PSD Mixer

29 September 2022

Petr Navratil

2022-10-13

Agenda

- Division updates
- Q+A
- GAPS introduction by Guy Leckenby
- Science Talk

  Richard Woloshyn: “What is Lattice QCD and why do we need it?”
- Food and hang-out time!

We are now keeping a record for in-person mixer attendees as required by Finance, and to help the Mixer Committee plan our mixers accordingly. Please **scan the QR code** at the door or on the presentation slides to sign-in. Online attendees do not have to sign in.

Announcements

- 2023/24 MRO Budget – PSD divisional target is $577,575 (current fiscal year $578,370)
  - **Targets for your MRO budgets remain the same as for this fiscal year**
  - Use Adaptive Planning - Workday's financial planning, budgeting, and analysis module
  - Input must be completed by **October 14, 2022**
  - Relocation cost for NSERC funded postdocs must be included in the MRO NRC budget

- ACOT – October 24-25, 2022
  - PSD participation – parallel sessions, poster session, site tour

- NRC Evaluation – Peer Review Committee (November 29 – December 3, 2022)

Peer Review Committee

Key information

1. **Dates**: Tuesday, November 29, 2022 – Thursday, December 1, 2022
2. **Format**: In-person; contingency for remote if required
3. **Questions**:

Theme(s)	Question for PRC
Scientific Excellence	1. To what extent is TRIUMF a platform for scientific excellence, including in its: a. knowledge creation (e.g., scientific publications, technology development) b. connector role (i.e., extent to which Canada's participation in TRIUMF connected Canada to the world in TRIUMF-related fields) c. infrastructure
Relevance	2. Is TRIUMF focusing on the right areas to stay relevant to the TRIUMF community and beyond?
Capabilities	3. To what extent does TRIUMF have the capacity, competencies and facilities needed to achieve its objectives moving forward?
Governance	4. To what extent is the governance of TRIUMF (e.g., committees, policies, and controls) effective / efficient? Are there any efficiencies to be gained? (taking into account the Canadian environment and system)

3. **Committee Members***:

Name	Area of expertise	Title/Current Position	Location	E-mail Address
CHAIR Dr. Kimberly S. Budil	Engineer/physicist; organizational management	Director, Lawrence Livermore National Laboratory	USA (West)	budil1@llnl.gov larson53@llnl.gov
Dr. Souzan Armstrong	Commercialization	Executive Director at WORLDiscoveries	Ontario, Canada	souzan.armstrong@uwo.ca
Dr. Simon R. Cherry	Nuclear Medicine	Distinguished Professor of Biomedical Engineering/Radiology at UC Davis	USA (West)	srcherry@ucdavis.edu
Dr. Alexandra Gade	Nuclear Physics	Professor of Physics, National Superconducting Cyclotron Laboratory, Michigan State University	USA	gade@nscl.msu.edu
Dr. Catherine Kallin	Molecular and Materials Science	Professor in Dept. of Physics & Astronomy at McMaster University	Victoria, BC, Canada	kallin@mcmaster.ca
Dr. Brad Sherrill	Accelerator physics	Professor of Physics at Michigan State University	USA	sherrill@frib.msu.edu
Dr. Elizabeth H. Simmons	Particle physicist; organizational management	Executive Vice Chancellor at the University of California San Diego.	USA (West)	ehsimmons@ucsd.edu jpinto@ucsd.edu
Dr. Frank Zimmermann	Accelerator physics / International lab	CERN, FCC study deputy leader	Switzerland	frank.zimmermann@cern.ch

* Pending possible changes

TRIUMF Tiger Team has been struck to manage the delivery of all documentation, presentations and material for the PRC. Meets weekly to oversee process. Currently working on agenda and talk definitions

Plenary	Plenary lead	Question 1: To what extent is TRIUMF a platform for scientific excellence? (knowledge creation, connecting role, infrastructure)	Question 2: Is TRIUMF focusing on the right areas to stay relevant to serve the needs of the TRIUMF community and beyond?	Question 3: To what extent does TRIUMF have the capacities, competencies, and facilities needed to achieve its objectives moving forward?	Question 4: To what extent is the governance of TRIUMF effective/efficient? Are there efficiencies to be gained?
Introduction	Kate Pachal	✓	✓	✓	
Overview	Nigel Smith	✓	✓	✓	✓
Particle Physics*	Isabel Trigger	✓	✓	✓	
Nuclear Physics*	Chris Ruiz	✓	✓	✓	
Accelerators*	Thomas Planche	✓	✓	✓	
Life Sciences*	Paul Schaffer	✓	✓	✓	
Materials Sciences*	Iain McKenzie	✓	✓	✓	
TRIUMF Innovations & Industrial Partnerships*	Kathryn Hayashi	✓	✓	✓	✓
Strategic Planning	Sean Lee	✓	✓	✓	✓
Governance & Management	Nigel + BoG representative	✓	✓	✓	✓

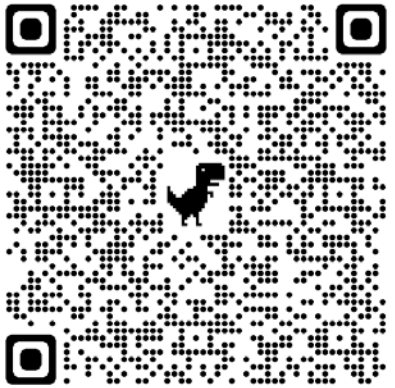
PSD engagement:

Plenary talks (particle, nuclear, materials sciences)
Parallel sessions (particle, nuclear, materials sciences)
Poster session
Site tour
Researcher CVs

Prioritize if asked for help!

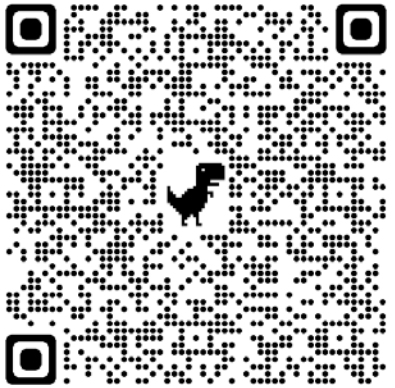
New Work Policy

- Flexible On-Site Work: Target Date ~ September 6 – (Majority of Staff)
  - Provide notice and obtain permission from your manager to work remotely - now
  - Approval based on operational requirements
- Formal Remote Work: Target Date – September 6 – October 31
  - Determine eligibility and advise Division Director & HR
  - Submission deadline – October 14
  - Approval based on operational requirements



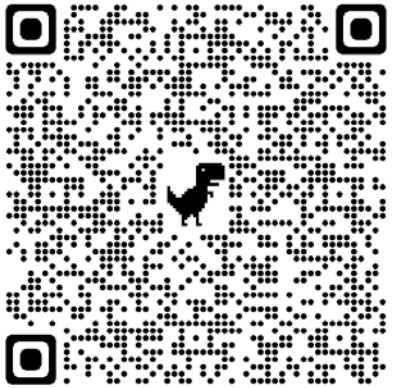
Divisional News

- PSD one-time budget requests at the TRIUMF Budget Retreat 06/23/2022
  - CMMS-UCN Helium Liquefier - operating budget for Y22/23 – approved
  - Additional PIF shielding blocks to mitigate radiation leak – approved
  - High Speed Four Channel, 6Ghz, 20Gsps Oscilloscope – approved
  - Meson Hall liquefier upgrade conceptual design study – funded by divisions (PSD/ACC)
  - Digital Detector Emulator – funded by division/departments



Divisional News

- CFI 2023 project proposals submitted
  - ATLAS Tier 1 Centre, Hyper-K, DarkLight, P-One, ARGO, nEXO
- TUCAN UCN project had the EAC review on June 17-21, 2022
  - Focus on achieving maximum source performance
- PSD submitted a BAE promotion package for the December BoG meeting
  - PSD ad hoc promotion committee met in August, chaired by Isabel Trigger
- Molecular and Materials Science Experiments Evaluation Committee met on July 25th and 26th, 2022
  - Examined 23 μSR proposals (8 progress reports and 15 new proposals) and 1 βNMR progress report
- BAE search – ALPHA
  - Ongoing
- Director, Physical Sciences search
  - Committee being formed



Reminders

- NSERC grants submission deadline approaching
  - Observe internal deadlines!

Grant	Internal Deadline*	Agency Deadline
SAP Project applications requesting $500,000 or more per year SAP MRS applications SAP RTI *Categories 2 and 3* applications	September 16, 2022	October 3, 2022 (*because Oct. 1 falls on a weekend)
SAP RTI *Category 1* applications RTI Grants outside of Subatomic Physics	October 11, 2022	October 25, 2022
Individual Discovery Grants SAP Discovery Grants - Individual AND Project requesting less than $500,000 per year	October 18, 2022	November 1, 2022

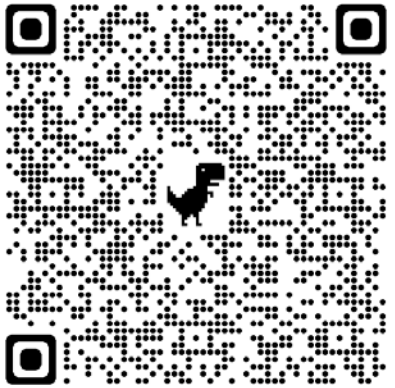
Reminders

- It is important to **enter your time in Workday** accurately and in a timely manner
  - Relevant for project tracking

Challenges

- The ISAC accelerated beam schedule this summer was impacted by technical failures
  - Problems with Charge State Booster, SC Linac, HP targets+FEBIAD
  - Coordination with the Accelerator Division to mitigate and resolve problems
  - Beam schedule adjustments

- Helium deliveries
  - Shortage of helium due to shutdowns of helium plants in Texas and Algeria coupled with the war in Ukraine slashing supplies from Europe
  - Price increase for purchases above the contract allocation
  - Bassam Hitti (CMMS) is coordinating TRIUMF purchasing



Recent events

- Graduate Instrumentation and Detector School (GRIDS) 2022 held at TRIUMF from June 13-24

- The 2022 Tri-Institute Summer School on Elementary Particles (TRISEP) held in TRIUMF auditorium from July 4-15
  - Organized jointly by the Perimeter Institute for Theoretical Physics, SNOLAB, and TRIUMF

- TRIUMF Science Week held from July 18-22, 2022
  - Hybrid format
  - More than 200 participants

- 2nd Joint Canada-APCTP Meeting on Nuclear Theory held from August 8-12 in the auditorium
  - 26 international participants
  - Both theory and experiment – update on the status of RAON (Korean RIB facility)

- SNOLAB-TRIUMF fall 2022 workshop on Light Dark Matter
  - GUINEAPIG = GeV and Under Invisibles with New Experimental Assays for Particles In the Ground
  - September 8-10, 2022 at TRIUMF

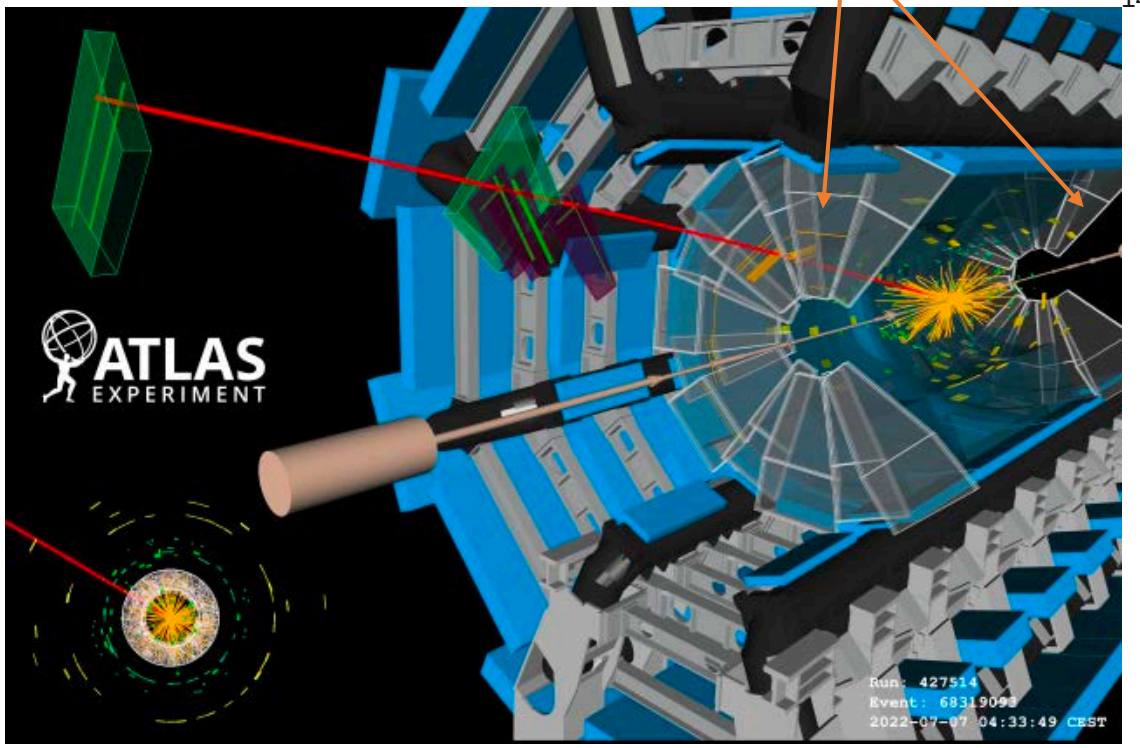
Recent events

- The International Nuclear Physics Conference INPC 2022 held in Cape Town, Sept 11-16
  - Largest nuclear physics conference
    - Held in Vancouver, organized by TRIUMF, in 2010
  - TRIUMF participation – 5 scientists plus many users presented talks (Jason Holt plenary)
    - Arthur McDonald was the opening plenary speakers

New employees

- Welcome party for **Stephan Malbrunot-Ettenauer** (BAE in Nuclear Physics) and **Chloe Malbrunot** (BAE in Particle Physics) at Jericho Beach on September 8th 2022

Research highlights – Particle Physics



- LHC Run 3 has started and the ATLAS New Small Wheels are starting to take data (event display to right)
- Many ATLAS results released at ICHEP:
  - ATLAS explores the self-interaction of the Higgs boson (with substantial TRIUMF group participation including Chris Gubbels' thesis work)
  - Observation of potential four-charm tetraquark, Joint polarization of W and Z bosons, Quantum interference when protons bounce off of each other

Research highlights – Particle Physics

- Celebrated the 10th anniversary of the Higgs Boson discovery by ATLAS and CMS on July 4th
- ATLAS TRIUMF post-doc Marco Valente did a “takeover” of the Science World Twitter account
- Max Swiatlowski gave a Higgs@10 talk at the Science Rendezvous event at UBC and wrote a blog post for Quantum Diaries

Nature paper

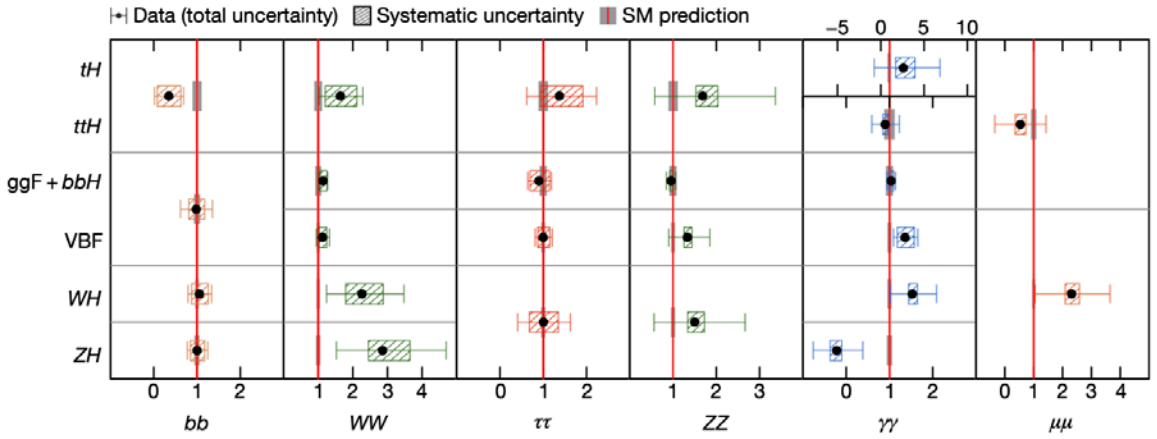
Article

A detailed map of Higgs boson interactions by the ATLAS experiment ten years after the discovery

https://doi.org/10.1038/s41586-022-04893-w
Received: 21 March 2022
Accepted: 23 May 2022
Published online: 04 July 2022
Open access
Check for updates

The ATLAS Collaboration[1]

The standard model of particle physics[1–4] describes the known fundamental particles and forces that make up our Universe, with the exception of gravity. One of the central features of the standard model is a field that permeates all of space and interacts with fundamental particles[5–9]. The quantum excitation of this field, known as the Higgs field, manifests itself as the Higgs boson, the only fundamental particle with no spin. In 2012, a particle with properties consistent with the Higgs boson of the standard model was observed by the ATLAS and CMS experiments at the Large Hadron Collider at CERN[10,11]. Since then, more than 30 times as many Higgs bosons have been recorded by the ATLAS experiment, enabling much more precise measurements and new tests of the theory. Here, on the basis of this larger dataset, we combine an unprecedented number of production and decay processes of the Higgs boson to scrutinize its interactions with elementary particles. Interactions with gluons, photons, and W and Z bosons—the carriers of the strong, electromagnetic and weak forces—are studied in detail. Interactions with three third-generation matter particles (bottom (b) and top (t) quarks, and tau leptons (τ)) are well measured and indications of interactions with a second-generation particle (muons, μ) are emerging. These tests reveal that the Higgs boson discovered ten years ago is remarkably consistent with the predictions of the theory and provide stringent constraints on many models of new phenomena beyond the standard model.



Discovery, accelerated

Research highlights - Nuclear Physics

The Astrophysical Journal, 936:107 (18pp), 2022 September 10 https://doi.org/10.3847/1538-4357/ac80fc

OPEN ACCESS

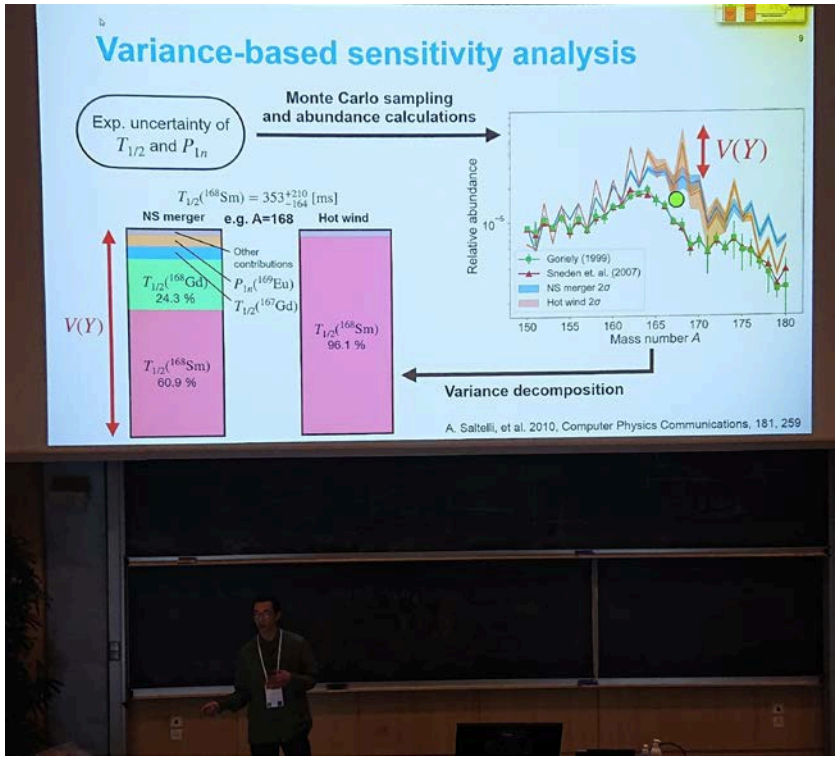
Measuring the β-decay Properties of Neutron-rich Exotic Pm, Sm, Eu, and Gd Isotopes to Constrain the Nucleosynthesis Yields in the Rare-earth Region

G. G. Kiss[1], A. Vitéz-Sveiczer[1,4], Y. Saito[3,4], A. Tarifeño-Saldivia[5,6], M. Pallas[5], J. L. Tain[6], I. Dillmann[3,7], J. Agramunt[6], A. Algora[1,6], C. Domingo-Pardo[6], A. Estrade[8], C. Appleton[9], J. M. Allmond[10], P. Aguilera[11,12], H. Baba[13], N. T. Brewer[10,14], C. Bruno[9], R. Caballero-Folch[3], F. Calvino[5], P. J. Coleman-Smith[15], G. Cortes[5], T. Davinson[9], N. Fukuda[13], Z. Ge[13], S. Go[13,16], C. J. Griffin[3], R. K. Grzywacz[10,14], O. Hall[9], A. Horváth[17], J. Ha[13,18], L. J. Harkness-Brennan[19], T. Isobe[13], D. Kahl[9], T. T. King[14], A. Korgul[20], S. Kovács[2], R. Krücken[3,4], S. Kubono[13], M. Labiche[15], J. Liu[21], J. Liang[3], M. Madurga[14], K. Miernik[20], F. Molina[11], A. I. Morales[6], M. R. Mumpower[22,23], E. Nacher[6], A. Navarro[5], N. Nepal[8], S. Nishimura[13], M. Piersa-Siłkowska[20], V. Phong[13], B. C. Rasco[10,14], B. Rubio[6], K. P. Rykaczewski[10], J. Romero-Barrientos[11], H. Sakurai[13], L. Sexton[3,9], Y. Shimizu[13], M. Singh[14], T. Sprouse[22,23], T. Sumikama[13], R. Surman[24], H. Suzuki[13], T. N. Szegedi[1], H. Takeda[13], A. Tolosa[6], K. Wang[8], M. Wolinska-Cichocka[25], P. Woods[9], R. Yokoyama[26], and Z. Xu[14]

[1] Institute for Nuclear Research (ATOMKI), 4026 Debrecen, Bem tér 18/c, Hungary; ggkiss@atomki.hu
[2] University of Debrecen, 4001 Debrecen, Egyetem tér 1, Hungary
[3] TRIUMF, 4004 Wesbrook Mall, Vancouver, BC V6T 2A3, Canada; saito@triumf.ca
[4] Department of Physics and Astronomy, The University of British Columbia, Vancouver BC V6T 1Z1, Canada

- Latest paper from **BRIKEN collaboration** published in Astrophys. J.
- **28 new neutron-branching ratios and 9 new half-lives** of most neutron-rich lanthanides
- **Astrophysical interpretation led by UBC/TRIUMF PhD student Yukiya Saito** – developed novel techniques for uncertainty quantification of nuclear physics parameters on r-process abundance curve
- **Talk at Nuclear Physics in Astrophysics (NPA-X)** at CERN
- Another paper from collaboration **accepted for publication in PRL**

New BRIKEN @RIKEN Nishina Center paper published!

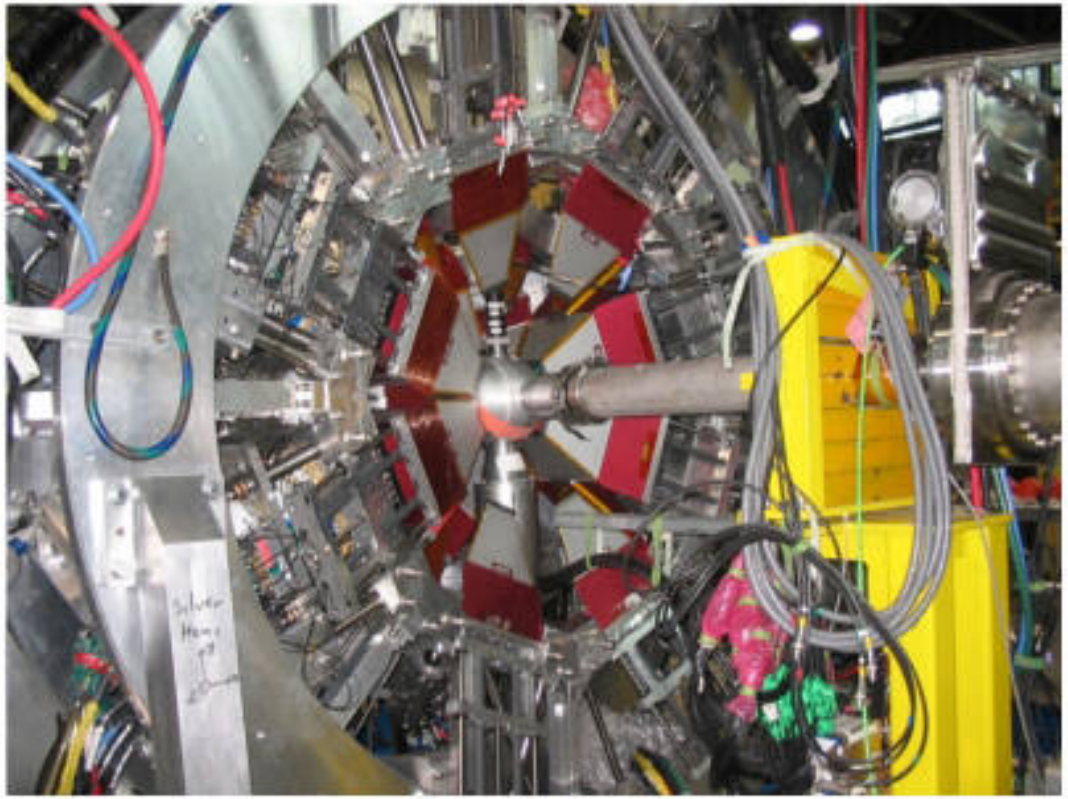


Research highlights - Nuclear Physics

Recent Publications of the TIGRESS Collaboration

- “Single neutron transfer on ^{23}Ne and its relevance for the pathway of nucleosynthesis in astrophysical X-ray bursts”, G. Lotay et al., Phys. Lett. B 833, 137361 (2022); the measurement utilized the SHARC highly-segmented Si array, and a novel ionization technique used for the first time at ISAC, extracting 2^+ ions from the forced electron beam induced arc discharge source

- “Improved measurement of the $0^+ \rightarrow 0^+$ *E0* transition strength for ^{72}Se using the SPICE spectrometer”, J. Smallcombe et al., Phys. Rev. C 106, 014312 (2022); the experiment used the SPICE internal conversion electron spectrometer



Research highlights - Theory

- High-profile ab initio nuclear theory publications

  Nature (ISOLDE), Nature Physics, PRL, 2 PLB (one with TITAN)

PHYSICAL REVIEW LETTERS 129, 042503 (2022)

***Ab Initio* Prediction of the ^{4}He$(d,\gamma)^6$Li Big Bang Radiative Capture**

C. Hebborn,[1,2,*] G. Hupin,[3] K. Kravvaris,[2] S. Quaglioni,[2] P. Navrátil,[4] and P. Gysbers[4,5]

Physics Letters B 832 (2022) 137259

Contents lists available at ScienceDirect

Physics Letters B

www.elsevier.com/locate/physletb

Nuclear *ab initio* calculations of ^{6}He β-decay for beyond the Standard Model studies

Ayala Glick-Magid[a], Christian Forssén[b,*], Daniel Gazda[c], Doron Gazit[a,*], Peter Gysbers[d,e], Petr Navrátil[d]

Physics Letters B 833 (2022) 137288

Contents lists available at ScienceDirect

Physics Letters B

www.elsevier.com/locate/physletb

Summit of the N=40 island of inversion: Precision mass measurements and ab initio calculations of neutron-rich chromium isotopes

R. Silwal[a,b,*], C. Andreoiu[c], B. Ashrafkhani[d], J. Bergmann[e], T. Brunner[f], J. Cardona[a,g], K. Dietrich[a,h], E. Dunling[a,i], G. Gwinner[g], Z. Hockenbery[a,f], J.D. Holt[a,f], C. Izzo[a], A. Jacobs[a,j], A. Javaji[a,j], B. Kootte[a,g], Y. Lan[a,j], D. Lunney[k], E.M. Lykiardopoulou[a,j], T. Miyagi[a,l,m], M. Mougeot[n,o], I. Mukul[a], T. Murböck[a], W.S. Porter[a,j], M. Reiter[p], J. Ringuette[a,q], J. Dilling[a,j], A.A. Kwiatkowski[a,r]

Article

Nuclear moments of indium isotopes reveal abrupt change at magic number 82

https://doi.org/10.1038/s41586-022-04818-7

Received: 10 June 2021

Accepted: 28 April 2022

Published online: 13 July 2022

A. R. Vernon[1,2,3✉], R. F. Garcia Ruiz[2,4✉], T. Miyagi[5], C. L. Binnersley[1], J. Billowes[1], M. L. Bissell[1], J. Bonnard[6], T. E. Cocolios[3], J. Dobaczewski[6,7], G. J. Farooq-Smith[3], K. T. Flanagan[1,8], G. Georgiev[9], W. Gins[3,10], R. P. de Groote[3,10], R. Heinke[4,11], J. D. Holt[3,12], J. Hustings[3], Á. Koszorús[3], D. Leimbach[11,13,14], K. M. Lynch[4], G. Neyens[3,4], S. R. Stroberg[15], S. G. Wilkins[1,2], X. F. Yang[3,16] & D. T. Yordanov[4,9]

nature physics

ARTICLES

https://doi.org/10.1038/s41567-022-01715-8

Check for updates

OPEN

Ab initio predictions link the neutron skin of ^{208}Pb to nuclear forces

Baishan Hu[1,11], Weiguang Jiang[2,11], Takayuki Miyagi[1,3,4,11], Zhonghao Sun[5,6,11], Andreas Ekström[2], Christian Forssén[2✉], Gaute Hagen[1,5,6], Jason D. Holt[1,7], Thomas Papenbrock[5,6], S. Ragnar Stroberg[8,9] and Ian Vernon[10]

Research highlights - Theory

PHYSICAL REVIEW C **105**, L052802 (2022)

Letter

Searching for the origin of the rare-earth peak with precision mass measurements across Ce–Eu isotopic chains

R. Orford,[1,2,3,*] N. Vassh,[4,†] J. A. Clark,[2,5] G. C. McLaughlin,[6] M. R. Mumpower,[7] D. Ray,[2,5] G. Savard,[2,8] R. Surman,[4] F. Buchinger,[1] D. P. Burdette,[2,4] M. T. Burkey,[2,8,‡] D. A. Gorelov,[2,5] J. W. Klimes,[2,§] W. S. Porter,[2,‖] K. S. Sharma,[5] A. A. Valverde,[2,5] L. Varriano,[2,8] and X. L. Yan[2,9]

universe

MDPI

Article

Origin of Plutonium-244 in the Early Solar System

Maria Lugaro [1,2,3,4,*], Andrés Yagüe López [5,†], Benjámin Soós [1,2,3], Benoit Côté [1,2,6,7,†], Mária Pető [1,2], Nicole Vassh [8], Benjamin Wehmeyer [1,2,9] and Marco Pignatari [1,2,6,10,†]

The Astrophysical Journal, 936:84 (12pp), 2022 September 1 https://doi.org/10.3847/1538-4357/ac85bc

The *R*-Process Alliance: Abundance Universality among Some Elements at and between the First and Second *R*-Process Peaks*

Ian U. Roederer[1,2], John J. Cowan[3], Marco Pignatari[2,4,5,6], Timothy C. Beers[2,7], Elizabeth A. Den Hartog[8], Rana Ezzeddine[2,9], Anna Frebel[2,10], Terese T. Hansen[11], Erika M. Holmbeck[2,12], Matthew R. Mumpower[2,13,14], Vinicius M. Placco[15], Charli M. Sakari[16], Rebecca Surman[2,17], and Nicole Vassh[18]

Neutron star observations of pseudoscalar-mediated dark matter

John Coffey,[1,*] David McKeen,[2,†] David E. Morrissey,[2,‡] and Nirmal Raj[2,§]

arXiv:2207.02221

Research highlights - Science and Technology

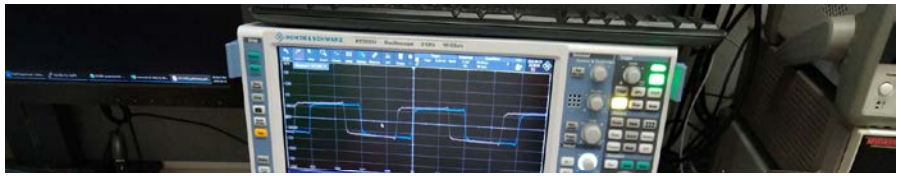
Electronics Group

- Progress continues on Moller boards. Now integrating with the Moller trigger signals

- Good progress on Darkside DAQ boards.
- Global Data Manager Clock distributed

  to a Crate Data Manager, with ~ 8 ps jitter

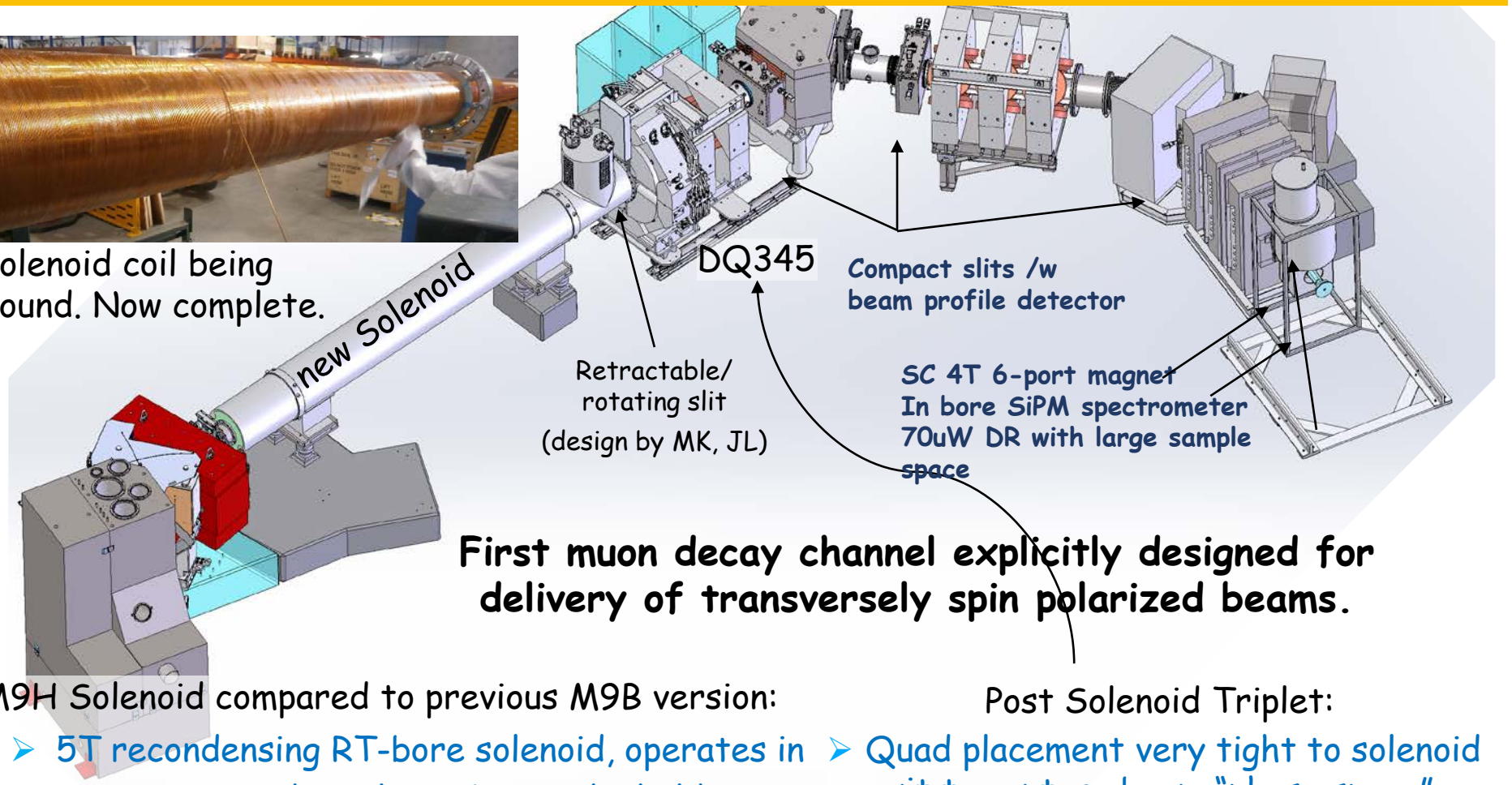
DarkSide-20K GDM – CDM clock synchronization test



ssues with the HW
and FW development.

The Rising of the TRIUMF M9H Phoenix, with new chops

Solenoid coil being wound. Now complete.



First muon decay channel explicitly designed for delivery of transversely spin polarized beams.

M9H Solenoid compared to previous M9B version:

- 5T recondensing RT-bore solenoid, operates in persistent mode with a robust 10hr hold time during total power loss or interruption
- Increased bore diameter
- Awarded to Tesla Engineering, U.K

Post Solenoid Triplet:

- Quad placement very tight to solenoid exit to capture beam "phase space".
- Triplet encompasses strong horizontal and vertical steering capabilities to collect and steer off-axis spin polarized muons

Thank you
Merci

Questions?

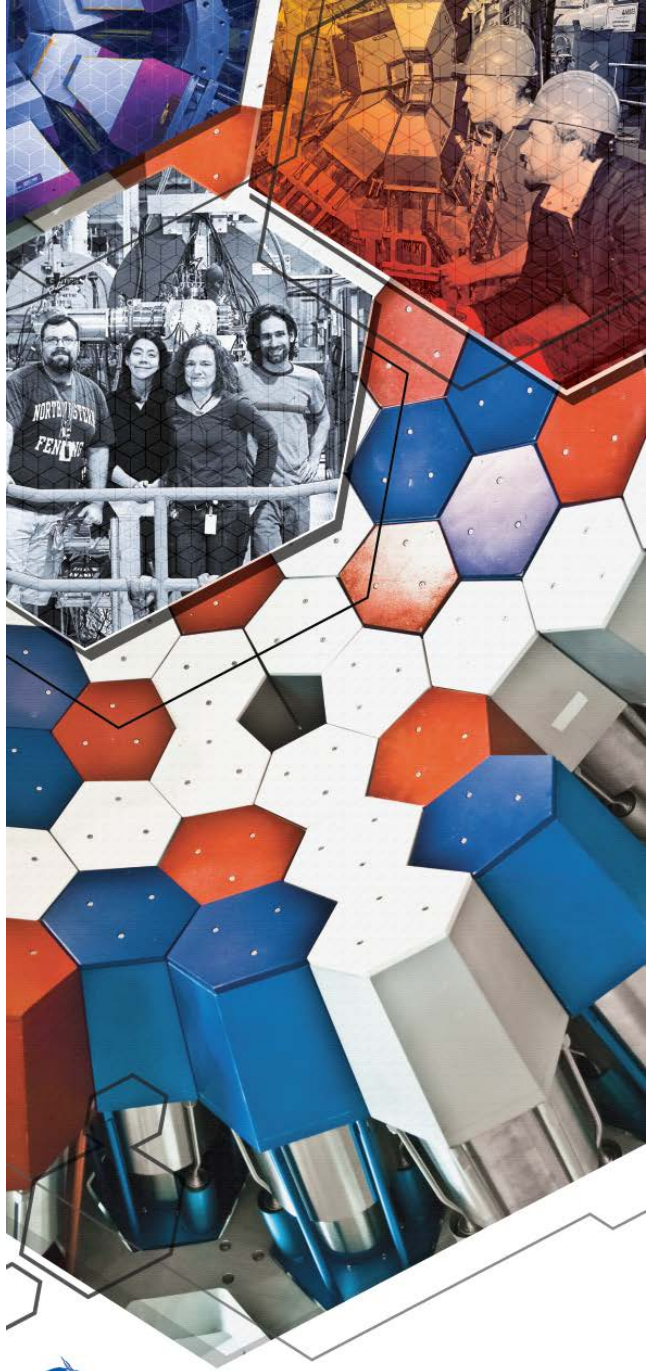
Discovery, accelerated

GAPS: the Grads And Postdocs Society

Website: gaps.triumf.ca

What we do:

1. Organise social/networking events
2. Hold professional development seminars
3. Advocate for your rights and well being



Discovery, accelerated