg was performed at TRIUMF. The experiment used the Gamma-Ray Infrastructure for Fundamental Investigations of Nuclei (GRIFFIN) to detect gamma rays and, for the first time, the Regina Cube for Multiple Particles (RCMP), a newly developed silicon detector array designed to detect low-energy protons and alpha particles. This setup enables the most sensitive search to date for rare decay branches and gamma-ray transitions from astrophysically important states. This talk will describe the analysis of 20Mg decay and what it can tell us about the resonances that play a key role in stellar nucleosynthesis.

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Session Classification: Poster Session

Contribution ID: **57**

A data-driven approach to learning about nuclear structure

Historically, students entering the field of nuclear structure learn about the topic through encountering models. Often, the order in which models are presented echoes the chronology of discoveries within the topic. Students are then provided with one or two selected examples of nuclear data which strongly support a particular model. In this way, they often fail to achieve a wider understanding of the field or the utility of particular models.

We have been pioneering an alternative pedagogical approach to nuclear structure, starting with the data and seeing how that suggests models rather than reverse. Access to large databases of validated data is a particular feature of nuclear structure, unusual to other fields, and naturally associated with the societal relevance of such data. This abundance of data encourages student-led investigations. It also leads to an appreciation of which models have the widest utility in describing nuclei such as the rotational model while the extreme independent particle model is applicable to very few extant cases. We have developed a series of textbooks that follow this Nuclear Data approach, starting with Nuclear Data: A Primer. This was followed with intermediate level textbooks entitled and Nuclear Data: A Collective Motion View and Nuclear Data: An Independent-Particle Motion View.

In this presentation, we will give an overview of the philosophy beyond our pedagogical approach providing some interesting examples. We will emphasise the potential for future applications of techniques in Data Science and Machine Learning. Such interdisciplinary approaches to the data may lead to new insights especially those driven by students who approach the subject with a fresh pair of eyes.

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Session Classification: Poster Session

Contribution ID: **67**

Decay Spectroscopy of 161Eu with the GRIFFIN Spectrometer

The neutron-rich Gadolinium isotopes around mass A=160 represent a critical region for understanding both nuclear structure and astrophysical nucleosynthesis. These nuclei exhibit large prolate deformations and lie along the freeze-out path of the rapid neutron capture process (*r-process*). Understanding their structure can give insight into the rare-earth abundance peak formation. The odd-mass isotope (N=97) provides a sensitive probe of the single-particle spectrum in this deformed region through its one-neutron excitation experiments relative to the well-studied even-even core. The low-lying single-neutron states have been probed via the ^{160}Gd(d,p) reaction, and several Nilsson configurations were suggested. The study of the excited states via the neutron capture reaction provided very limited information on the gamma-ray decays, and the previous study by beta-decay placed only four transitions in the decay scheme. The present work reports new high-precision measurements of excited states following beta-decay of high-purity beams produced at the TRIUMF-ISAC facility. To avoid molecular and isobaric contamination, IGLIS(Ion Guide Laser Ion Source) was used along with the ISAC mass separator to greatly improve beam purity with two-step laser ionization selecting Eu isotopes only. Using the GRIFFIN high-efficiency gamma-ray spectrometer augmented with the PACES conversion electron spectrometer and beta-particle tagging with the Zero Degree Scintillator, this work has identified 87 new gamma-ray transitions and constructed a level scheme comprising 35 new excited states. The half-life has been remeasured with improved precision. An overview of the experiment and analysis will be provided with these results, providing stringent tests of the Nilsson model in the midshell region and delivering crucial nuclear structure inputs for *r-process* calculations.

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Session Classification: Poster Session

Contribution ID: **71**

Mirror energy differences in $T_z = \mp 3/2$ nuclei ^{45}Cr and ^{45}Sc

Isospin symmetry implies that the nuclear force acts in the same way between proton-proton, neutron-neutron and proton-neutron pairs in the atomic nucleus. To probe this symmetry, it is possible to study the so-called "mirror nuclei" that have interchanged numbers of protons and neutrons and thus should have analogous structures. Leaving aside the Coulomb interaction, the difference in excitation energy of the states characterised by the same isospin in mirror nuclei, called mirror energy differences (MED), are signatures of isospin symmetry breaking [1].
The proton-rich members of the mirror pairs are challenging to to produce and populate in high-spin states. In a recent experiment performed at the Accelerator Laboratory of the University of Jyväskylä the 3-proton excess nucleus ^{45}Cr, a T=3/2 mirror of ^{45}Sc, was studied using the MARA separator [2] and the JUROGAM3 spectrometer [3]. ^{45}Cr was produced in the 3-neutron evaporation channel of the ^{24}Mg+^{24}Mg fusion-evaporation reaction at different beam energies. Although this reaction channel is strongly suppressed in terms of production cross section with respect to the other evaporation channels, the ^{45}Cr evaporation residues were unambiguously identified at the MARA focal plane by exploiting the characteristic β-delayed proton emission decay mode of this nucleus [4].
Previous works investigated the mirror energy differences of the ^{45}Cr-^{45}Sc mirror pair produced in two-nucleon knockout up to the J=11/2 states [5] and carried out a sensitivity study of the MED in positive parity bands [6].
Our work aims at extending the level scheme of ^{45}Cr and comparing our results with predictions from the shell model calculations. The half-life of the $3/2^+$ isomeric state in ^{45}Cr could also be measured in our experiment. In addition to that, the experimental 3-neutron evaporation production cross section for ^{45}Cr was extracted as a function of the excitation energy. The experimental results were compared with the predictions of PACE4 [7] and GEMINI++ [8] fusion-evaporation simulation codes, which produce discordant results that differ for a few orders of magnitude. This result can be particularly useful when planning further experiments in this mass region of the N=Z line.

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Session Classification: Poster Session

Contribution ID: **75**

Lifetime measurements of excited states of ^{210}Pb and ^{200}Pt applying the two-neutron transfer reaction*

Low-spin and low-energy observables give access to the underlying nuclear structure of atomic nuclei. Moderately neutron-rich radioactive isotopes can efficiently be provided by the (^{18}O, ^{16}O) two-neutron transfer reaction. The population of low-spin excited states allows measurements of their γ-ray coincidences and lifetimes, hence, electromagnetic matrix elements.
Improved microscopic understanding of cosmic nucleosynthesis calls for more precise and complete data on neutron-rich nuclei in the mass region around the doubly-magic nucleus ^{208}Pb that serve to constrain microscopic nuclear models [1]. In particular, the $B(E2)\downarrow$ values of yrast transitions of ^{210}Pb partially show discrepancies with shell-model calculations. However, the uncertainty of the adopted $B(E2;2_1^+ \to 0_1^+)$ value [2] was too large to conclusively compare the experimental and theoretical results. Therefore, ^{210}Pb was investigated in an experiment at the 10 MV FN-tandem accelerator at the University of Cologne.
Furthermore, the W, Os, Pt and Hg region of the nuclear chart exhibits phase transitions between oblate, prolate and spherical shapes [3, 4]. The energy ratio $R_{4/2} = E(4_1^+)/E(2_1^+)$ indicates a transition from γ-softness towards sphericity for the Pt isotopic chain when approaching the neutron-shell closure at $N = 126$. ^{200}Pt with $N = 122$ could mark the transitional point between the γ-soft nuclei ^{196,198}Pt and the semi-magical, supposedly spherical ^{204}Pt and was studied at the 9 MV tandem accelerator at the IFIN-HH in Bucharest-Măgurele. Besides the $R_{4/2}$ ratio, the $B_{4/2}$ ratio of the $B(E2)\downarrow$ values of the $4_1^+ \to 2_1^+$ and $2_1^+ \to 0_1^+$ transitions serves as a complementary indicator for nuclear structure.
The $B(E2)\downarrow$ value is inversely proportional to the lifetime of the de-exciting state. Therefore, we performed lifetime measurements applying the recoil-distance Doppler-shift method [5]. Our significantly more precise result for the $B(E2;2_1^+ \to 0_1^+)$ value of ^{210}Pb enhances the comparability to shell-model calculations, underlining a discrepancy in a consistent shell-model description of the $B(E2;2_1^+ \to 0_1^+)$ and $B(E2;4_1^+ \to 2_1^+)$ values [6]. Further, we measured the lifetimes of the 2_1^+ and 4_1^+ states of ^{200}Pt allowing for the calculation of the $B_{4/2}$ ratio, which shows good agreement with the theoretical limit of a spherical nucleus, indicating the structural evolution within the Pt isotopic chain [7, 8].

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Session Classification: Poster Session

Contribution ID: **76**

Emergence of quadrupole collectivity near shell closures

Quadrupole collectivity near shell closures dominates the structure of low-lying excited states. The $B_{4/2} = \frac{B(E2; 4_1^+ \to 2_1^+)}{B(E2; 2_1^+ \to 0_1^+)}$ ratio as a measure of collectivity takes benchmark values in the collective limits of a spherical harmonic vibrator with $B_{4/2}^{\mathrm{vib}} = 2$, or quadrupole-deformed limits with $B_{4/2}^{\mathrm{rot}} = 1.43$, regardless of axial symmetry. For near-magic nuclei with seniority-dominated low-lying states, $B_{4/2}$ can take values even lower than unity. For $^{132}_{52}$Te with its proximity to the $Z = 50$ and $N = 82$ shell closures this quantity will serve as an indicator of the balance between spherical-collective and spherical-seniority dominated structures.

The isoscalar proton-neutron symmetric 2_1^+ state and the isovector mixed-symmetry $2^+_{1,\mathrm{ms}}$ state are predominantly of one-quadrupole phonon character. Therefore, the properties of these states also give insights into the nuclear structure. The isotope ^{132}Te is of particular interest since it is close to and an isobar of the doubly magic ^{132}Sn. With only two valence protons and two valence-neutron holes, the mixing of the respective proton and neutron configurations into the wave functions is of utmost importance, as it constitutes the foundation for more complex collective states when turning to larger valence spaces.

Our recent lifetime measurements at IFIN-HH Bucharest [1] and IKP Cologne [2] on ^{132}Te show emerging collectivity and complement the investigation of mixed-symmetry states in the $N = 80$ isotonic chain. Here the ^{130}Te(^{18}O,^{16}O)^{132}Te two-neutron transfer reaction was employed to produce the radioactive ^{132}Te. Shell model calculations have been performed to compare the contributions of different configurations to the wave function.

In a further study, $^{212}_{88}$Ra is studied which is with $N = 124$ in proximity to the neutron-shell closure at $N = 126$. A radioactive ^{212}Ra ion beam was provided by HIE-ISOLDE to explore the collectivity of its first excited 2^+ state.

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Presenter: MAYR, Hannes

Session Classification: Poster Session

Contribution ID: **81**

Probing the s-process via Exclusive Indirect Measurement of the $^{22}Ne(\alpha,\gamma)^{26}Mg$ Reaction

The slow neutron capture process (s-process) creates almost half of the elements heavier than iron in the universe. One of the most important neutron sources for the s-process is the $^{22}Ne(\alpha,n)^{25}Mg$ reaction, which competes with the $^{22}Ne(\alpha,\gamma)^{26}Mg$ reaction. The current nuclear data for these reactions show great discrepancies. Thus, in order to understand the synthesis of heavy elements, it is crucial to study the ratio between these two reactions.

Using the EMMA mass spectrometer and TIGRESS γ-ray spectrometer at TRIUMF, our goal is to indirectly measure the $^{22}Ne(\alpha,\gamma)^{26}Mg$ reaction. The experiment involves bombarding a LiF target with ^{22}Ne beam. A silicon detector is used to detect light ejectiles, the TIGRESS array is used to detect the γ-rays from the reactions, and the EMMA spectrometer to select the recoils of interest. Different coincidence measurements between the three detectors allows us to measure the particle spectroscopic factors for states above the neutron threshold.

In this talk, I will present the preliminary results and work in progress, as well as the major challenges we face.

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Session Classification: Poster Session

Contribution ID: **82**

Measuring 39K(3He,α)38K with GODDESS to search for energy levels in 38K important for the 37Ar(p,γ)38K reaction rate

The 37Ar(p,γ)38K reaction plays a critical role in determining the abundances of several stable isotopes at the endpoint of rp-process nucleosynthesis in novae. To inform the astrophysical reaction rate of proton capture on 37Ar and guide any future direct measurements, a better understanding of the 38K energy levels above the 37Ar+p threshold is essential. Experimentally, these excited states of 38K just above the proton threshold may be probed through alternative, experimentally-accessible reactions.

To this end, the 39K(3He,αγ)38K reaction in regular kinematics was measured. The ATLAS accelerator at Argonne National Laboratory provided a beam of 3He at 30 MeV/u, which was incident on an enriched potassium-39 target. Gamma rays and charged particles were detected using the GODDESS system, comprised of the Oak Ridge Rutgers University Barrel Array (ORRUBA) for charged particles, and the Gamma Ray Energy Tracking In-beam Nuclear Array (GRETINA) for gamma rays. The spectroscopy provides information on the excited states of 38K, including those near the proton separation energy of 5.2 MeV. Experimental constraints on the energies and spin-parities of low-spin states in this region, which are of astrophysical importance, as well as their implications for the rp-process, will be discussed.

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Session Classification: Poster Session

Contribution ID: **83**

Excitation energies of the low-lying isomeric states in 100-Y and 102-Y

Beta-decaying, spin-trap isomers have been observed in ^{96}Y, ^{98}Y and ^{100}Y with half-lives ranging from 9 to 0.7 seconds [Ab08,Ch20,Si21]. A recent paper [Ca25] has investigated the isomeric-yield ratio in production of all three in fission and observed that, in ^{96}Y and ^{100}Y it is the higher-spin state which is populated more strongly, whereas in ^{98}Y the opposite situation is observed. Moreover, Cannarozzo et al., [Ca25] concluded that in ^{100}Y the higher-spin state is the ground state which is opposite to the ordering in [Si21]. In ^{102}Y there are two beta-decaying states which have similar half lives ($t_{1/2}$ = 360(40) ms [Sh83] and 300(10) ms [Hi91]) and a small energy difference, making it difficult to measure their relative energy. Data measured at the JOSEF recoil separator at Jülich [Sh83] indicates that it is the high-spin state that is preferentially populated in the thermal fission of ^{235}U but it is still unknown whether this is the ground- or isomeric state.
This presentation will report on the use of the Phase Imaging –Ion cyclotron Resonance (PI-ICR) method [El13] at the JYFLTRAP double Penning trap at the IGISOL facility at the University of Jyväskylä, Finland to measure the relative energies of the beta-decaying states in ^{102}Y and re-measure ^{100}Y. The nuclei of interest were produced via induced fission of ^{238}U using a 30 MeV proton beam. In ^{100}Y a value of 147.8(42) keV was measured for the excitation energy of the isomeric state, which overlaps with the previously measured value of 145(15) keV [Ha07] and reduces the experimental error by a factor of 4. In ^{102}Y the closeness in energy of the 2 states makes the analysis quite complicated and although the two states were not fully separated, the observed mass distribution can be fitted with a bi-modal distribution with preliminary analysis indicating an excitation energy of ~10 keV for the isomeric state. Details of the experiment and of the analysis procedures will be discussed.

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Session Classification: Poster Session

Contribution ID: **84**

Nuclear structure of 94Pd at transition-point between the isoscalar and isovector characteristics

Nuclei near the doubly magic nucleus ^{100}Sn ($N = Z = 50$) have been extensively studied to investigate nuclear structure, including shell evolution, seniority effects, and proton–neutron interactions. In this work, ^{94}Pd with $N = Z + 2$ was investigated with a focus on isovector($T = 1$) and isoscalar($T = 0$) neutron-proton pairing using the fast-timing measurement. Half-lives of yrast excited states in ^{94}Pd were measured using isomeric decay spectroscopy. The experiment was performed at RIBF (Radioactive Isotope Beam Factory), RIKEN, where ^{94}Pd ions were produced via in-flight fragmentation of a ^{124}Xe beam impinging on a ^{9}Be target. These ions were implanted into the GARi active stopper array, and isomeric delayed γ rays were detected with the IDATEN fast-timing array consisting of 48 $LaBr_3$(Ce) detectors. The half-lives were determined using the generalized centroid difference method, yielding the $T_{1/2}$ values of ≤ 15 ps, $13(11)$ ps, ≤ 13 ps, $693(72)$ ps, and ≤ 19 ps for the (2_1^+), (4_1^+), (6_1^+), (8_1^+), and (10_1^+) states, respectively. The half-lives of the (2_1^+), (4_1^+) and (10_1^+) states are reported here for the first time, and the uncertainties of the half-lives of the (6_1^+) and (8_1^+) states have been improved compared to previous measurements. Reduced transition probabilities $B(E2)$ were deduced from the measured half-lives and discussed in the context of shell-model calculations employing the JUN45 effective interaction, including $T = 0$, $T = 1$ and full interaction. The results suggest that ^{94}Pd, with $N = Z + 2$, lies in a transitional regime between the $N = Z$ isoscalar-pairing domain (^{92}Pd) and the $N = 50$ isovector-dominated region (^{96}Pd).

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Session Classification: Poster Session

Contribution ID: **85**

Enabling Systematic Nuclear Structure Studies Through Automated Level-Scheme Construction

Recent decades have witnessed exponential growth in both the quality and volume of experimental nuclear data, driven by advancements in detector technologies and accelerator capabilities. Gamma-ray spectroscopy has particularly benefited from these improvements, with large-scale spectrometers such as GRIFFIN and TIGRESS at TRIUMF enabling collection of increasingly complex, high-dimensional datasets containing hundreds of transitions. Level schemes—the excited-state energies and decay pathways of nuclei—are fundamental to nuclear structure research, yet their construction from spectroscopic data remains a months-to-years manual process of visual pattern recognition, coincidence gating, and iterative refinement. This research reformulates level-scheme construction as a constrained inverse problem, taking γ-ray singles spectra and symmetric coincidence matrices as inputs and recovering directed decay networks.

The approach addresses key challenges inherent to real data: the undirected nature of coincidence measurements, irresolvable doublets, missing weak transitions, and detector artifacts. Building on transition-matrix formalism that analytically relates scheme connectivity to measured intensities, we develop a three-stage pipeline: a probabilistic data layer encoding measurement uncertainties, a learned proposal layer that captures structural priors to constrain combinatorial search, and a physics-enforcing inference layer ensuring energy consistency and intensity-flow conservation.

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Session Classification: Poster Session

Contribution ID: **89**

Level Structure and Electromagnetic Transition Character in 158Er from Beta Decay of 158Tm

In nuclei near N~90, low-lying level schemes often contain several unplaced transitions, and many excited states lack definitive spin and multipolarity assignments. This limits the extraction of electromagnetic matrix elements and hinders detailed interpretation of configuration mixing and nuclear structure. The structure of 158Er has been investigated following the β decay of 158Tm using the GRIFFIN spectrometer.
Internal conversion coefficients (ICCs) were determined from measured electron and γ-ray intensities and compared with theoretical values to establish transition multipolarities. Seventeen transitions have been assigned definitive multipolarities, and the spin-parity of twelve excited states were constrained or newly assigned. Six transitions exhibit enhanced ICC values relative to theoretical expectations, indicating multipole mixing with contributions consistent with E0 admixtures; these preliminary results will be presented.

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Session Classification: Poster Session

Contribution ID: **97**

Neutron capture resonance structure and cross section measurements of 243Am

The long-term management of high-level nuclear waste will necessarily involve the transmutation of highly radioactive materials using accelerator-driven systems converting long lived radioactive waste products into short-lived or stable nuclei. Am is the most abundant, long lived radioactive product in high-level nuclear waste, but the neutron capture cross section is known with high-level uncertainty (>10 %), whereas uncertainties of approximately 2% are needed for transmutation.

Such studies presents challenges, including the difficulties of working with actinide materials and the complexity of analyzing the abundant resonance structures. We have made significant progress in producing and handling of actinide targets generally, and Am specifically. We implement solution combustion synthesis methods to make robust targets on a variety of backing materials. An initial measurement at the LANSCE facility, using the DANCE 4π array of 160 BF2 detectors and the neutron time-of-flight technique, showed that the purity of the target can yield precise cross sections, resolving the fine resonance structures in 243Am(n,γ). We intend to present our preliminary results.

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Presenter: TAN, Wanpeng

Session Classification: Poster Session

Contribution ID: **102**

Structure of Neutron-Rich ^{33,34,35}Mg from β Decay Studies

The structure of neutron-rich magnesium isotopes in the vicinity of the so-called Island of Inversion provides a sensitive testing ground for nuclear models and shell evolution far from stability. In this work, we investigate the β decay of ^{33,34,35}Mg using high-efficiency γ-ray spectroscopy in combination with β tagging. The experiment was performed using the GRIFFIN spectrometer at TRIUMF, with radioactive beams delivered by the ISAC facility. For ^{33}Mg, the primary objective is to constrain the spin and parity of its ground state through a detailed study of β feeding to states in ^{33}Al. In particular, the extraction of ground-state feeding and the associated $\log ft$ values provides key information on the allowed or forbidden nature of the transitions, offering insight into the underlying nuclear configurations. The β decay of ^{34}Mg populates excited states in ^{34}Al, a nucleus known for its complex structure and the coexistence of different configurations. We extend previous studies by refining the level scheme and performing γ–γ angular correlation measurements to assign spin and parity to low-lying states. For ^{35}Mg, a comprehensive analysis of β-delayed γ rays has been performed. A new level scheme for ^{35}Al is established based on coincidence relationships and cycle-based decay fitting. From this analysis, β-feeding intensities and corresponding $\log ft$ values are extracted, providing constraints on transition strengths and nuclear structure. Overall, these results contribute to a more coherent picture of shell evolution and configuration mixing in neutron-rich nuclei around $N \approx 20$. These results are compared with shell-model calculations and state-of-the-art *ab initio* approaches to assess the predictive power of nuclear structure models in this region.

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Session Classification: Poster Session

Contribution ID: **105**

Insight on shape coexistence in ^{100}Zr through lifetime measurements at GRIFFIN

The sudden onset of deformation in $A \approx 100$ nuclei at $N = 60$ has been described as a ground-state shape transition that has raised a lot of interest over the years from an experimental and theoretical point of view [1]. This transition is most pronounced in the Zr and Sr isotopic chains where the low-energy excited-state structure shows significant signs of deformation developing at $N = 60$, as opposed to the spherical-like structure observed at $N \leq 58$.

At present, the two most promising theoretical interpretations of this phenomenon are given by the Monte Carlo Shell Model (MCSM) [2] and the Interacting Boson Model with Configuration Mixing (IBM-CM) [3]. The MCSM calculations interpret the structure of ^{100}Zr within a multiple-shape-coexistence scenario with several distinct deformed shapes predicted for the lowest 0^+ states, with rotational bands built on top of them. In contrast, the IBM-CM calculations predict a weakly-deformed "intruder" ground-state configuration in ^{100}Zr, with corresponding β and γ bands, and a low-lying spherical "normal" configuration.

In order to test these theoretical models an experiment was performed at the TRIUMF-ISAC facility to investigate the structure of ^{100}Zr following the β decay of ^{100}Y by utilizing the GRIFFIN γ-ray spectrometer [4]. The 15 HPGe clover detectors of GRIFFIN were coupled with seven $LaBr_3$ detectors for fast-timing lifetime measurements, and the PACES array for conversion electrons.

Mainly low-spin excited states were populated in the β decay of the 1^- state in ^{100}Y. This allowed for the lifetimes of several key non-yrast excited states in ^{100}Zr, including those of the 2^+_2 and 0^+_3 states, to be extracted for the first time in this study using the Generalized Centroid Difference method. These new results will be presented and compared to the MCSM and IBM-CM theoretical predictions. Evidence supporting the shape-coexistence scenario in ^{100}Zr will be presented, together with the notable structural similarities between ^{100}Zr and ^{98}Sr.

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Session Classification: Poster Session

Contribution ID: **111**

Study of Multiple Shape Coexistence in 110Cd

Cd isotopes, particularly ^{110,112}Cd, have long been considered the best examples of nuclei with vibrational behaviour. However, recent studies challenge this interpretation, suggesting that Cd isotopes possess characteristics of multiple shape coexistence. To further investigate this issue, a series of β-decay experiments were conducted to improve the spectroscopic information on ^{110,112}Cd. The obtained results will be crucial for the complementary Coulomb-excitation studies that aim to determine the intrinsic shapes of low-lying 0^+ states.

The current work examines the nuclear structure of ^{110}Cd through the $\beta-$ decay of ^{110}Ag and the $\beta+$/EC decay of ^{110}In conducted at the TRIUMF-ISAC facility. The radioactive-ion beams of ^{110}Ag and ^{110}In were delivered to a mylar tape located at the centre of the GRIFFIN spectrometer, which consisted of 15 HPGe clover detectors with BGO Compton-suppression shields.

The obtained γ-γ coincidence data was used to construct a level scheme of ^{110}Cd, to confirm previously observed in-band transitions, and to seek evidence for rotational bands in ^{110}Cd. In this presentation, selected preliminary results and key findings will be discussed.

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Session Classification: Poster Session

Contribution ID: **113**

Coulomb excitation of 110Cd studied with AGATA at LNL

For several decades, stable even-mass Cd isotopes have been considered to be textbook examples of multiphonon spherical vibrators [1] based on the excitation energy pattern of their low-lying states. However, a detailed study of ^{110}In β decay and subsequent beyond-mean-field theoretical calculations [2-6] suggested instead the presence of multiple shape coexistence in the ^{110}Cd and ^{112}Cd isotopes. To verify this hypothesis, it is essential to determine the shapes of low-lying 0^+ states in stable even-even Cd nuclei. The Coulomb-excitation method [7], which enables a model-independent analysis of nuclear shapes through the use of quadrupole sum rules [7], provides a powerful tool for this type of research.

The Coulomb excitation of ^{110}Cd using a 187-MeV ^{60}Ni beam was performed at the National Institute for Nuclear Physics - Legnaro National Laboratories, Italy [8]. This experiment was a part of a broader program focused on systematic Coulomb-excitation studies of ^{110}Cd initiated with measurements using ^{14}N and ^{32}S beams at the Heavy Ion Laboratory, University of Warsaw [6]. The program also included a measurements with a heavier reaction partner ^{208}Pb, which was performed at Argonne National Laboratory, USA [9].

The ^{60}Ni + ^{110}Cd experiment was carried out using the AGATA γ-ray tracking spectrometer [10,11] and the particle detection array SPIDER [12]. In total 20 states of both negative and positive parities were populated up to 3.2 MeV of excitation energy, including, in particular, the 0^+_3 state at 1731 keV. The on-going analysis focuses on the extraction of the γ-ray intensities from which a set of electromagnetic matrix elements in ^{110}Cd will be obtained, including quadrupole moments of excited states. This will provide insight into the nuclear shape of the 0^+_2 and 0^+_3 states. The quadrupole deformation parameters for the $0^+_{1,2}$ states obtained from the experiments with the ^{14}N and ^{32}S beams will be presented, along with preliminary results of the analysis of the AGATA data.

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Session Classification: Poster Session

Contribution ID: **114**

Towards determination of distribution of magnetization in 48K using b- NMR technique and nuclear DFT approach

Following the N=28 shell closure, a noticeable change in the slope of the charge radii, often called a "kink", has been observed in neutron-rich calcium isotopes [1,2]. However, the exact size of this kink and its underlying causes remain unclear. Theoretical predictions suggest that several factors might contribute to this behavior, including the presence of large nuclear deformations or significant radial extensions of the nuclear density distribution. To address these questions and explore the origins of the observed kink, we will determine the distribution of magnetization, specifically the differential hyperfine anomaly (also known as Bohr-Weisskopf effect), for 48K. This will be compared with the corresponding distributions in the neighboring isotopes 47K and 49K. To achieve this, we employed the b-Nuclear Magnetic Resonance (NMR) technique [3] to measure the precise magnetic moments of these isotopes. Additionally, laser-rf double resonance spectroscopy [4] will be used to determine the hyperfine structure constant (A) with high accuracy.

The data interpretation will be done with the help of nuclear density functional theory approach with angular momentum symmetry restoration [5] to analyze the variation in these moments across different angular momentum projections and mass. We employ the Hartree-Fock- Bogoliubov formalism to determine the magnetic dipole moments of the isotopes using HFODD code [6]. The spectroscopic moments are then compared with the experimental measurements. The recent results from the experiment will be presented. These findings serve as a benchmark for neutron-rich odd-odd isotopes.

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Session Classification: Poster Session

Contribution ID: **120**

Critical need for DSAM lifetime re-evaluations

The structure of fp shell nuclei has been the subject of intensive study for many decades. These nuclei remain of crucial importance because they provide a foundation for studies of neutron-rich nuclei currently being investigated at facilities such as FRIB (e.g. [1]). Within the fp shell, large-basis shell model calculations, wherein both protons and neutrons occupy the $0f_{7/2}$, $1p_{3/2}$, $0f_{5/2}$, and $0p_{1/2}$ orbits, are now routine, and can be tested against a considerable body of data [2]. Electromagnetic transition strengths provide a primary set of observables to test shell model wavefunctions, which are usually based on effective interactions derived from fits to energy levels [2].

Through the late 1960s to the early 1980s the lifetimes of many excited states in the fp shell were measured by the Doppler-shift attenuation method (DSAM) with the required stopping powers evaluated using the theory of Lindhard, Scharff and Schiott (LSS) [3]. It was recently discovered [4] that the anomalously strong literature value [5] for the experimental strength of the $4_1^+ \to 2_1^+$ transition in ^{58}Fe could be attributed to the use of LSS electronic stopping powers in Doppler-shift measurements, which for the case of ^{58}Fe stopping in tantalum, differ by a factor of two from more recent values given by SRIM [6]. Woodside *et al.* [4] re-evaluated the 1978 DSAM lifetime measurement on ^{58}Fe [7] with the LSS stopping powers replaced by values from SRIM, which brought the transition strength of the $4_1^+ \to 2_1^+$ transition into agreement with shell model calculations [2].

This example is unlikely to be unique: we have therefore begun to re-evaluate historical DSAM measurements that used LSS stopping powers. One outcome is a re-evaluation of effective charges applicable for the fp shell. For example, Honma *et al.* [2] adopted the standard $e_p = 1.5$ and $e_n = 0.5$ in their comprehensive test of the GXFP1 interaction, whereas re-evaluated lifetimes in ^{54}Cr strongly favor the "universal" effective charges $e_p = 1.33$ and $e_n = 0.45$ recently proposed for the sd and fp shells by Ogunbeku *et al.* [1].

An overview of the progress and implications of this work will be given, including an evaluation of the impact of historical DSAM lifetime data on extracted electric monopole ($E0$) transition strengths such as those in the Ni isotopes [8].

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Session Classification: Poster Session

Contribution ID: **121**

Experimental Study of Low-Spin States in ^{42}Ca and ^{44}Ca as a Probe for Shape Coexistence

Nuclear shape coexistence plays a crucial role in understanding the microscopic origin of nuclear deformation [1-4].
In this respect, the Ca isotopic chain between the shell closures at N=20 and N=28 is an optimal test
area where different theoretical approaches can be used and their predictions compared with experimental data (\textit{e.g.} large-scale Shell Model calculations, Density Functional Theory and \textit{ab-initio} methods [5-7]).\\
In this work, we report on high-precision low-spin gamma-ray spectroscopy of even-even ^{42}Ca and ^{44}Ca nuclei populated via thermal neutron capture reactions at the Institut Laue-Langevin (ILL).
In both ^{42}Ca and ^{44}Ca, the presence of 0^+ excitations associated with deformed and superdeformed structures has already been demonstrated [8,9], however, further investigation is still essential to study other possible excitations associated with deformed configurations.
This is a complementary study to the existing analysis on the odd systems ^{41,47,49}Ca [10], already published by this collaboration, and it aims to track the evolution of the nuclear structure along the Calcium isotopic chain.\\
^{42}Ca and ^{44}Ca were populated via (n$_{th}$, γ) reaction on CaCo$_3$ targets, including one enriched with radioactive ^{41}Ca.
The γ cascades depopulating the neutron-capture states, located at 11.5 MeV and 11.1 MeV, respectively, were detected by the HPGe FIPPS array [11].
Employing γ-γ and γ-γ-γ coincidence techniques, the level schemes of ^{42}Ca and ^{44}Ca were significantly expanded by adding 10 and 56 new levels and 109 and 610 new transitions, respectively.
These results will be presented together with preliminary studies on γ-γ angular correlations to establish the spin and parities of excited states.
Comparison with Shell Model calculations will also be discussed.

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Session Classification: Poster Session

Contribution ID: **127**

Probing Spin-Triplet Pairing Through Nuclear Mass Measurements

Nuclear masses are fundamental observables that give insight into nuclear structure, fundamental interactions, and astrophysics. Pairing gaps are an experimental observable that can be extracted from nuclear mass data and can show exotic nuclear behavior, especially for odd-even staggering and pairing effects. These pairing gaps can also provide information about nuclear deformation and the existence of the exotic state of matter known as spin-triplet pairing, especially near the $N = Z$ and $A \approx 130$ region.

Multiple-Reflection Time of Flight Mass Spectrometry (MR-TOF-MS) provides high mass separation power in a short amount of time by bouncing ions between electrostatic mirrors. This increases the flight path of trapped ions, allowing ions of different mass but injected with the same energy to separate. The high mass resolving powers and short storage times have contributed to MR-TOF devices becoming common for beam purification and mass spectrometry in Rare-Isotope-Beam and accelerator facilities around the world. To search for the nucleon spin triplet pairing, we used the TRIUMF Ion Trap for Atomic and Nuclear science (TITAN) MR-TOF-MS to measure several samarium, europium, cerium, and lanthanum isotopes in the specified region.

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Session Classification: Poster Session

Contribution ID: **128**

Measurement of the 18O(α, γ)22Ne reaction to constrain the structure properties of 22Ne resonances

Half of the elements heavier than iron in the universe are synthesized by the slow neutron capture process (s-process), which occurs in asymptotic giant branch (AGB) stars and in massive stars. The $^{18}O(\alpha, \gamma)^{22}Ne$ reaction is a key link in determining the availability of ^{22}Ne in the stellar environment, which affects the amount of neutrons available for the s-process through the $^{22}Ne(\alpha, n)^{25}Mg$ reaction. The nuclear parameters of some of the excited states in ^{22}Ne play a key role in determining the thermonuclear reaction rate. The $^{18}O(\alpha, \gamma)^{22}Ne$ reaction was measured in inverse kinematics for the first-time using the DRAGON recoil separator at TRIUMF, Canada's particle accelerator centre. We studied resonance states in ^{22}Ne with excitation energies of 10.28 and 10.29 MeV to measure their structure information, namely strengths and energies, which will be compared with the available nuclear data. In this talk, I will present the scientific motivation, the experimental setup, and progress on the analysis for obtaining the resonance strengths and energies. I will also discuss potential future plans for additional measurements of the $^{18}O(\alpha, \gamma)^{22}Ne$ reaction with DRAGON.

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Session Classification: Poster Session

Contribution ID: **130**

Target Fragmentation in Hadron Therapy: direct and inverse kinematic measurements

Particle therapy with protons and heavy ions relies on a precise understanding of nuclear interactions in tissue. In this context, nuclear fragmentation processes, in particular target and beam fragmentations, play a crucial role, producing secondary fragments with high linear energy transfer and impacting dose deposition and radiobiological effectiveness. However, at present fragmentation cross sections in the therapeutic energy range remain insufficiently constrained.

The FOOT (FragmentatiOn Of Target) experiment is designed to perform high-precision measurements of nuclear fragmentation cross sections in the 50-700 MeV/n energy range, with a target uncertainty of ~5%. Using inverse kinematics with 16O and 12C beams on C and C2H4 targets, FOOT investigates reaction mechanisms and fragment production over a broad charge range. This approach overcomes the intrinsic limitation of direct kinematics, where low-energy target fragments typically stop within the target material and remain experimentally inaccessible. First results obtained with 200 and 400 MeV/n 16O beams will be presented.

The possibility of performing the first direct measurement of target fragmentation induced by proton beams is being explored by the DAMON (Direct meAsureMent of target fragmentatiON) project, which has been funded by the European Union - Next Generation EU, Mission 4 Component 1, CUP H53D23001090006. DAMON employs Nano-Imaging Trackers (NITs), based on ultra-fine nuclear emulsion films with nanometric AgBr crystals, which provide sub-micrometre spatial resolution. This enables the reconstruction of short tracks from low-energy recoils and target fragments directly at the production point, without relying on kinematic boosting. The direct kinematics configuration is essential to access the genuine topology and phase space of proton-induced target fragmentation, providing observables that are otherwise inaccessible and offering a fully complementary perspective to inverse kinematics measurements. Exposures have been performed with proton beams in the 70-211 MeV range at several facilities: Trento Proton Therapy Center (Trento, Italy), CNAO (Pavia, Italy), HIMAC (Chiba, Japan) and the Nagoya Proton Therapy Center (Nagoya, Japan). The first results demonstrate the potential of NIT technology for precision studies of proton-induced nuclear fragmentation.

Results from both experiments provide new constraints on reaction channels and fragment yields in light-ion interactions with tissue-equivalent materials, contributing to a more accurate description of nuclear processes at therapeutic energies and offering relevant input for both nuclear reaction modelling and applied nuclear physics.

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Session Classification: Poster Session

Contribution ID: **131**

Fusion-evaporation Cross-section Measurements Near 56Ni Using TIP and TIGRESS at TRIUMF

The study of exotic, short-lived nuclei far from the valley of stability is crucial for the exploration of nuclear structure and nucleosynthesis. To fulfill these pursuits, fusion-evaporation reactions serve as an essential reaction mechanism for accessing exotic nuclei such as those near the proton drip line. However, the tools available for predicting fusion-evaporation reaction cross-sections — and thus making accurate reaction rate predictions for new experiments — have been found to overestimate by an order of magnitude. To address this, fusion-evaporation cross-section measurements are being made via comparison against observed gamma-ray peaks from Coulomb excitation.

This presentation will begin by introducing an experiment conducted at TRIUMF, Canada's particle accelerator centre, which used: the TRIUMF-ISAC Gamma-Ray Escape Suppressed Spectrometer (TIGRESS) for gamma-rays; the CsI Ball array in the TIGRESS Integrated Plunger (TIP) for charged particles; a calcium target with a thick gold backing; and a high-intensity stable beam of 20Ne to access the region near doubly magic 56Ni via 40Ca(20Ne,XaYp) reactions. The majority of the presentation will centre on the methodology used to measure fusion-evaporation cross-sections in the absence of a continuously-monitored beam intensity by combining the well-known Coulomb excitation formalism, theoretical fusion-evaporation angular distributions, and efficiency-corrected relative gamma-ray intensities. Results will be presented and discussed.

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Session Classification: Poster Session

Contribution ID: **132**

Coupling of TIGRESS and EMMA with Auxiliary Array TIP at TRIUMF

Work has been conducted at TRIUMF, Canada's particle accelerator centre, to combine the capabilities of the TRIUMF-ISAC Gamma-Ray Escape Suppressed Spectrometer (TIGRESS) for gamma-rays, the CsI Ball array in the TIGRESS Integrated Plunger (TIP) for charged particles, and the ElectroMagnetic Mass Analyzer (EMMA) for recoil-mass spectrometry. This trio allows for an entirely new suite of measurements using fusion-evaporation, radiative-capture, and transfer reactions. This presentation will discuss the selectivity achieved by coupling TIGRESS and EMMA alongside a suite of auxiliary detectors housed within TIGRESS such as TIP. This combination of apparatus opens up a range of new studies into nuclear structure and astrophysics by enabling high-energy-resolution gamma-ray spectroscopy and reaction measurements of weak fusion-evaporation channels in the presence of dominant background reactions. The combined capabilities of TIGRESS, EMMA, and TIP in the context of a fusion-evaporation study of the region near doubly magic 56Ni without the requirement of neutron spectroscopy will be the core topic discussed.

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Session Classification: Poster Session

Contribution ID: **133**

Characterization of high-spin states in neutron-rich Au isotopes near N=126: Regularities and inheritances

The interplay between single-particle and collective degrees of freedom in atomic nuclei constitutes a fundamental aspect in quantum many-body physics, particularly manifest in odd-nucleon systems where unpaired nucleons couple to the even-even core. The region southwest of 208Pb offers a rich landscape for such studies. For example, across the Au isotopic chain, isomeric bands based on πh11/2 and πh11/2 ⊗ νi13/2 configurations in odd-even and odd-odd Au, respectively, provide a systematic probe of how high-j unique-parity nucleons couple to the core. However, neutron-rich Au isotopes approaching N = 126 remain largely unexplored, where decoupling or weak-coupling limits are expected. Investigating the high-spin structure of these nuclei is therefore of considerable interest. Furthermore, detailed spectroscopic knowledge in this region is valuable for astrophysical r-process calculations, particularly for constraining first-forbidden β-decay rates.

Producing neutron-rich nuclei in this region and achieving unambiguous particle identification pose significant experimental challenges. To address the difficulties, MNT reactions between a 136Xe beam (7 MeV/u) and a 198Pt target were employed at GANIL, combined with a suite of complementary spectrometers. Projectile-like fragments (PLFs) were fully identified using the VAMOS++ spectrometer, and the corresponding target-like fragments (TLFs) near N ≈ 126 were selected based on isotopically identified PLFs and reconstructed excitation energies. Prompt γ rays were detected with AGATA, a state-of-the-art HPGe tracking array, enabling high-spin spectroscopy of the TLFs. Additionally, CATLIFE—a time-of-flight spectrometer coupled with the EXOGAM HPGe array—was employed to measure delayed γ rays and determine TLF mass numbers prior to neutron evaporation, providing crucial independent fragment characterization. A novel kinetic-energy calibration method based on supervised machine-learning techniques was implemented for the VAMOS++ data, improving ion charge-state identification at energies near the Bragg peak.

In this contribution, we will report new results on the high-spin structure of 195-202Au isotopes. New level schemes have been constructed and known structures extended above the long-lived isomers. Notably, new $(25/2^+)$ isomers in 199Au and 201Au have been identified, with half-lives of T1/2 = 140(20) μs and 15.2(29) μs, respectively. The excitation energies in the Au isotopes reflect structures inherited from corresponding states of the neighboring Hg cores and evolve consistently across the extended isotopic chain. A local dip in the level-energy systematics, deviating from the monotonic trend toward the N = 126 shell closure, is observed at N = 119. Furthermore, our measurements reveal the disappearance of the odd-J mirror bands in the level schemes of odd-odd Au isotopes for N ≥ 117. These experimental findings, interpreted within the framework of large-scale shell-model calculations, advance our understanding of the interplay between high-j orbitals and the collective core near the N = 126 shell closure.

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Session Classification: Poster Session

Contribution ID: **136**

Developments for nuclear structure studies of heavy nuclides using the mass spectrometer SHIPTRAP

Super-heavy elements (Z > 103) owe their existence to nuclear shell effects and deformations of the nucleus, which stabilize the nucleus against Coulomb repulsion [1]. Direct mass measurements of isotopic and isobaric chains of these nuclides using Penning traps [2] can quantify the strength of these nuclear shell effects, allowing us to map nuclear shell evolution. Additionally, precise mass measurements can complement decay spectroscopy studies by measuring the excitation energy of low-lying, long-lived isomeric states.
The SHIPTRAP experiment studies transuranic nuclei produced via fusion-evaporation reactions at rates below one particle per hour. These measurements are possible thanks to technical developments carried out in the last few years such as a cryogenic buffer-gas stopping cell and the high-precision phase-imaging ion-cyclotron-resonance technique. These have already enabled the study of exotic nuclides with production cross sections on the order of 10 nb with SHIPTRAP [3].
To complement previous measurements, mass measurements of long-lived isotopes in Cm-Fm region can contribute to asses the size of the deformed neutron shell gap at N=152 as a function of the proton number. These can be accessed using a recoil ion source.
In this contribution, the development of a new recoil-ion source branch for SHIPTRAP, dedicated to the offline study of long-lived isotopes will be discussed. It consists of a compact gas cell that uses nonlinear electric fields to stop and transport recoil ions, coupled to a cooler-buncher RFQ to provide cooled ions for Penning trap mass spectrometry.

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Session Classification: Poster Session

Contribution ID: **142**

Precision mass measurement of barium isotopes and implications for double beta decay

Double β (2β) and double electron capture (ECEC) decays are active areas of research, and confirmation of a neutrinoless decay channel would identify the neutrino as a Majorana particle. The half-lives of these decay modes depend sensitively on the masses of the parent and daughter isotopes as the Q-value determines both the resonant enhancement of neutrinoless ECEC decays [1] and the available phase space in standard ECEC decays [2]. Many candidate isotopes for such decays have yet to be observed experimentally.

We measured the nuclear masses of ^{132}Ba and ^{134}Ba with the JYFLTRAP double Penning trap mass spectrometer via the Phase Imaging Ion Cyclotron Resonance (PI-ICR) technique. Stable barium ions were produced using a plasma discharge ion source, mass-separated with a magnetic dipole, and then bunched in the radio-frequency quadrupole trap (RFQ) before injection into JYFLTRAP. We present a mass measurement of a double electron capture (ECEC) decay candidate (^{132}Ba) and discuss its relevance to the resonantly enhanced neutrinoless ECEC decay mode, as well as an updated calculation of the available phase space in two-neutrino ECEC decay.

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Session Classification: Poster Session

Contribution ID: **144**

Study of key ^{57}Ni(p,γ)^{58}Cu resonances and their impact on nucleosynthesis in supernovae

The ^{57}Ni(p,γ)^{58}Cu reaction rate significantly impacts nucleosynthesis in various astrophysical sites. Perhaps most importantly, it impacts the production of the observable isotope ^{44}Ti in core-collapse supernovae (CCSNe). Despite the importance of this reaction, no experimental rate previously existed for ^{57}Ni(p,γ)^{58}Cu. To experimentally constrain this rate, the structure of ^{58}Cu was probed via the ^{58}Ni(^{3}He,t)^{58}Cu reaction using two complementary measurements. The first measurement utilized GODDESS (GRETINA ORRUBA Dual Detectors for Experimental Structure Studies) at Argonne National Laboratory's ATLAS facility, and the second measurement utilized the Enge split-pole spectrograph at the University of Notre Dame's Nuclear Science Laboratory. These measurements precisely determined level energies of ^{58}Cu and constrained the level spins. The structure information provided by these measurements was used to arrive at the first experimentally constrained rate for ^{57}Ni(p,γ)^{58}Cu, and the impact of this newly-constrained rate on the production of ^{44}Ti in CCSNe was investigated via nuclear network calculations. Experimental procedures, analysis, and results will be presented.

This work is supported by the University of Notre Dame, U.S. Department of Energy (DOE), National Science Foundation, National Nuclear Security Administration, and DOE Office of Science Graduate Student Research program. This work used the resources of Argonne National Laboratory's ATLAS facility.

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Session Classification: Poster Session

Contribution ID: **147**

Coupled Alpha/Beta/Gamma Detection at SFU with SCI-CASTER and the 8Pi Spectrometer

The Simon Fraser University Nuclear Science Laboratory (NSL) is home to the SCI-CASTER project, which aims to develop position-sensitive ionization chamber detector technologies for precision charged particle measurements. Modern waveform digitization and analysis methods enable this by allowing for the direct application of the Shockley-Ramo theorem to the induced charge signals of the ionization chamber, yielding measurements of charge drift times and track proximity to detector electrodes.
Additionally, refurbishment of the 8Pi gamma-ray spectrometer array has been underway at the NSL to bring all 132 inner-layer Bismuth Germanium Oxide (BGO) scintillator detectors and 20 outer-layer Compton-Suppressed Spectrometers (CSS) to full operation with modern amplification, high-voltage, and data acquisition hardware. To date, the BGO inner-layer has been brought to full performance.
The combination of a SCI-CASTER detector with the 8Pi spectrometer will in principle allow coupled alpha/beta/gamma spectroscopy to be carried out at SFU, resulting in the full characterization of long-lived isotope decay chains and enhancing minute sample contamination detection through the application of high-efficiency and high-precision data acquisition. The in-progress design of the proposed SCI-CASTER detector will be presented, alongside intermediate results of the simulation and prototype testing phases of the project.

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Session Classification: Poster Session

Contribution ID: **151**

Benchmarking Interaction Ordering in GRETINA Using Doppler-Corrected Energies and Linear Polarization

Accurate identification of γ-ray interaction sequences in highly segmented HPGe detector arrays is critical for extracting nuclear structure observables. In particular, the determination of the first and second interaction points directly impacts Doppler correction and linear polarization measurements. However, ambiguities in interaction ordering remain a key limitation in current analysis approaches.

We present a framework for benchmarking interaction ordering in the GRETINA array using physics-driven observables. Doppler-corrected γ-ray energy resolution is used as a diagnostic for the accuracy of first interaction point identification, while linear polarization sensitivity provides a complementary probe of second interaction point reconstruction.

Initial studies demonstrate that these observables provide stringent and independent constraints on interaction ordering, enabling quantitative comparison between reconstruction approaches. This methodology establishes a direct link between detector-level reconstruction and experimentally accessible physics quantities.

These benchmarks provide a pathway for systematically improving interaction ordering and extending the sensitivity of γ-ray spectroscopy measurements, particularly for weak transitions and polarization observables in complex datasets.

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Session Classification: Poster Session

Contribution ID: **153**

Probing transitional structure and collectivity in neutron-deficient 158Er

The rare-earth region provides an ideal testing ground for nuclear structure evolution, where enhanced collectivity and low-lying 0⁺ states challenge simple models and require additional degrees of freedom such as triaxial and octupole deformation. Much of the existing experimental data, however, is concentrated in the stable Nd–Dy region, and it remains unclear whether these models can be extended to higher proton numbers.

Neutron-deficient erbium isotopes provide access to the N~90 transitional region at higher proton numbers, where experimental data are scarce and theoretical descriptions remain largely untested. In this region, while the ground-state band evolves smoothly toward the N=82 shell closure, the excited 0⁺ band exhibits a minimum in energy at N=90, indicating a change in structure and possible mixing of different configurations across ^{156,158,160}Er.

A Coulomb-excitation experiment has been performed at TRIUMF using a radioactive ¹⁵⁸Er beam with γ rays detected by TIGRESS. Combined with complementary new data from β-decay, the analysis aims to extract precise E2 matrix elements between the ground state band and the K = 0,2 bands of 158Er, to distinguish between collective and quasiparticle excitations, constrain band structure and possible triaxiality, and determine model-independent shape parameters using Kumar–Cline sum rules. GOSIA analysis is in progress, and preliminary results provide insight into the structure and collectivity of ¹⁵⁸Er.

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Session Classification: Poster Session

Contribution ID: **154**

Development of an Ion Transport and Identification System for Barium Tagging in Liquid Xenon Neutrinoless Double Beta Decay Experiments

Neutrinoless double beta decay ($0\nu\beta\beta$) is a hypothetical, lepton-number-violating process which, if observed, would confirm the Majorana nature of the neutrino. A proposed next-generation experiment searching for this decay in liquid xenon (LXe) is nEXO, anticipated to deploy 5 tonnes of LXe enriched to 90% in the double beta decay ($2\nu\beta\beta$) isotope ^{136}Xe, targeting a half-life sensitivity beyond 10^{28} years. A unique possibility with experiments such as nEXO is the possibility to access the detector volume to probe for the presence of the ^{136}Ba daughter produced in a candidate decay. This technique, referred to as barium tagging, will provide confirmation of $0\nu\beta\beta$ on an event-by-event basis, reducing backgrounds down to the Standard Model-allowed $2\nu\beta\beta$ channel.

We present a summary of the Ba-tagging scheme being initially developed as an upgrade path for the nEXO experiment, with a focus on the development of the ion extraction and identification system. The system includes an RF-only ion funnel for transporting the Ba^+ from a high-pressure xenon gas environment to vacuum environment where it can then be trapped. The trapped Ba^+ can subsequently be identified via laser fluorescence spectroscopy. The system also includes a multiple-reflection time-of-flight mass spectrometer to confirm the presence of $^{136}Ba^+$ and enable systematic studies of ion extraction and transport using other ion species.

We will describe the overall tagging scheme and operating principles, the status of the R&D efforts and the near-term goals towards realizing a complete demonstration of single-ion extraction from LXe. These efforts aim to benchmark the overall performance of this Ba-tagging scheme and quantify the overall gain in discovery reach through its implementation in next-generation liquid xenon neutrinoless double beta decay searches.

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Session Classification: Poster Session

Contribution ID: **156**

In-source laser spectroscopy of ground- and isomeric states of neutron-rich polonium with LIST

The Isotope Separator On Line DEvice (ISOLDE) is a facility for the production and study of radioactive ion beams at CERN. The Laser Ion Source and Trap (LIST) of the Resonance Ionization Laser Ion Source (RILIS) enables access to isotopes that otherwise suffer from strong isobaric contamination [1,2].
We report the continued study of neutron-rich polonium ($Z = 84$) isotopes through in-source laser spectroscopy with LIST, where improved suppression of isobaric francium contamination enabled extension of measurements up to ^{220}Po. Alpha-decay spectra were recorded with the ISOLDE Decay Station (IDS) with sufficient resolution to distinguish between polonium ground and isomeric states as well as isobaric contaminants.
From isotope shifts and hyperfine structure in atomic transitions, the changes in mean-squared charge radii $\langle r^2 \rangle$ and the magnetic dipole and electric quadrupole moments of ^{219,220}Po ground states and the high-spin isomers ^{211m,212m}Po were extracted for the first time. For $^{204,206\text{-}211,217,218}$Po, the obtained values agree with literature [2-6]. Comparison to single-particle and empirical moments calculated with the additivity relation suggests a marked difference in $\nu 1i_{11/2}$ occupation between the isomeric and ground states of ^{211,212}Po. According to several DFT calculations [7,8], occupation of this orbital determines the kink in the $\langle r^2 \rangle$ at $N = 126$.
The LIST furthermore enabled the first detailed spectroscopy of ^{219,220}Po with IDS and the Alpha SETup (ASET), and a summary will be presented.

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Session Classification: Poster Session

Contribution ID: **159**

Towards a Revised Picture of Octupole Structure in Neutron-Rich ^{148}Ba

Octupole deformation in Barium isotopes has been experimentally established up to N=90 [1,2], with more recent evidence extending this behavior up to N=94. Symmetry-conserving configuration mixing (SCCM) calculations confirm an evolution toward increasingly quadrupole-deformed shapes accompanied by sustained octupole correlations in this region[3].

New spectroscopic information was obtained using the GRIFFIN spectrometer on neutron-rich ^{148}Ba isotope following the β-decay from ^{148}Cs. Particular attention is given to a tentative $(3-)$ state, whose structure is re-examined in light of the new data. The observed decay patterns suggest that this assignment may involve a more complex configuration, potentially reflecting mixing between states of different character. Additionally, gamma-ray transitions are investigated with the aim to further refine the level scheme.

Ongoing analysis aims to clarify the nature of this state and its role in the emerging picture of octupole collectivity. The results are discussed in the context of isotopic and isotonic systematics, providing insight into the evolution of quadrupole deformation and octupole correlations in this mass region.

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Session Classification: Poster Session

Contribution ID: **160**

Precision Mass Measurements of Neutron-Rich Sb Isotopes and Structure Evolution Beyond N=82

The neutron-rich Sb isotopes beyond the N=82 shell closure provide a sensitive testing ground for nuclear structure far from stability. Precision mass measurements in this region are key inputs for studying neutron pairing, the evolution of two-neutron separation energies, and the possible emergence of a subshell closure at N≈90.
The Multiple-Reflection Time-of-Flight Mass Spectrometer (MR-TOF-MS) at TITAN-TRIUMF is particularly well suited for accessing such short-lived and weakly produced isotopes. Its fast measurement cycles, high resolving power, and sensitivity enable measurements on the millisecond timescale at yields well below one ion per second, while simultaneously suppressing isobaric contaminants.
In this work, we report mass measurements of neutron-rich $^{136-140}$Sb performed with the TITAN MR-TOF-MS, including first-time measurements of $^{139-140}$Sb. These results offer new insights into nuclear structure beyond N=82.

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Session Classification: Poster Session

Contribution ID: **175**

Calibration of ^{120}Sn Spectroscopic Data Obtained from Thermal Neutron Capture at FIPPS

The semi-magic Sn ($Z = 50$) isotopes near the neutron mid-shell ($A = 112$–122) exhibit the phenomenon of shape coexistence, in which the proton 2p-2h excitation is associated with the presence of multiple deformed nuclear shapes within a low and narrow range of energies [1]. In recent experiments, thermal neutron capture reactions have been used to study the isotopes ^{116,118}Sn [2,3]. The expected $J^{\pi} = 0^{+}$ and 1^{+} capture states allow for direct transitions from the neutron separation energy (S_n) to lower-lying 0^{+} and 2^{+} levels of interest [2].

We report the progress of our analysis of the γ-ray spectroscopic data of ^{120}Sn produced from the thermal neutron capture an enriched sample of ^{119}Sn. The experiment was performed at the Institut Laue-Langevin using the FIPPS spectrometer, which consists of a ring of 8 Compton-suppressed HPGe clover detectors positioned at 90° to a thermal neutron beamline [4]. Drift corrections were performed with the Cross-Correlation Correction Method [5]. Energy calibrations were performed using known peaks of ^{120}Sn as well as high-energy primary S_n transitions of ^{120}Sn ($S_n = 9104.1 \pm 1.1$ keV) and contaminants [6,7].

The calibrated γ-singles spectrum contains 9.5 billion events and has an energy resolution of 2.5 keV at 1.4 MeV. 14 primary transitions have so far been identified, including those that populate low-lying 0^{+} and 2^{+} states, and we expect to establish new transitions and excited states over a wide range of energies.

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Session Classification: Poster Session

Contribution ID: **176**

Investigating Negative-Parity States in ^{118}Sn with GRIFFIN

The Sn isotopes have the largest number of stable isotopes of any element; this is largely due to their semi-magic nature (Z=50). They span two neutron shell closures (N=50 to N=82), with 10 stable isotopes between ^{112}Sn and ^{124}Sn. This makes them a great laboratory for testing theoretical models as well as investigating changes in nuclear properties with varying neutron number. Much can be said about positive-parity states, such as how shape coexistence in ^{118}Sn and its neighbouring isotopes is manifested in the observation of ground state positive-parity bands in the vicinity of deformed rotational bands at low energies [1]. On the other hand, little is known about the negative-parity states in these semi-magic nuclei. It is likley that the negative-parity sates in ^{118}Sn are due to a neutron in the negative-parity $h_{11/2}$ orbital coupling to another neutron in one of the positive-parity $s_{1/2}$, $d_{3/2}$, $d_{5/2}$, or $g_{7/2}$ orbitals [2]. This provides the motivation for an in depth spectroscopic study of the negative-parity structure in ^{118}Sn.

The negative-parity states in ^{118}Sn were populated by the β decay of the 8.5 second 8^-isomer of ^{118}In, produced in the ISAC facility at TRIUMF. The GRIFFIN [3] spectrometer was used to detect the resulting γ-rays; GRIFFIN is an incredibly powerful tool, consisting of 16 Compton-suppressed HPGe clover detectors [4] with a total of 64 crystals. GRIFFIN was coupled to the ancillary SCintillating Electron Positron Tagging ARray (SCEPTAR), comprised of 20 plastic scintillators for tagging β particles [3] and was fixed with a 20 mm Delrin shield. A total of 6.7 $\times 10^7$ events in addback singles and 2.5 $\times 10^7$ $\gamma - \gamma$ addback events in a 350 ns coincidence window were detected during the experiment.

In the present work, the isomeric composition of the ^{118}In radioactive ion beam (RIB) produced at the ISAC facility has been determined. Additionally, thirteen new transitions and four new states have been added to the level scheme of ^{118}Sn. In the near future, angular correlations will be performed to confirm the spin-parities of these new excited states.

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Session Classification: Poster Session