

TRIUMF ARIEL Science Workshop 2026



Report of Contributions

Contribution ID: 1

Type: **Invited oral presentation**

Coulomb excitation with TIGRESS for nuclear structure

Tuesday, 21 April 2026 09:00 (20 minutes)

TIGRESS has been used successfully over the past decade for nuclear structure studies using Coulomb excitation, coupled to the BAMBINO array of dual silicon detectors. I will briefly introduce the method, the benefits of the experimental setup and highlight some recent successes. I will then discuss future opportunities for the programme, focussing on the new capabilities that ARIEL will deliver.

Primary author: HENDERSON, Jack (University of Surrey)

Presenter: HENDERSON, Jack (University of Surrey)

Session Classification: Gamma-ray Spectroscopy enabled by ARIEL re-accelerated rare isotope beams

Contribution ID: 2

Type: **not specified**

Introductory remarks

Thursday, 23 April 2026 09:05 (5 minutes)

Presenter: GRASSO, Marcella (IN2P3 Director for Nuclear Physics)

Session Classification: CNRS Workshop - Intro & Accelerator R&D

Contribution ID: 3

Type: **not specified**

Welcome

Presenter: LUCOTTE, Arnaud (IN2P3 Director for Accelerator Technology)

Session Classification: CNRS Workshop - Intro & Accelerator R&D

Contribution ID: 4

Type: **not specified**

Accelerator Technology R&D in France

Thursday, 23 April 2026 09:10 (20 minutes)

Presenter: LUCOTTE, Arnaud (IN2P3 Director for Accelerator Technology)

Session Classification: CNRS Workshop - Intro & Accelerator R&D

Contribution ID: 5

Type: **Invited oral presentation**

The BeEST experiment in the ARIEL era

Tuesday, 21 April 2026 13:30 (20 minutes)

Precision measurements of the final-state products in nuclear beta decay and electron capture (EC) decay processes can be used as powerful laboratories to search for beyond standard model (BSM) physics from the meV to TeV scale, as well as for targeting fundamental questions of quantum mechanics at the subatomic scale. For the past seven years, the BeEST (Beryllium Electron capture in Superconducting Tunnel Junctions (STJs)) collaboration has taken the approach of embedding electron-capture (EC) decaying radioisotopes produced at TRIUMF in thin-film STJs to precisely measure the recoiling atom that gets an eV-scale “kick” from the neutrino following EC decay. Since these recoils must conserve energy and momentum with the neutrino, they carry unique (and potentially “hidden”) signatures of weakly coupled BSM physics. As such, nuclear recoil spectroscopy of EC decaying isotopes has shown tremendous promise in our search for signatures of BSM physics including neutrino mass, exotic weak currents, and potential “dark” particles created within the Q -value window of the decay; including neutrino mass, exotic weak currents, and potential “dark” particles created within the Q -value window of the decay. Such measurements provide a complimentary and (crucially) model-independent portal to the dark sector with sensitivities that push towards synergy between laboratory and cosmological probes.

I will introduce the experimental concept and extensions of the research program before discussing prospects for the experimental program in the ARIEL era.

Primary author: LENNARZ, Annika (TRIUMF)

Presenter: LENNARZ, Annika (TRIUMF)

Session Classification: Experimental horizons for BSM and electroweak interactions using AMO techniques and rare isotope beams

Contribution ID: 6

Type: **Contributed poster presentation**

Cancer research at ARIEL: FLASH radiotherapy and medical isotope production

ARIEL presents a new playground not only for nuclear physics, but also for medical applications of nuclear physics. ARIEL has the capability to produce photons for FLASH radiotherapy (RT), a capability currently available at only a few laboratories worldwide. In 2021, in vivo FLASH RT and conventional RT experiments were performed on mice using 10 MV photons at ARIEL.

Production of Ac-225, an isotope that has demonstrated remarkable results in clinical trials for treating metastatic prostate cancer, is planned as a by-product of proton beam delivery in ARIEL. The Ac-225 production process also produces several other isotopes of interest for medical applications.

ARIEL at TRIUMF presents a unique platform for a wide range of life sciences research. This poster highlights achievements to date, and outlines future capabilities for experiments at ARIEL contributing to the growing field of nuclear medicine.

Primary author: Dr DUNLING, Eleanor (TRIUMF)

Presenter: Dr DUNLING, Eleanor (TRIUMF)

Session Classification: Reception & Poster Session

Contribution ID: 7

Type: **Invited oral presentation**

Searching for Lorentz Violation at TRIUMF and J-PARC

Wednesday, 22 April 2026 11:20 (20 minutes)

To achieve experimental breakthroughs in quantum gravity, there is significant interest in searching for violations of the gravitational inverse-square law—probing large extra dimensions predicted by string theory—as well as violations of Lorentz symmetry. This talk presents recent progress and upcoming experimental projects in these fields. In particular, we will discuss testing Lorentz invariance by investigating the time variation in the lifetimes of polarized unstable particles and nuclei, with a focus on next-generation projects at the ARIEL facility.

Primary author: MURATA, Jiro (Rikkyo University)

Presenter: MURATA, Jiro (Rikkyo University)

Session Classification: Future directions in exploring fundamental symmetries with rare-isotopes

Contribution ID: 8

Type: **Contributed poster presentation**

Coupling of TIGRESS and EMMA with Auxiliary Array TIP at TRIUMF

The combination of a germanium detector array, charged particle detector and recoil mass spectrometer with the neutron-rich radioactive beams available upon completion of ARIEL will allow for an entirely new suite of measurements using fusion-evaporation, radiative-capture, and transfer reactions. This presentation will discuss the selectivity achieved by coupling the TIGRESS gamma-ray spectrometer and the EMMA mass spectrometer 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 reactions 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 ^{56}Ni without the requirement of neutron spectroscopy will be the core topic discussed.

Primary author: ASCH, Heinz (Simon Fraser University)

Co-authors: Dr GILLESPIE, Stephen (FRIB); Dr STAROSTA, Krzysztof (SFU); Dr HACKMAN, Greg (TRIUMF); Dr DAVIDS, Barry (TRIUMF); Dr ALCORTA, Martin (TRIUMF); Dr BHATTACHARJEE, Soumendu (TRIUMF); Dr ESKER, Nicholas (TRIUMF); Dr GARNSWORTHY, Adam (TRIUMF); Mr GEORGES, Shaun (TRIUMF); Mr MACHULE, Peter (TRIUMF); Dr MARTIN, Matthew (ANL); Dr OLCHANSKI, Konstantin (TRIUMF); Dr PEARSON, Chris (TRIUMF); Mr REDEY, Andrew (SFU); Dr SVENSSON, Carl (University of Guelph); Mr WOINOSKI, Alex (SFU); Mr VAN WIEREN, Ken (SFU); Dr WILLIAMS, Jonathan (TRIUMF); Dr WILLIAMS, Matthew (University of Surrey); Mr YU, Zu (SFU)

Presenter: ASCH, Heinz (Simon Fraser University)

Session Classification: Reception & Poster Session

Contribution ID: 9

Type: **Invited oral presentation**

Investigating fundamental symmetries at ARIEL

Wednesday, 22 April 2026 09:20 (20 minutes)

N/A

Primary author: SENG, Chien Yeah (University of Tennessee, Knoxville)

Presenter: SENG, Chien Yeah (University of Tennessee, Knoxville)

Session Classification: The symbiotic relationship between nuclear theory and ARIEL experiments

Contribution ID: 10

Type: **Invited oral presentation**

Electron-RI scattering at SCRIT and ARIEL

Wednesday, 22 April 2026 16:10 (20 minutes)

Electron scattering is a powerful tool for probing nuclear structure, because it enables model-independent studies. For instance, elastic electron scattering accurately provides the charge density distribution of nuclei, directly reflecting their nuclear shape. Furthermore, inelastic electron scattering and other electron-induced reactions significantly aid our understanding of nuclear spectroscopy. As a result, electron scattering has been performed on various stable nuclei, yielding numerous achievements. Despite these successes, its application to unstable nuclei has been limited to only very long-lived examples. Consequently, the broader application of electron scattering to unstable nuclei has long been awaited.

The main difficulty in achieving electron scattering with unstable nuclei is the preparation of a target with a sufficient number of atoms to reach a required luminosity (over 10^{27} cm⁻²s⁻¹), especially considering their extremely low production rates. To overcome this situation, a novel ion trapping method, Self-Confining Radioactive Isotope Ion Target (SCRIT) method, was developed.[1] After demonstrating its principle, the SCRIT electron scattering facility was constructed at RIKEN RI Beam Factory in 2009.[2] Recently, we achieved a major milestone: the world's first electron scattering experiment using online-produced unstable nuclei was successfully conducted with a Cs beam in 2022.[3] This success opens up a new and exciting research field for the study of unstable nuclei.

ARIEL is a new research facility dedicated to nuclear physics of unstable nuclei, and it produces high-intensity and more-exotic radioisotope (RI) beams using high-power electron or proton beams. This presents an extremely important opportunity for conducting electron-RI scattering experiments, similar to those pioneered at the SCRIT facility. The utilization of ARIEL's electron beam for these experiments

and its capability to produce high-intensity and exotic RI beams will significantly expand the research scope and enable the achievement of even higher luminosity for electron-RI scattering.

In this contribution, we will report on the present status and perspectives of the SCRIT facility, and also discuss the possibility of electron-RI scattering at ARIEL.

[1] M. Wakasugi, T. Suda, and Y. Yano, Nucl. Instr. and Meth. A532, 216 (2004).

[2] M. Wakasugi et al., Nucl. Instr. and Meth. B317, 668 (2013).

[3] K. Tsukada et al., Phys. Rev. Lett. 131, 092502 (2023).

Primary author: OHNISHI, Tetsuya (RIKEN Nishina Center)

Co-author: SCRIT COLLABORATION

Presenter: OHNISHI, Tetsuya (RIKEN Nishina Center)

Session Classification: Future experimental infrastructure developments at ARIEL

Contribution ID: 11

Type: **Contributed poster presentation**

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

The development of ARIEL and other new facilities which expand experimental capabilities to study atomic nuclei triggers the need to advance theories of nuclear structure and reactions. A strong theoretical framework addressing nuclear properties from first-principles is necessary to direct exploration, formulate informative experiments, and interpret the data that ARIEL will grant access to.

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).

Primary authors: Prof. DZYUBLIK, Alexey Yaroslav (National Academy of Sciences of Ukraine); LO, Helena (Simon Fraser University); STAROSTA, Krzysztof (SFU)

Presenter: LO, Helena (Simon Fraser University)

Session Classification: Reception & Poster Session

Contribution ID: 12

Type: **not specified**

Panel Discussion

Tuesday, 21 April 2026 12:00 (30 minutes)

Presenters: DI PIETRO, Alessia; FERNANDEZ DOMINGUEZ, Beatriz (University of Santiago de Compostela); KAY, Benjamin (Argonne National Laboratory); CATFORD, Wilton (University of Surrey)

Session Classification: Opportunities in reaction studies with re-accelerated rare isotope beams at ARIEL

Contribution ID: 13

Type: **not specified**

Panel Discussion

Monday, 20 April 2026 14:30 (30 minutes)

Presenters: HERWIG, Falk (University of Victoria); LOTAY, Gavin (University of Surrey); CHRISTIAN, Greg (St Mary's University); ONG, Wei Jia

Session Classification: Nuclear Astrophysics enabled by ARIEL rare isotope capabilities

Contribution ID: 14

Type: **not specified**

Panel Discussion

Tuesday, 21 April 2026 14:30 (30 minutes)

Presenters: TAGGART SINGH, Jaideep; KARTHEIN, Jonas; HUTZLER, Nick; HOEKSTRA, Steven

Session Classification: Experimental horizons for BSM and electroweak interactions using AMO techniques and rare isotope beams

Contribution ID: 15

Type: **not specified**

Panel Discussion

Tuesday, 21 April 2026 16:30 (30 minutes)

Presenters: SCHURY, Peter; SILWAL, Roshani; RINGLE, Ryan (FRIB/Michigan State University)

Session Classification: Perspectives on rare isotope experiments at ARIEL with ion trapping & manipulation

Contribution ID: 16

Type: **not specified**

Panel Discussion

Monday, 20 April 2026 16:30 (30 minutes)

Presenters: GARRETT, Paul; SPAGNOLETTI, Pietro (Simon Fraser University)

Session Classification: Future directions & challenges in rare-isotope decay experiments

Contribution ID: 17

Type: **not specified**

Panel Discussion

Tuesday, 21 April 2026 10:00 (30 minutes)

Presenters: RHODES, Daniel; ALMOND, Mitch; BENDER, Peter

Session Classification: Gamma-ray Spectroscopy enabled by ARIEL re-accelerated rare isotope beams

Contribution ID: **18**

Type: **not specified**

Panel Discussion

Wednesday, 22 April 2026 10:00 (30 minutes)

Presenters: GEZERLIS, Alex (University of Guelph); LEE, Dean; POTEL AGUILAR, Gregory (Michigan State University); SCHUNCK, Nicolas

Session Classification: The symbiotic relationship between nuclear theory and ARIEL experiments

Contribution ID: 19

Type: **not specified**

Panel Discussion

Wednesday, 22 April 2026 12:00 (30 minutes)

Presenters: VUTHA, Amar; MELCONIAN, Dan (Cyclotron Institute, Texas A&M University); O'DONNELL, David; MADISON, Kirk

Session Classification: Future directions in exploring fundamental symmetries with rare-isotopes

Contribution ID: 20

Type: **not specified**

Panel Discussion

Wednesday, 22 April 2026 14:30 (30 minutes)

Presenters: LASSEN, Jens (TRIUMF Canada's particle accelerator centre); LI, Ruohong (TRIUMF); HI-RAYAMA, Yoshikazu (KEK WNSC)

Session Classification: New directions in laser spectroscopy with rare isotopes

Contribution ID: 21

Type: **not specified**

Open Discussion

Wednesday, 22 April 2026 16:30 (30 minutes)

Session Classification: Future experimental infrastructure developments at ARIEL

Contribution ID: 22

Type: **Contributed poster presentation**

Physics Opportunities with TRIUMF's neutral atom trap for beta decay (TRINAT)

TRINAT has at least four existing efforts with opportunities for collaborators and their students. A correlation between spin, beta, and recoil has enhanced sensitivity to time-reversal odd, parity-even, isospin-breaking nucleon-nucleon interactions because of 47K decay's isospin-hindered Fermi component, making it potentially complementary to MORA's more general decays as well as to electric dipole moment searches and neutron resonance experiment NOPTREX. Developing metrology for the potassium atom's 4S to $5\text{P}_{1/2}$ transition will test atomic many-body theory needed to enable a better charge radius measurement of 38mK to test isospin-breaking calculations needed for V_{ud} determination. The angular distribution of neutrinos and betas from the isobaric analog decay of 37K reflects their absolute and relative helicities, a distinct prediction of our model of electroweak interactions. We also consider an improved 38mK beta- ν correlation experiment, which requires considerable development to reach sensitivity goals of WISArD. With this poster the local spokesperson would present these opportunities to this workshop.

Primary author: BEHR, John (TRIUMF)

Presenter: BEHR, John (TRIUMF)

Session Classification: Reception & Poster Session

Contribution ID: 23

Type: **Invited oral presentation**

Experience of TITAN's MR-TOF-MS at ISAC and its potential capabilities at ARIEL

Tuesday, 21 April 2026 16:10 (20 minutes)

The multiple-reflection time-of-flight mass spectrometer (MR-TOF-MS) has been part of the TRIUMF's Ion Trap for Atomic and Nuclear Science for about 9 years. Coupled to the ISAC facility for the delivery of rare isotope beams (RIBs) plenty of results have been shown, from extending the landscape of known nuclear masses to aiding for the development of ion sources and targets. Within the ARIEL era, extreme neutron rich nuclei will be produced via photofission with more rate and with less isobaric contamination compared to ISAC yields. ARIEL production rates employing photofission together with the already demonstrated capabilities of the MR-TOF-MS for suppressing contaminants via re-trapping, open opportunities of further expanding the known nuclear masses towards neutron rich nuclei in the light and heavy fission peaks. Also, the MR-TOF-MS will enable real-time yield measurements and beam composition characterization, which will enable characterization and optimization of the new production targets (APTW and AETE) and enable new developments.

In this presentation I will give a brief overview of the MR-TOF-MS technique and its achievements in TRIUMF coupled to the ISAC facility and an outlook for the opportunities of the MR-TOF-MS in the ARIEL era.

Primary author: AYET SAN ANDRES, Samuel (IFIC - UV)

Presenter: AYET SAN ANDRES, Samuel (IFIC - UV)

Session Classification: Perspectives on rare isotope experiments at ARIEL with ion trapping & manipulation

Contribution ID: 24

Type: **Invited oral presentation**

Dual-Mode solenoidal spectrometers at ARIEL

Wednesday, 22 April 2026 15:30 (20 minutes)

Dual-mode solenoidal spectrometers combine flexibility, high detection efficiency, and precise kinematic reconstruction for reaction studies with rare isotope beams. This concept enables operation in two complementary modes: an active target mode employing a gaseous Active Target Time Projection Chamber (AT-TPC) for studies with low-intensity or extended targets, and a silicon detector array mode providing high-resolution particle tracking for solid targets. The integration of these approaches within a common solenoidal magnetic field allows comprehensive coverage of transfer, elastic, and resonance reactions in inverse kinematics. This talk will cover the technical design principles, operational modes, demonstrated performance through landmark experiments, and implementation roadmap for dual-mode solenoidal spectrometers. This versatility ensures optimal adaptation to the diverse beam conditions and physics objectives across ARIEL's experimental program. The demonstrated performance and adaptability of solenoidal spectrometers make them an especially well suited technology for advancing TRIUMF's nuclear structure and astrophysics research.

Primary author: AYYAD, Yassid (USC-IGFAE)

Presenter: AYYAD, Yassid (USC-IGFAE)

Session Classification: Future experimental infrastructure developments at ARIEL

Contribution ID: 25

Type: **Invited oral presentation**

New science directions using a high-voltage MR-ToF device at ARIEL

Tuesday, 21 April 2026 14:10 (20 minutes)

Many experiments at radioactive ion beam (RIB) facilities require isobarically and isomerically pure beams at high ion intensities. Over the years, Multi-Reflection Time-of-Flight (MR-ToF) devices have gained remarkable attention for mass separation of short-lived radionuclides. They exceed mass resolving powers of $m/\Delta m = 1e5$ within a few (tens of) milliseconds. Space charge effects, however, pose a challenge for the mass separation in cases where excessively many ions are confined in the MR-ToF device. This limits the wider application of MR-ToF mass separators at RIB facilities.

By performing ion-optical simulations including space charge effects, we have shown that the ion flux in MR-ToF devices can be increased by more than two orders of magnitude when raising the kinetic energy of the stored ions and when improving the geometrical design [1-4]. According to our simulations, an ion flux between $5e7$ to $1e5$ ions/s will become possible for mass resolving powers between $1e4$ and $5e5$ assuming an energy of 30 keV of the stored ions.

In this contribution, we present an overview of highly selective and high-flux mass separation and discuss the relevance of high-voltage MR-ToF devices for next-generation RIB facilities such as ARIEL. We report the first experimental results of MIRACLS' 15 keV MR-ToF device [5], which enabled highly sensitive fluorescence-based collinear laser spectroscopy (CLS) of exotic Mg and Cd ions. The latter's combination of MR-ToF and CLS has recently also enabled a multi-order enhancement in the sensitivity of electron-affinity measurements [6], allowing the determination of this quantity for heavy and superheavy elements. Furthermore, we discuss the design of FRIB's proposed 30 keV MR-ToF mass separator, which will enable both high mass resolving power and high ion throughput [3,4]. We will highlight its potential for both FRIB and ARIEL to enable new experimental opportunities.

[1] F.M.Maier et al, NIMA 1056, 168545 (2023).

[2] F.M.Maier et al, NIMA 1075, 170365 (2025).

[3] F. M. Maier, C. M. Ireland et al., NIMA 1084, 171220 (2026).

[4] C. M. Ireland, F. M. Maier et al., NIMA 1087, 171426 (2026).

[5] F. M. Maier, M. Vilen et al., NIMA 1048, 1679277 (2023).

[6] F. M. Maier, E. Leistenschneider et al., Nat. Commun. 16, 9576 (2025).

Primary author: MAIER, Franziska (FRIB)

Presenter: MAIER, Franziska (FRIB)

Session Classification: Experimental horizons for BSM and electroweak interactions using AMO techniques and rare isotope beams

Contribution ID: 26

Type: **Invited oral presentation**

Ab initio calculations around neutron-rich shell closures

Wednesday, 22 April 2026 09:00 (20 minutes)

This talk will discuss ab initio calculations around neutron-rich shell closures relevant for the evolution of shell structure, for electromagnetic moments, as well as for nuclear masses and beta decays for the r-process.

Primary author: SCHWENK, Achim (TU Darmstadt)

Presenter: SCHWENK, Achim (TU Darmstadt)

Session Classification: The symbiotic relationship between nuclear theory and ARIEL experiments

Contribution ID: 27

Type: **Invited oral presentation**

MRTOF-MS at RIBF/BigRIPS: Recent measurements and developments, and dealing with rare events

Tuesday, 21 April 2026 15:50 (20 minutes)

Tackling the increasing challenge to determine the mass of isotopes having low production yields and short half-lives, multi-reflection time-of-flight (MRTOF) mass spectrometry has grown from an initially rarely-used technology to the world's most commonly-used method for measurements with a relative mass precision down to $\delta m/m = 10^{-8}$. This technology has been developed at RIKEN's RIBF facility for about two decades in combination with gas-filled ion catchers for low-energy access of isotopes produced by the in-flight method.

In the recent years, three independent systems operating at different access points at RIBF, have provided substantial data in the medium- and heavy-mass region of the nuclear chart, reaching out to the superheavy nuclides. Recent achievements like high mass resolving power [1] followed by the development of α/β -TOF detectors [2] and in-MRTOF ion selection have tremendously increased the selectivity of the systems [3]. The combined application allows for background-free identification of the rarest isotopes.

In this contribution, I will give a short overview about the success of MRTOF atomic mass measurements using BigRIPS in the recent past [4]. I will discuss instrumentation plans, with a view to a new type of β -TOF detector potentially useful for future mass measurements using ARIEL. Furthermore I will discuss challenges for the analysis of contaminated spectra with a low rate of wanted events.

References:

- [1] M. Rosenbusch et al., Nucl. Instrum. Meth. A 1047, 167824 (2023).
- [2] T. Niwase et al., Theo. Exp. Phys. 2023(3), 031H01 (2023).
- [3] W. Xian, M. Rosenbusch, V. H. Phong et al., Front. Phys. 13 (2025).
- [4] S. Kimura et al., Phys. Rev. Lett. 135, 152701 (2025).

Primary authors: ROSENBUSCH, M. (RIKEN Nishina Center for Accelerator-Based Science); CHEN, S. (University of York); FU, C. (Institute of Modern Physics); HIRAYAMA, Y. (KEK Wako Nuclear Science Center); HOU, D. S. (The University of Hong Kong); IIMURA, S. (Rikkyo University); ISHIYAMA, H. (RIKEN Nishina Center for Accelerator-Based Science); ITO, Y. (KEK Wako Nuclear Science Center); KIMURA, S. (KEK Wako Nuclear Science Center); KOJIMA, T. (RIKEN Nishina Center for Accelerator-Based Science); LEE, J. (The University of Hong Kong); LIU, J. (Institute of Modern Physics); MUKAI, M. (KEK Wako Nuclear Science Center); MICHIMASA, S. (RIKEN Nishina Center for Accelerator-Based Science); MIYATAKE, H. (KEK Wako Nuclear Science Center); MOON, J. Y. (Institute for basic science); NISHIMURA, S. (RIKEN Nishina Center for Accelerator-Based Science); NAIMI, S. (IJCLab); NIWASE, T. (Kyushu University); PHONG, V. H. (RIKEN Nishina Center for Accelerator-Based Science); SCHURY, P. (KEK Wako Nuclear Science Center); SONODA, T. (RIKEN Nishina Center for Accelerator-Based Science); TAKAMINE, A. (Kyushu University); WADA, M. (Institute of Modern Physics); WATANABE, Y. X. (KEK Wako Nuclear Science Center); XIAN, W. D. (The University of Hong Kong, Sino-French Institute of Renmin University of China); YAN, S. (Jinan University); YEUNG, T. T. (The University of Tokyo); ZHA, S. (The University of Hong Kong)

Presenter: ROSENBUSCH, M. (RIKEN Nishina Center for Accelerator-Based Science)

Session Classification: Perspectives on rare isotope experiments at ARIEL with ion trapping

& manipulation

Contribution ID: 28

Type: **Invited oral presentation**

Beta-decay and neutron emission - a strained relationship

Monday, 20 April 2026 15:50 (20 minutes)

Beta-delayed neutron emission is an important decay mode for very neutron-rich nuclei. For the highly asymmetric nuclei, nuclear structure and large decay energies can affect neutron emission probabilities.

Experiments at the ISOLDE Decay Station (IDS) and the FRIB Decay Station Initiator (FDSi) provided a wealth of new data, leading to spectroscopy of beta-delayed two-neutron emission [Dys25], new cases of neutron-gamma competition [Pie21, Xu23], and observations of non-statistical effects [Xu24, Bra26]. The data do not necessarily agree with the established models for this process, and to make reliable predictions of neutron-emission branching ratios for more exotic r-process nuclei, the inconsistencies need to be understood. The experimental data are still scarce and scattered, but measurements on exotic isotopes are essential for developing a better model of beta-delayed neutron emission.

This work is supported in part by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics under Contract No. DE-FG02-96ER40983 (UTK), by the Stewardship Science Academic Alliances program through DOE Award No. DE-NA0003899 and NSF Major Research Instrumentation Program Award No. 1919735.

[Bra26] N. Braukman et al., Decay of 44S, in preparation.

[Dys25] P.Dyszal Phys. Rev. Lett. 135, 152501 (2025).

[Xu23] Z. Xu et al., Phys. Rev. Lett. 133, 042501 (2024).

[Xu24] Z. Y. Xu et al., Phys. Rev. Lett. 131, 022501 (2023).

[Pie21] M. Piersa-Siłkowska et al. , Phys. Rev. C 104, 044328 (2021).

Primary author: GRZYWACZ, Robert (University of Tennessee)

Presenter: GRZYWACZ, Robert (University of Tennessee)

Session Classification: Future directions & challenges in rare-isotope decay experiments

Contribution ID: 29

Type: **Contributed poster presentation**

Timepix3-Based Optical Time Projection Chamber: Fast 3D Tracking for Low-Energy Nuclear Experiments

An optical Time Projection Chamber (oTPC) is proposed for low-energy nuclear physics experiments at TRIUMF/ARIEL, using a Timepix3-based single-photon camera as readout. When charged particles ionize the detector gas, the resulting electron avalanches produce scintillation light captured by an externally mounted camera with an image intensifier —avoiding the complexity of conventional wire-based systems.

The Timepix3 chip offers a 256×256 pixel matrix with 55 μm pitch, simultaneous time-of-arrival and time-over-threshold readout, and 1.6 ns timing resolution. This enables full 3D track reconstruction by combining pixel position with timing data to avoid pile-up, while the energy-sensitive response adds calorimetric capability.

The system demonstrates high granularity, precise timing, and flexible 3D reconstruction in a compact format, validated with alpha-particle sources and cosmic rays. The oTPC + Timepix3 platform is presented as a promising instrument for next-generation low-energy nuclear experiments at ARIEL.

Primary author: CABO LANDEIRA, Cristina (IGFAE - Universidade de Santiago de Compostela)

Co-authors: FERNANDEZ DOMINGUEZ, Beatriz (University of Santiago de Compostela); Dr ALVAREZ-POL, Hector (Universidade de Santiago de Compostela); Dr CAAMANO FRESCO, Manuel (Universidade de Santiago de Compostela); Dr CORTESI, Marco (Facility for Rare Isotope Beams (FRIB)); AYYAD, Yassid (USC-IGFAE)

Presenter: CABO LANDEIRA, Cristina (IGFAE - Universidade de Santiago de Compostela)

Session Classification: Reception & Poster Session

Contribution ID: 30

Type: **Invited oral presentation**

The Scattering Experiment Chamber of HIE –ISOLDE and the study of di-neutron correlations via 2n-transfer reactions in of ^{11}Li and ^{13}Be

Tuesday, 21 April 2026 11:00 (20 minutes)

The XT03 beamline at HIE ISOLDE provides a versatile station for reaction studies, centred on the SEC chamber, which has hosted numerous experiments during its first decade of operation. Halo nuclei such as ^{11}Li and ^{14}Be offer a unique opportunity to investigate di neutron correlations and the evolution of shell structure in light neutron rich systems.

The ground state of ^{11}Li contains mixed p, s, and d components, and its low energy continuum shows broad dipole type strength together with narrower resonances at higher excitation energies. However, the lowest resonance near 1 MeV remains poorly constrained. Studies of the $N = 7-8$ isotonic chains reveal significant shifts of the neutron orbitals, leading to the $\frac{1}{2}^+/\frac{1}{2}^-$ inversion in ^{11}Be and the breakdown of the $N = 8$ magic number in ^{12}Be , highlighting the need for reliable information on the unbound nucleus ^{13}Be .

Transfer reactions with radioactive beams in inverse kinematics provide a sensitive probe of these structures. Two neutron transfer from ^9Li is predicted to populate selectively the ground and low lying excited states of ^{11}Li . At ISOLDE, we investigate (t,p) reactions on ^9Li and ^{11}Be at 7 MeV/u and 5.4 MeV/u to study the low energy excitations of ^{11}Li and the resonant states of ^{13}Be . This contribution presents the SEC setup and the first results from these measurements.

Primary author: TENGBLAD, Olof (IEM - CSIC)

Presenter: TENGBLAD, Olof (IEM - CSIC)

Session Classification: Opportunities in reaction studies with re-accelerated rare isotope beams at ARIEL

Contribution ID: 31

Type: **Contributed poster presentation**

The neighborhood of ^{78}Ni : Probing the N = 50 Shell Closure with ARIEL Photofission

The neutron-rich region surrounding ^{78}Ni provides a stringent test of nuclear structure far from stability and plays a central role in the astrophysical r-process responsible for the $A \approx 80$ abundance peak. As a doubly-magic nucleus, ^{78}Ni offers a key benchmark for investigating the persistence of the N = 50 shell closure in extremely neutron-rich nuclei. However, direct mass measurements have reached only as far as ^{75}Ni (N=47). Extrapolated mass models beyond this diverge from each other as the shell closure is approached. In particular, sensitivity studies identify ^{76}Ni as a critical r-process waiting-point nucleus whose mass strongly impacts predicted abundance patterns. Achieving these measurements at TRIUMF requires both improved beam development and reduced contamination, capabilities that will be enabled by the ARIEL facility, which will deliver cleaner radioactive ion beams to the existing TITAN mass spectrometers.

At TRIUMF's Ion Trap for Atomic and Nuclear science (TITAN), the Multiple-Reflection Time-of-Flight Mass Spectrometer (MR-TOF-MS) can reach mass resolving powers exceeding 400,000, with measurement times on the order of milliseconds, making it ideal for measuring these short-lived, neutron-rich nuclei. Its mass-selective re-trapping feature further suppresses background contaminants in the delivered beam by factors of 10^4 – 10^8 . This enables both yield characterization and high-precision mass measurements, even for low-intensity beams during the early ARIEL ramp-up phase, as part of the ongoing collaboration between the Target and Ion Source Department and TITAN. This symbiosis will be critical to extending mass measurements toward ^{78}Ni . Thus, TITAN will constrain two-neutron separation energies across the N = 50 shell closure and provide critical nuclear inputs for r-process nucleosynthesis models in the $A \approx 80$ region.

Primary authors: WELIGAMPOLA, Pavithra (TRIUMF); CANNON, Alec (University of Victoria)

Co-authors: CHAMBERS, Christopher (TRIUMF); Dr RASIWALA, Hussain (TRIUMF); KWIATKOWSKI, Anna (TRIUMF)

Presenters: WELIGAMPOLA, Pavithra (TRIUMF); CANNON, Alec (University of Victoria)

Session Classification: Reception & Poster Session

Contribution ID: 32

Type: **Contributed poster presentation**

Next-generation Penning-trap mass spectrometry at TITAN with ARIEL

Mass spectrometry plays an important role in many fields of physics research such as nuclear astrophysics, nuclear structure, and fundamental symmetries. Precise knowledge of masses is critical to these studies. For example, a relative mass precision of 10^{-8} is required to probe the Standard Model and beyond. This level of precision with radioactive species has been achieved only with Penning trap mass spectrometry. Coupling the Penning trap to an EBIT charge breeder allows for further improvement in precision by boosting the charge state of the ions. In order to extend storage time of these highly charged ions, the TITAN Penning trap system has been upgraded recently to cool the trap to cryogenic temperatures using cryoabsorption and cryocondensation, attaining a vacuum of 10^{-11} mbar. Currently, a phase-based technique to determine the frequency is being implemented which will allow the TITAN Penning trap mass spectrometer to achieve relative precisions $< 10^{-9}$. This new technique coupled with ARIEL's cleaner RIB production and longer beamtimes will allow for exciting science to occur. One such experiment is measuring the Q-value decay of Rb^{74} to Kr^{74} . Rb^{74} is a heavy superallowed emitter which will provide an experimental benchmark for isospin symmetry breaking calculations once the Q-value uncertainty is reduced. Using the decay and recapture ion trap technique in the EBIT, we can directly produce the daughter, Kr^{74} , more cleanly than via ISOL and the FEBIAD ion source. Thus, the TITAN Penning trap will make the highest-precision and -accuracy direct Q-value determination as well as individual mass measurements. We will present the status of the recent upgrades as well as the outlook for mass spectrometry at TITAN to test the Standard Model.

Primary author: GREATHOUSE, Amelia (TRIUMF, McGill)

Co-author: RAY, Dwaipayana

Presenters: GREATHOUSE, Amelia (TRIUMF, McGill); RAY, Dwaipayana

Session Classification: Reception & Poster Session

Contribution ID: 33

Type: **Contributed poster presentation**

Injection of Radiochronometers into Early Solar System Meteoritic Materials at ASPIRE

Proof that our Early Solar System (ESS) was irradiated with short-lived radionuclides (SLR's) from an external supernovae is well-evidenced by the fossil presence of ^{26}Al , ^{41}Ca , ^{60}Fe and other SLR's in ancient geologic and meteoritic phases. Many of these SLR's (i.e. ^{26}Al) find significance as radiometric clocks that record the formation of ESS solids and the timings of planetary body assembly. However, a major uncertainty in irradiation models is the absence of experimental data. SLR beams and their analogs can be produced by the new ARIEL facility. These SLR's will be used at ASPIRE (the ASTrochemical & Planetary materials IRradiation Experiment) at TRIUMF to benchmark cross-section reactions in the ESS against existing irradiation models. This contribution discusses upcoming plans at ASPIRE to leverage exotic ARIEL SLR beams, to better understand fundamental issues in ESS chronometry and partitioning of radioisotopes into meteoritic phases like calcium-aluminum-rich inclusions (CAIs), chondrules, and other materials.

Primary author: CHARLES, Christopher (TRIUMF)

Presenter: CHARLES, Christopher (TRIUMF)

Session Classification: Reception & Poster Session

Contribution ID: **34**

Type: **Invited oral presentation**

TBD

Monday, 20 April 2026 13:30 (20 minutes)

Presenter: LAIRD, Alison

Session Classification: Nuclear Astrophysics enabled by ARIEL rare isotope capabilities

Contribution ID: 35

Type: **Invited oral presentation**

TBD

Presenter: WILLIAMS, Matthew (University of Surrey)

Session Classification: Nuclear Astrophysics enabled by ARIEL rare isotope capabilities

Contribution ID: **36**

Type: **Invited oral presentation**

TBD

Presenter: RICHARD, Andrea

Session Classification: Nuclear Astrophysics enabled by ARIEL rare isotope capabilities

Contribution ID: 37

Type: **Invited oral presentation**

TBD

Presenter: ROGER, Thomas

Session Classification: Opportunities in reaction studies with re-accelerated rare isotope beams at ARIEL

Contribution ID: **38**

Type: **Invited oral presentation**

TBD

Presenter: MACHIAVELLIE, Augusto

Session Classification: Opportunities in reaction studies with re-accelerated rare isotope beams at ARIEL

Contribution ID: **39**

Type: **Invited oral presentation**

TBD

Presenter: LEACH, Kyle (Colorado School of Mines)

Session Classification: Experimental horizons for BSM and electroweak interactions using AMO techniques and rare isotope beams

Contribution ID: 40

Type: **Invited oral presentation**

TBD

Wednesday, 22 April 2026 11:00 (20 minutes)

Presenter: JAMISON, Alan

Session Classification: Future directions in exploring fundamental symmetries with rare-isotopes

Contribution ID: 41

Type: **Invited oral presentation**

TBD

Presenter: REDSHAW, Matthew

Session Classification: Future directions in exploring fundamental symmetries with rare-isotopes

Contribution ID: 42

Type: **Invited oral presentation**

TBD

Monday, 20 April 2026 15:30 (20 minutes)

Presenter: SVENSSON, Carl

Session Classification: Future directions & challenges in rare-isotope decay experiments

Contribution ID: 43

Type: **Invited oral presentation**

TBD

Presenter: CRAWFORD, Heather

Session Classification: Future directions & challenges in rare-isotope decay experiments

Contribution ID: 44

Type: **Invited oral presentation**

TBD

Presenter: WIMMER, Kathrin

Session Classification: Gamma-ray Spectroscopy enabled by ARIEL re-accelerated rare isotope beams

Contribution ID: 45

Type: **Invited oral presentation**

TBD

Presenter: IMAI, Nobu

Session Classification: Gamma-ray Spectroscopy enabled by ARIEL re-accelerated rare isotope beams

Contribution ID: 46

Type: **Invited oral presentation**

TBD

Presenter: MORO, Antonio

Session Classification: The symbiotic relationship between nuclear theory and ARIEL experiments

Contribution ID: 47

Type: **Invited oral presentation**

TBD

Presenter: REITER, Pascal

Session Classification: Perspectives on rare isotope experiments at ARIEL with ion trapping & manipulation

Contribution ID: 48

Type: **Invited oral presentation**

TBD

Presenter: TAKAMINE, Aike

Session Classification: New directions in laser spectroscopy with rare isotopes

Contribution ID: 49

Type: **Invited oral presentation**

TBD

Wednesday, 22 April 2026 13:50 (20 minutes)

Presenter: DE GROOTE, Ruben P.

Session Classification: New directions in laser spectroscopy with rare isotopes

Contribution ID: 50

Type: **Invited oral presentation**

TBD

Wednesday, 22 April 2026 14:10 (20 minutes)

Presenter: BD, T

Session Classification: New directions in laser spectroscopy with rare isotopes

Contribution ID: 51

Type: **Invited oral presentation**

TBD

Presenter: LITVINOV, Yuri

Session Classification: Future experimental infrastructure developments at ARIEL

Contribution ID: 52

Type: **Invited oral presentation**

ARIEL Facility Overview

Monday, 20 April 2026 09:15 (45 minutes)

Presenter: EGORITI, Luca (TRIUMF)

Session Classification: ARIEL Overview

Contribution ID: 53

Type: **Invited oral presentation**

ARIEL Experiments Overview

Monday, 20 April 2026 10:00 (45 minutes)

Presenter: GARNSWORTHY, Adam (TRIUMF)

Session Classification: ARIEL Overview

Contribution ID: 54

Type: **not specified**

Welcome address

Monday, 20 April 2026 09:00 (15 minutes)

Presenters: SMITH, Nigel (TRIUMF); KANUNGO, Rituparna (TRIUMF)

Session Classification: ARIEL Overview

Contribution ID: 55

Type: **Contributed poster presentation**

Atomic Parity Violation Detection through Forbidden Transitions in Optically Trapped Francium

Measuring Atomic Parity Violation (APV) in the weak interaction is an excellent way to test the standard model at low momentum scales. One way to do this is studying parity violating transitions in alkali atoms. Francium is the ideal element to use in these searches, as its heavy mass gives a relativistic enhancement to parity violating transitions 18 times that of Cesium. The Francium Trapping Facility (FTF) at TRIUMF allows for the trapping of francium by neutralizing francium ions created at TRIUMF in a zirconium foil, and then utilizing two Magneto-Optical Traps (MOTs) to hold the atoms in place while they are probed. With this apparatus, effort is ongoing to measure the forbidden M1 7s-8s transition in francium, to prepare for an APV measurement of the transition utilizing Stark interference. Recent developments include the installation of a power buildup cavity to improve the intensity of the 506 nm light used to cycle the 7s-8s transition. An overview of the experimental apparatus at TRIUMF will be presented.

Primary author: ARROWSMITH-KRON, Gordon

Co-authors: SHARMA, Anima (University of Manitoba); GWINNER, Gerald; HALILOVIC, Iris (University of Manitoba); BEHR, John (TRIUMF); BUDU, Ohene-Kofi (TRIUMF); MORSHED, Tasanul

Presenter: ARROWSMITH-KRON, Gordon

Session Classification: Reception & Poster Session

Contribution ID: 56

Type: **Contributed poster presentation**

Probing shape coexistence in ^{114}Sn using decay spectroscopy with GRIFFIN

Probing shape coexistence in ^{114}Sn using decay spectroscopy with GRIFFIN

Primary authors: COLLABORATION, GRIFFIN; MADHU, Madhu (Simon Fraser University)

Presenter: MADHU, Madhu (Simon Fraser University)

Session Classification: Reception & Poster Session

Contribution ID: 57

Type: **Contributed poster presentation**

Ab initio calculations of ${}^6\text{He} + p$ reactions

A long-standing goal of nuclear theory is development of a predictive *ab initio* framework for nuclear structure and reactions. One such framework is the no-core shell model with continuum (NCSMC), in which the many-body wave function is expanded in terms of eigenstates of the many-body Hamiltonian obtained within the no-core shell model (NCSM), *i.e.* using the harmonic-oscillator basis, and basis states in which the nucleons are distributed between clusters, each described within the NCSM. Recent developments of the NCSMC allow for inclusion of different distributions of the nucleons between the clusters (mass partitions) in a single coupled-channel calculation, which allows for calculations of charge-exchange and nucleon-transfer reactions. I will present results of the first ever NCSMC calculation coupling three mass partitions, namely ${}^6\text{He} + p$, ${}^6\text{Li} + n$, and ${}^4\text{He} + {}^3\text{H}$, using chiral nuclear forces as input. In particular, I will present cross sections of the (p,p) , (p,n) , and (p,t) reactions on radioactive ${}^6\text{He}$ and compare them to available experimental data.

Primary author: HERKO, Jakub (TRIUMF)

Co-authors: HUPIN, Guillaume (CNRS/IJCLab); KRAVVARIS, Konstantinos (Lawrence Livermore National Laboratory); NAVRATIL, Petr (TRIUMF); QUAGLIONI, Sofia (LLNL)

Presenter: HERKO, Jakub (TRIUMF)

Session Classification: Reception & Poster Session

Contribution ID: 58

Type: **Contributed poster presentation**

Development of an accelerator-driven Ba-ion source to optimize Barium tagging techniques

Neutrinoless double-beta decay ($0\nu\beta\beta$) offers a way to probe for physics beyond the Standard Model. Observation of $0\nu\beta\beta$ will validate the Majorana nature of neutrinos, demonstrate violation of lepton number explaining the observed baryon asymmetry in the universe, and probe new mass generation mechanisms up to the GUT scale. The planned nEXO experiment will search for $0\nu\beta\beta$ decay in ^{136}Xe with a projected half-life ($t_{1/2}$) sensitivity exceeding 10^{28} years at the 90% confidence level over 10 years of livetime, using a tonne-scale liquid xenon (LXe) time projection chamber (TPC). In parallel, research is ongoing for future upgrades to nEXO to suppress background and further increase this sensitivity. One such approach is the extraction and identification of the $\beta\beta$ -decay daughter Ba ion, also known as Ba tagging, which will confirm $\beta\beta$ events irrefutably. In addition to nEXO, Ba tagging would help other next-generation, tonne-scale Xe TPC experiments, like XLZD, approach $t_{1/2}$ sensitivities of 10^{28} years and beyond. To that end, an accelerator-driven ion source is currently being developed at TRIUMF, where radioactive ions of ^{139}Cs and ^{139}Ba will be implanted inside an LXe volume, extracted electrostatically, and identified via γ spectroscopy. Past measurements at the ISAC yield station demonstrate that both isotopes can be delivered at sufficient intensities using a UC_x target. A commissioning phase using Ar gas has been approved for beam time by the Nuclear Physics Experiments Evaluation Committee at TRIUMF with high priority, and the experimental set up is in its final stages of completion for this phase. ARIEL coming online points to an exciting future for science at TRIUMF with higher probability of beam-time allotments for detailed systematic studies of extraction efficiency and ion mobility. The upcoming CANREB facility equipped with an Electron Beam Ion Source will facilitate background reduction, a crucial requirement for this experiment. Once developed, the ion source will be used to optimize ion extraction methods under development by other groups within the nEXO collaboration. The background for the project, the apparatus, and recent updates will be presented along with planned measurements.

Primary author: RAY, Dwaipayan

Co-authors: MARQUIS, Megan (McMaster University/TRIUMF); BALBUENA, Ali Verlyn (University of North Carolina Wilmington); BRUNNER, Thomas (McGill/TRIUMF); DANIELS, Timothy (University of North Carolina Wilmington); KWIATKOWSKI, Anna (TRIUMF); LENNARZ, Annika (TRIUMF)

Presenter: RAY, Dwaipayan

Session Classification: Reception & Poster Session

Contribution ID: 59

Type: **Contributed poster presentation**

Opportunities for direct measurements of weak r-process reactions with ARIEL beams

Work has already been done at TRIUMF to directly study (α, n) reactions using both DRAGON and EMMA, with the aid of the DEMAND neutron detector array. These reactions are important for understanding both the weak r-process and the s-process. Many of the reactions relevant to the weak r-process involve neutron-rich radioactive nuclei. ARIEL will expand TRIUMF's rare isotope beam capabilities and broaden the opportunities for direct studies of these reactions.

Primary author: REED, Ben (TRIUMF/Saint Mary's University)

Co-authors: WEBSTER, Aeyla (TRIUMF); LAIRD, Alison; LENNARZ, Annika (TRIUMF); DAVIDS, Barry (TRIUMF); ANGUS, Cameron (TRIUMF); RUIZ, Chris (TRIUMF); JAMESON, Claire (University of Surrey); YATES, Daniel (TRIUMF); LOTAY, Gavin (University of Surrey); CHRISTIAN, Greg (St Mary's University); HACKMAN, Greg (TRIUMF); Dr O'NEILL, Joey (University of Birmingham); WILLIAMS, Jonathan (TRIUMF); SOLE VILAJOSANA, Laia (Universitat Politècnica de Catalunya); Dr ENRIQUE CHARON, Luis (TRIUMF); LORIA, Mallory (University of Victoria/TRIUMF); WILLIAMS, Matthew (University of Surrey); Dr ZHU, Yiyi (TRIUMF)

Presenter: REED, Ben (TRIUMF/Saint Mary's University)

Session Classification: Reception & Poster Session

Contribution ID: 60

Type: **Contributed poster presentation**

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.

Primary author: Mr WOINOSKI, Alex (SFU)

Co-authors: REDEY, Andrew (SFU); ASCH, Heinz (Simon Fraser University); LO, Helena (Simon Fraser University); STAROSTA, Krzysztof (Krzysztof Starosta)

Presenter: Mr WOINOSKI, Alex (SFU)

Session Classification: Reception & Poster Session

Contribution ID: 61

Type: **Contributed poster presentation**

Fission Fragment Detection using the Photon Beam of ARIEL

The SCI-CASTER project at the SFU Nuclear Science Laboratory 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. Thus far, all prototype detectors in the project have consisted of a single-sided geometry intended for decay measurements. In light of the advent of the ARIEL-era, it is proposed that a twin-chamber SCI-CASTER system be constructed and implemented at the ARIEL facility for investigation of photo-fission fragment detection employing high-energy photon beams from conversion of electrons accelerated by the e-linac impinging on heavy targets. The feasibility and preliminary design considerations of the detector will be presented.

Primary author: REDEY, Andrew (Simon Fraser University)

Co-authors: STAROSTA, Krzysztof (Krzysztof Starosta); ASCH, Heinz (Simon Fraser University); WOINOSKI, Alex; LO, Helena (Simon Fraser University)

Presenter: REDEY, Andrew (Simon Fraser University)

Session Classification: Reception & Poster Session

Contribution ID: 62

Type: **Invited oral presentation**

Opportunities for Decay Spectroscopy with ARIEL

Monday, 20 April 2026 16:10 (20 minutes)

Beta-decay spectroscopy is a uniquely powerful probe, permitting often first experimental access to the excited states of exotic nuclei, but also a breadth of rich and detailed information when statistics permits. The experimental facilities at TRIUMF, combined with new beams delivered from ARIEL, are an exciting combination for future decay measurements. I will discuss some of the compelling physics topics decay spectroscopy can provide insights into, such as shell evolution and the impacts of weak binding, and focus on potential cases of interest enabled for study by ARIEL.

Primary author: CRAWFORD, Heather (Lawrence Berkeley National Laboratory)

Presenter: CRAWFORD, Heather (Lawrence Berkeley National Laboratory)

Session Classification: Future directions & challenges in rare-isotope decay experiments

Contribution ID: 63

Type: **Invited oral presentation**

Some recent advances in the description of exclusive and inclusive transfer reactions populating unbound states

Wednesday, 22 April 2026 09:40 (20 minutes)

Reactions populating unbound states, such as transfer, breakup or knockout, provide valuable spectroscopic information of weakly bound nuclei. Extraction of meaningful information from these reactions require the combination of a suitable reaction framework, tailored to the reaction at hand, with a realistic structure model for the involved nuclei.

In this presentation, I will discuss some examples of this type of reactions, covering a variety of situations. Firstly, I will present the case of ${}^9\text{Li}(d,p){}^{10}\text{Li}$, measured at ISOLDE [1] and TRIUMF [2]. The angular distribution of outgoing protons and the excitation energy spectrum of ${}^{10}\text{Li}$ can be well described by DWBA and CCBA calculations combined with a relatively simple structure model of the ${}^{10}\text{Li}$ system, comprising s -wave virtual state and a p -wave resonance. Above ~ 2 MeV, the data suggest the presence of d -wave strength [3,4]

As a second example, I will discuss the case of ${}^{17}\text{C}$, recently studied at GANIL [5] by means of the ${}^{16}\text{C}(d,p){}^{17}\text{C}$ reaction. In this case, the description of the excitation spectrum can be also well described with the inclusion of s and d waves, but requires a more elaborate structure model, including core deformation and Pauli blocking effects arising from the open shell nature of the ${}^{16}\text{C}$ {it core}.

Finally, I will move to the case of the population of high-lying excited states, usually leading to inclusive measurements in which many partial waves are potentially involved and isolated states are not resolved. In this case, the modeling can be efficiently and elegantly performed making use of the Ichimura-Austern-Vincent (IAV) model [6], in which the states of the participant+target system are described in terms of an effective, complex potential, akin to that used in optical model calculations for elastic scattering. I will present some of examples of these inclusive, stripping reactions and stress their application to surrogate and incomplete fusion.

[1] H.B. Jeppesen, et al., Phys. Lett. B642, 449 (2006).

[2] M. Cavallaro et al., Phys. Rev. Lett. 118, 012701 (2017).

[3] A.M. Moro, J. Casal, M. Gomez-Ramos, Phys. Lett. B 793, 13 (2019).

[4] F. Barranco, G. Potel, E. Vigezzi, and R. A. Broglia, Phys. Rev. C 101, 031305(R) (2020).

[5] Lois-Fuentes et al. Phys. Lett. B867, 139600 (2025).

[6] M. Ichimura, N. Austern, and C. M. Vincent, Phys. Rev. C 32, 431 (1985).

Primary author: MORO, A.M. (Universidad de Sevilla)

Co-authors: Dr LAY, J.A. (Departamento de FAMN. Universidad de Sevilla); Dr PUNTA, P. (Departamento de FAMN. Universidad de Sevilla); Dr CASAL, J. (Departamento de FAMN. Universidad de Sevilla); Dr GOMEZ-RAMOS, M. (Departamento de FAMN. Universidad de Sevilla)

Presenter: MORO, A.M. (Universidad de Sevilla)

Session Classification: The symbiotic relationship between nuclear theory and ARIEL experiments

Contribution ID: 64

Type: **Invited oral presentation**

Nuclear structure studies from precision mass measurements at ISAC and in the ARIEL era

Tuesday, 21 April 2026 15:30 (20 minutes)

Precision mass measurements of exotic nuclei provide a direct and model-independent probe of nuclear structure, giving access to binding energies and derived observables such as two-neutron separation energies, shell-gap indicators, and odd-even staggering. At TRIUMF-ISAC, these techniques have enabled detailed studies of neutron-rich nuclei relevant to shell evolution, deformation, and the astrophysical

r-process. In this contribution, we will present recent precision mass measurements of neutron-rich isotopes, including our work on Sn isotopes beyond $N=82$ and on heavy neutron-rich Yb isotopes. These results illustrate how high-precision masses can reveal the persistence and evolution of shell structure, and identify structural reorganisation in the rare-earth region approaching a predicted $N\sim 116$ shape-transition region. Beyond their importance for nuclear structure, such measurements provide key experimental input for r-process calculations through neutron-separation energies and decay Q values.

We will discuss several science opportunities for precision mass measurements in the ARIEL era, particularly in neutron-rich regions where progress depends on sustained beam access and more systematic campaigns across isotopic chains. Two especially promising directions are the extension of mass measurements below ^{132}Sn , for example in the In, Ag, and Pd chains, to probe the evolution of shell structure below $Z=50$ and improve constraints on nuclei feeding the second r-process peak, and expanded studies of neutron-rich rare-earth nuclei, towards the Tb-Lu region, to map the evolution of deformation and pairing and to constrain the mass surface relevant for rare-earth peak formation. The emphasis will be on how precision masses, combined with complementary spectroscopy, can address open questions in neutron-rich nuclear structure and nucleosynthesis in the years ahead.

Primary author: REITER, Moritz Pascal (University of Edinburgh)

Co-author: Mx COLLABORATION, TITAN (TRIUMF)

Presenter: REITER, Moritz Pascal (University of Edinburgh)

Session Classification: Perspectives on rare isotope experiments at ARIEL with ion trapping & manipulation

Contribution ID: 65

Type: **Contributed poster presentation**

Troubleshooting the Next-Generation High-Power Electron Gun for Re-Accelerated Beam Production at TRIUMF

Nuclear reactions reveal critical information about nuclear structure and nuclear astrophysics. Some studies, like half-life determinations, are directly relevant to understanding the evolution of nuclear shells, while others have an indirect impact through the production of exotic species to advance the pathway of the rapid-neutron-capture process. The common requirement for these studies at TRIUMF is re-accelerated beam, which requires ion charge breeding. This can be best achieved by upgrading from an ECRIS-style to an EBIS-style breeder.

EBIS is the Electron Beam Ion Source in CANREB that charge breeds ions to highly charged ions (HCI) using a high power electron gun. Since the source faced several design challenges, an E-gun Test Stand was designed to perform a modular testing of the system. Its goal is to mimic the magnetic field of EBIS at the emission surface, ensuring a proper electron beam formation, and to capture the beam properties. We designed and simulated various configurations of the e-gun position using finite element analysis and multi-particle tracking code TRAK, benchmarking it with other codes like TRANSOPTR, IGUN and COMSOL. The Test Stand will also be used for further gun development, like testing the TITAN electron gun.

Primary author: ISMAGILOVA, Safia

Co-authors: KWIATKOWSKI, Anna (TRIUMF); SCHULTZ, Brad (TRIUMF); CHARLES, Christopher (TRIUMF); CARDONA, Jaime (TRIUMF); HARTMANN, Marco (TRIUMF); Ms DEHGHAN, Masoumeh (TRIUMF); KESTER, Oliver (TRIUMF); SHELBAYA, Olivier (TRIUMF)

Presenter: ISMAGILOVA, Safia

Session Classification: Reception & Poster Session

Contribution ID: 66

Type: **Invited oral presentation**

Testing Static Octupole Deformation in Radium Isotopes via Collinear Laser Spectroscopy at ARIEL

Wednesday, 22 April 2026 13:30 (20 minutes)

Radium isotopes near $A = 220-230$ exhibit strong octupole correlations, evidenced by low-lying negative-parity states and enhanced E3 transition strengths in even-even nuclei [1,2]. However, whether the underlying octupole deformation is static (a genuine ground-state symmetry breaking) or dynamic (a collective shape vibration) remains an open question.

In this contribution, the possibility of addressing this question through collinear laser spectroscopy of odd- A radium isotopes is discussed. I will outline a roadmap toward next-generation collinear laser spectroscopy of radium isotopes aimed at testing static octupole deformation via hyperfine spectroscopy at TRIUMF ARIEL. While previous laser spectroscopy measurements in radium at ISOLDE have focused on isotope shifts and the extraction of magnetic dipole and electric quadrupole moments [3], future measurements involving higher- J atomic states enable sensitivity to rank-3 hyperfine interactions associated with the nuclear magnetic octupole moment.

The proposed approach relies on multi-state hyperfine spectroscopy and global analysis of hyperfine patterns to test whether dipole–quadrupole interactions are sufficient to describe the spectra, or whether a rank-3 contribution is required. This effectively turns the search for octupole deformation into a statistical hypothesis test rather than a direct measurement of a single small parameter.

In this talk, I introduce the physics motivation and discuss experimental requirements and feasibility at ARIEL, and invite community discussion on beam availability and infrastructure.

[1] L. P. Gaffney *et al.*, *Nature* **497**, 199 (2013).

[2] P. A. Butler *et al.*, *Phys. Rev. Lett.* **124**, 042503 (2020).

[3] K. M. Lynch *et al.*, *Phys. Rev. C* **97**, 024309 (2018).

Primary author: TAKAMINE, Aiko (Institute of Science Tokyo)

Presenter: TAKAMINE, Aiko (Institute of Science Tokyo)

Session Classification: New directions in laser spectroscopy with rare isotopes

Contribution ID: 67

Type: **Contributed poster presentation**

The Missing Nuclear and Atomic Spectroscopy Enabled in the ARIEL Era via the TITAN-EBIT

Experiments of highly suppressed or forbidden nuclear decays, like double-gamma decay or nuclear excitation by electron capture, require weeks-long setup and observation times in the TITAN-EBIT, which had been curtailed by the over-subscription of the ISAC era. The results of these experiments have far-reaching implications, including direct probes of electric dipole polarizability and the role of spectator electrons in rare HCI decays, which are crucial to nucleosynthesis studies for r-process environments. Moreover, nuclear charge radii, also feasible in the TITAN-EBIT, would provide the first absolute nuclear charge radii for Fr and Ra eEDM hunts and invaluable information about the evolution of nuclear shell structures. Together, these endeavors highlight TITAN's potential to leverage ARIEL's increased beam hours and beam development for innovative and exploratory science.

Primary authors: ASH, John (TRIUMF); DEHGHAN, Masoumeh (TRIUMF)

Presenters: ASH, John (TRIUMF); DEHGHAN, Masoumeh (TRIUMF)

Session Classification: Reception & Poster Session

Contribution ID: 68

Type: **Invited oral presentation**

ACTAR science opportunities at ARIEL

Tuesday, 21 April 2026 11:40 (20 minutes)

The ACTAR TPC device is a time projection chamber, developed for nuclear physics experiments, that allows for the 3D tracking of charged particles in an active gas volume. It has been used since 2019 during several campaigns at GANIL (Caen, France), and in 2025 at TRIUMF (Vancouver, Canada). The detector was designed to work as an active target (the gas acts as a target for nuclear reaction) or in implantation-decay mode. Experiments in both mode have been carried out. The principle of these experiments is to extract the physics information for the 3D reconstruction of the tracks ions and particles involved in nuclear reactions or decays.

The active target mode allows studying several types of reactions to address nuclear structure properties of exotic nuclei and/or unbound states. So far, experiments involving elastic and inelastic scattering transfer and charge exchange reactions have been performed.

The device is also well suited for exotic decay studies involving proton(s) emission. The decaying nuclei are implanted in the active volume, where the decay occurs and the trajectories of emitted particles are analyzed.

Typical studies and recent results obtained in experiments performed with this detector will be presented together with possible future studies to be performed at ARIEL

Primary author: ROGER, Thomas (GANIL)

Co-author: Dr GIOVINAZZO, Jérôme (LP2IB)

Presenter: ROGER, Thomas (GANIL)

Session Classification: Opportunities in reaction studies with re-accelerated rare isotope beams at ARIEL

Contribution ID: 69

Type: **Invited oral presentation**

Direct Measurements of (α ,n) Reactions for Nuclear Astrophysics with ARIEL

Monday, 20 April 2026 13:50 (20 minutes)

Reactions induced by alpha-particles that result in the emission of neutrons play a critical role across multiple disciplines of fundamental and applied nuclear physics. However, essential cross-section data for many key (α ,n) reactions are either discrepant or entirely unmeasured. In nuclear astrophysics, this deficiency severely impacts models that describe how heavy elements are formed during stellar burning, e.g. via the s-process in massive stars [1,2], and explosive environments, such as neutrino-driven winds of supernovae and neutron star mergers [3]. This problem is especially pronounced for the latter scenario, where entirely unmeasured (α ,n) reactions on radioactive nuclei strongly influence the path of a “weak”r-process [4]. However, with the ARIEL upgrade, TRIUMF is uniquely well-placed to provide essential data underpinning nucleosynthesis in both the weak r-process and s-process. Recently, a proof-of-concept measurement was published that demonstrated the use a recoil spectrometer (EMMA) and HPGe array (TIGRESS) to study (α ,n) reactions with radioactive beams [5], made possible by newly developed nanomaterial targets [6]. This study has now opened the door for a new experimental programme in weak r-process reaction studies, bolstered by improved selectivity from compact neutron detectors and, through the ARIEL upgrade, clean, neutron-rich beams with efficient charge-breeding. Meanwhile, the DRAGON facility provides an excellent tool to study (α ,n) reactions in stellar burning scenarios, again with improved selectivity from neutron detectors (DEMAND array) to expand capabilities beyond radiative capture. In this talk, I will present recent efforts towards an (α ,n) reaction programme using facilities in both the ISAC-I and ISAC-II halls, highlighting the many benefits provided by the ARIEL upgrade.

- [1] M. Wiescher, et al., Eur. Phys. J. A 59, 11(2023).
- [2] J. Frost-Schenk, et al., MNRAS 514, 2650–2657 (2022).
- [3] J. Bliss, et al., J. Phys. G 44, 054003 (2017).
- [4] A. Psaltis, et al., ApJ 935 27 (2022).
- [5] M. Williams, et al., PRL 134(11) 112701 (2025)
- [6] V. Godinho, et al., ACS omega 1(6) 1229-1238 (2016).

Primary author: Dr WILLIAMS, Matthew (Univesisity of Surrey)

Presenter: Dr WILLIAMS, Matthew (Univesisity of Surrey)

Session Classification: Nuclear Astrophysics enabled by ARIEL rare isotope capabilities

Contribution ID: 70

Type: **Invited oral presentation**

Nuclear Physics Activities in Fundamental Symmetries and Astrophysics at Central Michigan University

Wednesday, 22 April 2026 11:40 (20 minutes)

The experimental nuclear physics program at Central Michigan University encompasses the pillars of low energy nuclear science, including applications to astrophysics, nuclear structure and fundamental symmetries. In this presentation we will describe the current research program at CMU and possibilities for future experiments that will combine the capabilities of the ARIEL facility and the existing state-of-the-art devices available at TRIUMF. Future experimental proposals will include precision mass measurements with the TITAN Penning trap and MR-TOF-MS, beta-decay lifetime measurements, and reaction cross-section measurements.

Primary author: REDSHAW, Matthew (Central Michigan University)

Co-author: ESTRADA, Alfredo (Central Michigan University)

Presenter: REDSHAW, Matthew (Central Michigan University)

Session Classification: Future directions in exploring fundamental symmetries with rare-isotopes

Contribution ID: 71

Type: **Contributed poster presentation**

Nuclear Structure & Astrophysics Studies of Exotic Nuclei Using Reactions with Solid H₂/D₂ Target at IRIS

We will give an overview of recent results from IRIS experiments and discuss future directions enabled by ARIEL.

Primary authors: DAVIS, Keilah (TRIUMF); HUNT, Curtis (TRIUMF)

Co-authors: KANUNGO, Rituparna (TRIUMF); ALCORTA, Martin (TRIUMF)

Presenters: DAVIS, Keilah (TRIUMF); HUNT, Curtis (TRIUMF)

Session Classification: Reception & Poster Session

Contribution ID: 72

Type: **Invited oral presentation**

Study of the octupole collectivity of neutron-rich Ba isotopes

Tuesday, 21 April 2026 09:40 (20 minutes)

Octupole-deformed nuclei represent quantum many-body systems in which spatial reflection symmetry is broken in the body-fixed frame, while the symmetry must be restored in the laboratory frame. Such nuclei therefore provide a unique opportunity to investigate fundamental symmetry properties in atomic nuclei. However, the nature of octupole deformation remains insufficiently understood because most nuclei possessing octupole “magic numbers” are radioactive and experimentally difficult to access.

In the region around $Z \sim 56$ and $N \sim 88$, near the doubly octupole-magic nucleus ^{144}Ba , theoretical studies predict a systematic evolution of octupole deformation. In particular, both the emergence and disappearance of octupole collectivity are expected to occur as a result of the competition between quadrupole and octupole correlations.

At RIBF, using the energy-degrading and focusing device OED, we plan to investigate the evolution of octupole collectivity in neutron-rich Ce isotopes. For Ba isotopes, however, theoretical predictions indicate that the boundary of stable octupole deformation extends up to ^{150}Ba , which is presently beyond the experimental reach of RIBF. Therefore, we propose an experiment aimed at studying the octupole collectivity in neutron-rich Ba isotopes in order to clarify the evolution and limits of octupole deformation in this key mass region.

In this experiment, proton- and deuteron-induced inelastic scattering, together with Coulomb excitation, will be performed using re-accelerated radioactive ion beams. These complementary probes enable a systematic investigation of octupole and quadrupole collectivity through the measurement of transition strengths and excitation properties.

Primary author: IMAI, Nobu (Center for Nuclear Study, Univ. of Tokyo)

Presenter: IMAI, Nobu (Center for Nuclear Study, Univ. of Tokyo)

Session Classification: Gamma-ray Spectroscopy enabled by ARIEL re-accelerated rare isotope beams

Contribution ID: 73

Type: **Invited oral presentation**

A Low-Energy Storage Ring at an ISOL Facility: A Vision for the Future

Wednesday, 22 April 2026 15:50 (20 minutes)

Employing storage rings for precision physics experiments with highly charged ions (HCI) is a powerful approach –yet the full potential of this method remains to be unlocked at low energies. Storage of freshly produced secondary particles in a storage ring is a straightforward way to achieve the most efficient use of these rare species.

All presently operating heavy-ion storage rings are in operation at high-energy in-flight facilities. However, there are numerous physics cases requiring beams at low energies.

Successful nuclear reaction studies at the ESR have been demonstrated at GSI with decelerated beams and at CRYRING at GSI with stable beams from a local injector. Pure, ultra-thin, windowless gas targets in combination with beam cooling enable highest energy and angular resolutions. However, the deceleration of the beam is a slow process accompanied with inevitable beam losses.

Therefore, there is a dream to build a dedicated low-energy storage ring at an ISOL facility with a post-acceleration capability. One of the major advantages is the ability to efficiently accumulate the beam if it is injected directly at the energy required by the experiment. Depending on the radioactive half-life and beam loss rates, this may provide beam intensities approaching space charge limit.

Looking ahead, it might be possible to incorporate into the ring a free-neutron target. Combined with intense radioactive ions beams this would open an enormous discovery potential for neutron-induced reaction studies.

While the storage ring project at CERN/ISOLDE awaits realization, the scientific case has been firmly established. TRIUMF, with its world-leading ISOL capabilities and post-acceleration infrastructure, stands as an ideal site to bring this vision to life.

Primary author: LITVINOV, Yury (GSI Helmholtz Center for Heavy Ion Research)

Presenter: LITVINOV, Yury (GSI Helmholtz Center for Heavy Ion Research)

Session Classification: Future experimental infrastructure developments at ARIEL

Contribution ID: 74

Type: **Invited oral presentation**

Indirect Neutron-Capture Constraints Far from Stability

Monday, 20 April 2026 14:10 (20 minutes)

One of the biggest questions in nuclear astrophysics regards how elements are synthesized in stellar environments. Observations of astrophysical phenomena provide us with evidence for different nucleosynthesis processes, and modelling these astrophysical scenarios requires a detailed description of the complex nuclear physics that is involved. Radioactive decay, nuclear reactions, and the properties of individual nuclei are required to fully understand the origin of the elements, and substantial experimental and theoretical progress has been made to address this question. On the neutron-rich side of stability, neutron-capture processes such as the slow (s), intermediate (i), and rapid (r) processes play a pivotal role in our understanding of the origin of heavy elements. Direct neutron-capture measurements are infeasible for the short-lived nuclei involved in these processes, and therefore indirect neutron-capture techniques are needed. In this presentation I will discuss indirect neutron-capture techniques that have been developed over the last few years and how they can be applied to constrain reactions relevant to r-process nucleosynthesis.

Primary author: RICHARD, Andrea (Ohio University)

Presenter: RICHARD, Andrea (Ohio University)

Session Classification: Nuclear Astrophysics enabled by ARIEL rare isotope capabilities

Contribution ID: 75

Type: **Contributed poster presentation**

MeV gamma-ray lines from the decays of r-process isotopes in neutron star mergers

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Primary author: LARIVIÈRE, Maude (UBC / TRIUMF)

Co-authors: VASSH, Nicole (TRIUMF); SURMAN, Rebecca (University of Notre-Dame); WANG, Xilu (Institute of High Energy Physics, China); DENG, Yanwen (Institute of High Energy Physics, China)

Presenter: LARIVIÈRE, Maude (UBC / TRIUMF)

Contribution ID: 76

Type: **Contributed poster presentation**

Using Solar r-process abundances to probe nuclear masses with Markov Chain Monte Carlo

R-process nucleosynthesis is an important astrophysical process that is responsible for generating many of the heavy elements that we see in stars and in our own Solar System today. The exact events that occurred which enriched our Solar System with heavy elements is still a mystery. For example, the origin of the rare earth peak at $A \sim 164$ that arises in between the second and third peak from shell closures is still unknown. In addition to exploring astrophysical conditions, information on nuclear masses is required to predict the reaction rates that influence the r process. To learn about the masses and conditions that enriched our Solar System, we employ the Metropolis-Hastings algorithm to search a physically constrained parameter space of possible masses. This algorithm finds the combination of masses and astrophysical conditions that best match the Sun's abundance pattern as well as experimentally determined masses. This work thus provides estimates of neutron rich isotope masses for experiments to verify, illuminates the physical mechanisms behind the abundance pattern of the Sun, and provides insights into the r process events that enriched our Solar System. The work presented here will explore more astrophysical conditions than previously considered in the literature, including weak r process cases to explore the possible origin of the solar Light Precious Metal Peak.

Primary author: MAGOR, Aiden

Presenter: MAGOR, Aiden

Session Classification: Reception & Poster Session

Contribution ID: 77

Type: **Contributed poster presentation**

Nuclear Data Needs for Dynamic Nucleosynthesis in Stars

F. Herwig, P. Denissenkov, J. Issa

Astronomy Research Centre and Department of Physics and Astronomy, University of Victoria

Recent advances in 3D hydrodynamic simulations of stellar interiors and multi-zone nucleosynthesis calculations have identified specific nuclear reaction rates on unstable species whose experimental determination would significantly reduce uncertainties in predicted abundances and allow probing the 3D macro physics entangled with dynamic nucleosynthesis. In the intermediate neutron-capture process, which operates at neutron densities of 10^{13} to 10^{16} cm^{-3} , Monte Carlo sensitivity studies identify (n,γ) reactions on unstable isotopes, particularly ^{88}Kr , $^{88,89}\text{Rb}$, $^{90,92}\text{Sr}$, ^{139}Ba , and ^{141}La , as critical for reproducing observed first-peak element abundances in CEMP-i stars. Improved constraints on ^{141}Ba and ^{141}La capture rates are especially needed, as uncertainties in these rates drive a persistent discrepancy in the predicted Pr abundance for metal poor stars like CS 31062-050. New studies of O-C shell mergers in massive star progenitors, where 3D simulation-inspired mixing was explored with nucleosynthesis post-processing, that $^{100}\text{Pd}(\gamma,p)$ and (γ,α) correlate with the production of p-process isotopes ^{92}Mo , $^{96,98}\text{Ru}$, and ^{102}Pd , while $^{40}\text{Ca}(n,p)$ and $^{39}\text{Ar}(p,\gamma)$ govern ^{40}K production and $^{43}\text{Ca}(p,\gamma)$ and $^{44}\text{Sc}(p,n)$ govern ^{44}Ti yields across all mixing scenarios.

Primary author: HERWIG, Falk (University of Victoria)**Presenter:** HERWIG, Falk (University of Victoria)**Session Classification:** Reception & Poster Session

Contribution ID: 78

Type: **not specified**

The GANIL SPIRAL2 facility and science program

Thursday, 23 April 2026 14:00 (1h 15m)

Presenter: SAVAJOLS, Hervé (GANIL (CNRS))

Session Classification: TRIUMF Colloquium

Contribution ID: 79

Type: **not specified**

Accelerator Technology R&D at TRIUMF

Thursday, 23 April 2026 09:30 (20 minutes)

Presenter: KESTER, Oliver (TRIUMF)

Session Classification: CNRS Workshop - Intro & Accelerator R&D

Contribution ID: **80**

Type: **not specified**

SRF collaboration with IJCLab & TRIUMF

Thursday, 23 April 2026 09:50 (15 minutes)

Presenter: CHENEY, Camille (IJCLab, Orsay)

Session Classification: CNRS Workshop - Intro & Accelerator R&D

Contribution ID: **81**

Type: **not specified**

Radioactive molecules at GANIL

Presenter: FRANCHOO, Serge (IJCLab, Orsay)

Session Classification: CNRS Workshop - Astrophysics Session

Contribution ID: **82**

Type: **not specified**

Radioactive molecules at ISAC

Presenter: MALBRUNOT-ETTENAUER, Stephan (TRIUMF)

Session Classification: CNRS Workshop - Astrophysics Session

Contribution ID: **83**

Type: **not specified**

Discussion

Thursday, 23 April 2026 11:25 (15 minutes)

Session Classification: CNRS Workshop - Astrophysics Session

Contribution ID: **84**

Type: **not specified**

Discussion

Thursday, 23 April 2026 10:05 (25 minutes)

Session Classification: CNRS Workshop - Intro & Accelerator R&D

Contribution ID: 85

Type: **not specified**

Nuclear structure at ISAC (experiment)

Thursday, 23 April 2026 15:15 (20 minutes)

Presenter: HACKMAN, Greg (TRIUMF)

Session Classification: CNRS Workshop - Nuclear structure (experiment)

Contribution ID: **86**

Type: **not specified**

Nuclear structure by LPC-Caen (experiment)

Thursday, 23 April 2026 15:35 (20 minutes)

Presenter: DELAUNAY, Franck (LPC-Caen)

Session Classification: CNRS Workshop - Nuclear structure (experiment)

Contribution ID: 87

Type: **not specified**

Discussion

Thursday, 23 April 2026 15:55 (20 minutes)

Session Classification: CNRS Workshop - Nuclear structure (experiment)

Contribution ID: **88**

Type: **not specified**

Nuclear theory projects

Thursday, 23 April 2026 16:30 (15 minutes)

Presenter: HOLT, Jason (TRIUMF)

Session Classification: CNRS Workshop - Nuclear theory

Contribution ID: **89**

Type: **not specified**

Nuclear theory projects

Thursday, 23 April 2026 16:45 (15 minutes)

Presenter: HUPIN, guillaume (IJCLab, Orsay)

Session Classification: CNRS Workshop - Nuclear theory

Contribution ID: **90**

Type: **not specified**

Discussion

Thursday, 23 April 2026 17:00 (20 minutes)

Session Classification: CNRS Workshop - Nuclear theory

Contribution ID: **91**

Type: **not specified**

Nucleosynthesis and nuclear data

Presenter: VASSH, Nicole (TRIUMF)

Session Classification: CNRS Workshop - Session 5

Contribution ID: 92

Type: **not specified**

Nuclear astrophysics - HINA and AME

Presenters: NAIMI, S. (IJCLab); NAIMI, Sarah (IJCLab, Orsay)

Session Classification: CNRS Workshop - Session 5

Contribution ID: 93

Type: **not specified**

Discussion

Session Classification: CNRS Workshop - Session 5

Contribution ID: 94

Type: **not specified**

Recap of DRAGON/TUDA program

Thursday, 23 April 2026 10:50 (5 minutes)

Presenter: RUIZ, Chris (TRIUMF)

Session Classification: CNRS Workshop - Astrophysics Session

Contribution ID: 95

Type: **not specified**

Nucleosynthesis and nuclear data

Thursday, 23 April 2026 10:55 (15 minutes)

Presenter: VASSH, Nicole (TRIUMF)

Session Classification: CNRS Workshop - Astrophysics Session

Contribution ID: 96

Type: **not specified**

Nuclear astrophysics with HINA (+AME)

Thursday, 23 April 2026 11:10 (15 minutes)

Presenter: NAIMI, Sarah (IJCLab, Orsay)

Session Classification: CNRS Workshop - Astrophysics Session

Contribution ID: 97

Type: **not specified**

Recap of BeEST (TRIUMF/LPC-Caen) activities

Thursday, 23 April 2026 11:40 (5 minutes)

Presenter: LENNARZ, Annika (TRIUMF)

Session Classification: CNRS Workshop - Fundamental Interactions session

Contribution ID: 98

Type: **not specified**

Radioactive molecules at GANIL

Thursday, 23 April 2026 11:45 (15 minutes)

Presenter: FRANCHOO, Serge (IJCLab, Orsay)

Session Classification: CNRS Workshop - Fundamental Interactions session

Contribution ID: 99

Type: **not specified**

Radioactive molecules at TRIUMF

Thursday, 23 April 2026 12:00 (15 minutes)

Presenter: MALBRUNOT-ETTENAUER, Stephan (TRIUMF)

Session Classification: CNRS Workshop - Fundamental Interactions session

Contribution ID: **100**

Type: **not specified**

Discussion

Thursday, 23 April 2026 12:15 (15 minutes)

Session Classification: CNRS Workshop - Fundamental Interactions session

Contribution ID: **101**Type: **Invited oral presentation**

GANIL status & science program

GANIL/SPIRAL2 presently offers unique opportunities in nuclear physics and in many other fields that arise from not only the provision of low-energy stable beams, fragmentation beams, re-accelerated radioactive species, and recently neutron beams but also from the availability of a wide range of state-of-the-art spectrometers and instrumentation. A few examples of recent highlights will be presented together with upcoming new scientific opportunities with ongoing projects.

Primary author: SAVAJOLS, Hervé (GANIL (CNRS))

Presenter: SAVAJOLS, Hervé (GANIL (CNRS))

Session Classification: TRIUMF Colloquium

Contribution ID: 102

Type: **Invited oral presentation**

Pairing studies with transfer reactions at ARIEL*

Tuesday, 21 April 2026 11:20 (20 minutes)

A wealth of experimental data supports the important role played by pairing correlations in atomic nuclei. In analogy to superconductors, nuclear “Cooper pairs” have a strong influence on many properties such as binding energies, excitation spectra, deformations, moments of inertia, etc.

The study of pairing correlations in exotic nuclei is a subject of active research in nuclear structure. Specific areas include: i) The role of isovector pairing in neutron-rich isotopes, where the effects of weak binding and continuum coupling are expected to be important, ii) The competition of isovector and isoscalar neutron-proton pairing in $N=Z$ nuclei, and iii) The delicate balance between single-particle degrees of freedom and pairing and quadrupole correlations in the Islands of Inversion.

It is well established that direct single- and two-nucleon direct transfer reactions are unique tools to understand pairing correlations in nuclei as they are particularly suited to probe the quasi-particle nature and the two-nucleon pair density by determining occupancies (spectroscopic factors) and two-nucleon amplitudes (TNA) respectively.

The ARIEL facility will provide access to enhanced rare-isotope-beams capabilities at TRIUMF, with energies up to 16.5 MeV/u. These beams and existing (and to be developed) state-of-the-art instrumentation will enable a vibrant research program to study pairing correlations in exotic nuclei with transfer reactions.

In this presentation we will discuss some examples addressing the three areas mentioned above to showcase the opportunities that ARIEL will offer on this topic.

*This work was supported by the U.S. Department of Energy under Contract No. DE-AC05-00OR22725 with UT-Battelle, LLC.

Primary author: MACCHIAVELLI, Augusto (Oak Ridge National Laboratory)

Presenter: MACCHIAVELLI, Augusto (Oak Ridge National Laboratory)

Session Classification: Opportunities in reaction studies with re-accelerated rare isotope beams at ARIEL

Contribution ID: 103

Type: **Invited oral presentation**

Probing shape coexistence in neutron-rich nuclei with transfer reactions

Tuesday, 21 April 2026 09:20 (20 minutes)

Transfer reactions provide a powerful and selective tool to probe the microscopic structure of atomic nuclei. In particular, they are sensitive to single-particle occupancies and wave-function overlaps, offering direct insight into the interplay between single-particle and collective degrees of freedom. This makes them ideally suited to investigate shape coexistence in nuclei.

In this talk, I will give a brief introduction to transfer reactions and discuss recent measurements using radioactive ion beams. Special emphasis will be placed on two-neutron transfer reactions, which are particularly sensitive to shape coexistence and configuration mixing. I will outline future prospects for transfer-reaction studies at next-generation facilities, with a focus on the ARIEL project at TRIUMF. The increased beam intensities and extended isotope reach will open new opportunities for systematic investigations of shape coexistence in neutron-rich nuclei.

Primary author: WIMMER, Kathrin

Presenter: WIMMER, Kathrin

Session Classification: Gamma-ray Spectroscopy enabled by ARIEL re-accelerated rare isotope beams

Contribution ID: 104

Type: **Invited oral presentation**

The Superconducting Array for Low Energy Radiation (SALER) at ARIEL

Tuesday, 21 April 2026 13:50 (20 minutes)

SALER (Superconducting Array for Low-Energy Radiation) is a new experimental platform that uses superconducting sensors to study radioactive decay through direct detection of eV-scale nuclear recoil and other low-energy observables. The approach has already been developed and tested in the rare-isotope environment at FRIB, establishing its promise as a powerful new tool for precision decay studies. ARIEL offers an exciting opportunity to extend this capability to a broad and complementary range of isotopes and science cases, including weak-interaction studies, tests of fundamental symmetries, and questions in nuclear structure and astrophysics. In this talk, I will discuss the SALER concept, its demonstrated progress to date, and the prospects for a future program at ARIEL.

Primary author: LEACH, Kyle (Queen's University)

Presenter: LEACH, Kyle (Queen's University)

Session Classification: Experimental horizons for BSM and electroweak interactions using AMO techniques and rare isotope beams