



TRIUMF Update & Canadian Long Range Planning

April 15th, 2026



Discovery,
accelerated

Update on TRIUMF Programme

Nuclear Physics Experiments @ TRIUMF (ISAC-ARIEL)

Nuclear structure of rare isotopes to discover new features and understand nature's strong force defining nuclear shells and shapes.

(**EMMA, GRIFFIN, IRIS, TIGRESS, TITAN, TUDA**)

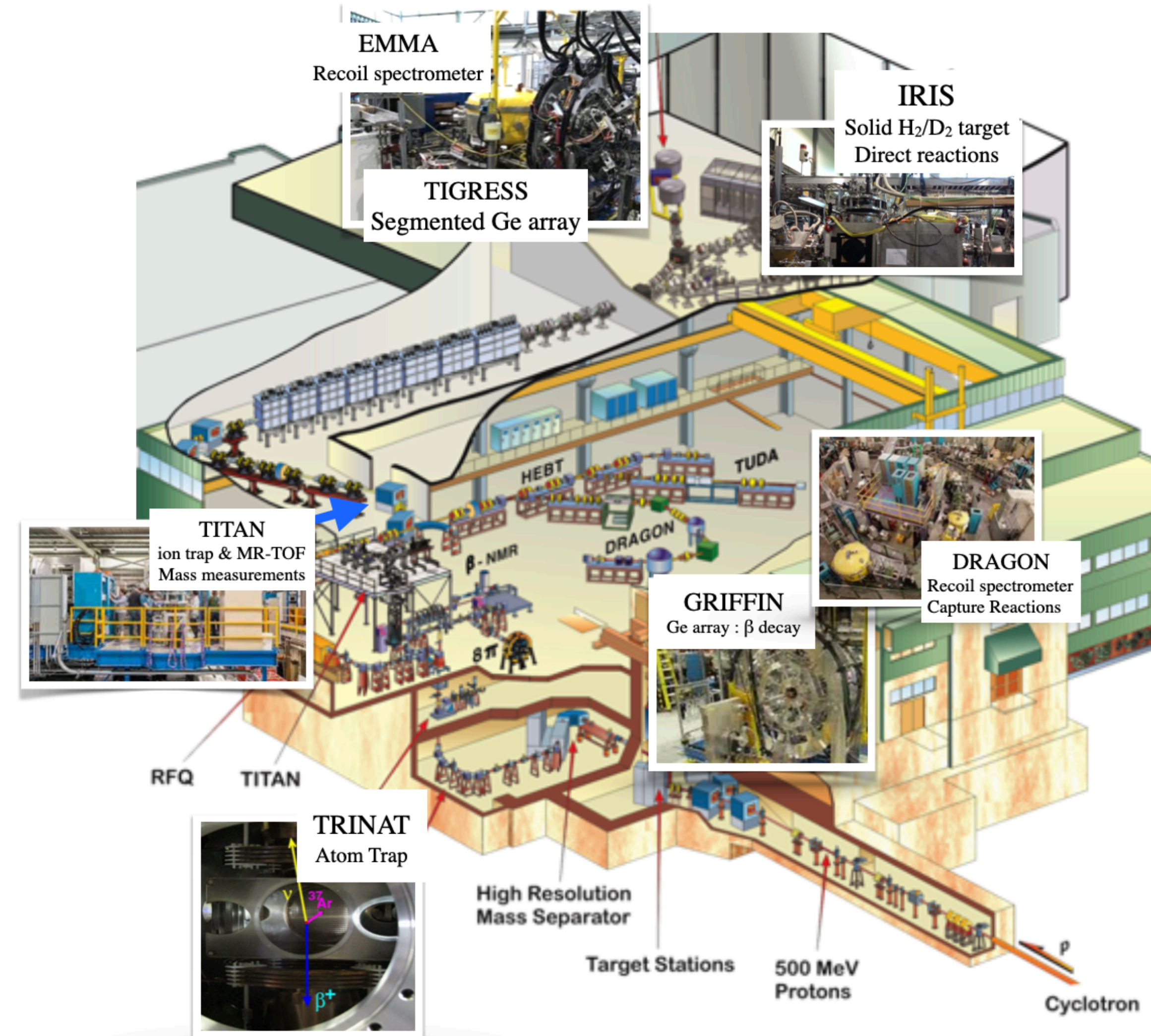
Nuclear astrophysics studies to understand the creation of elements in nature. (**EMMA, DRAGON, GRIFFIN, IRIS, TIGRESS, TITAN, TUDA**)

Search for new signature of new physics beyond the Standard Model : Precision tests of fundamental symmetries.

- Precision studies of the unitarity of the CKM matrix elements : Beta asymmetry correlations (**TRINAT**), Superaligned beta decays (**GRIFFIN**)
- Radioactive molecules highly sensitive tools for electric dipole moments and anapole moments (**RadMol**) : **CFI funding success in 2025 !**
- Search for sterile neutrinos (**BeEST**)

Offshore nuclear physics

- Rare decays & relativistic nuclear reactions : GSI-FAIR, RIKEN, FRIB
- MR-TOF : MIRACLS @ ISOLDE
- Accelerator Developments : EIC



Particle Physics Experiments @ TRIUMF

TRIUMF Ultra-Cold Neutron project (TUCAN)

Precision test of fundamental symmetry in nature

- Search for CP violation through neutron electric dipole moment measurement

PENELOPE

- World's best neutron lifetime measurement

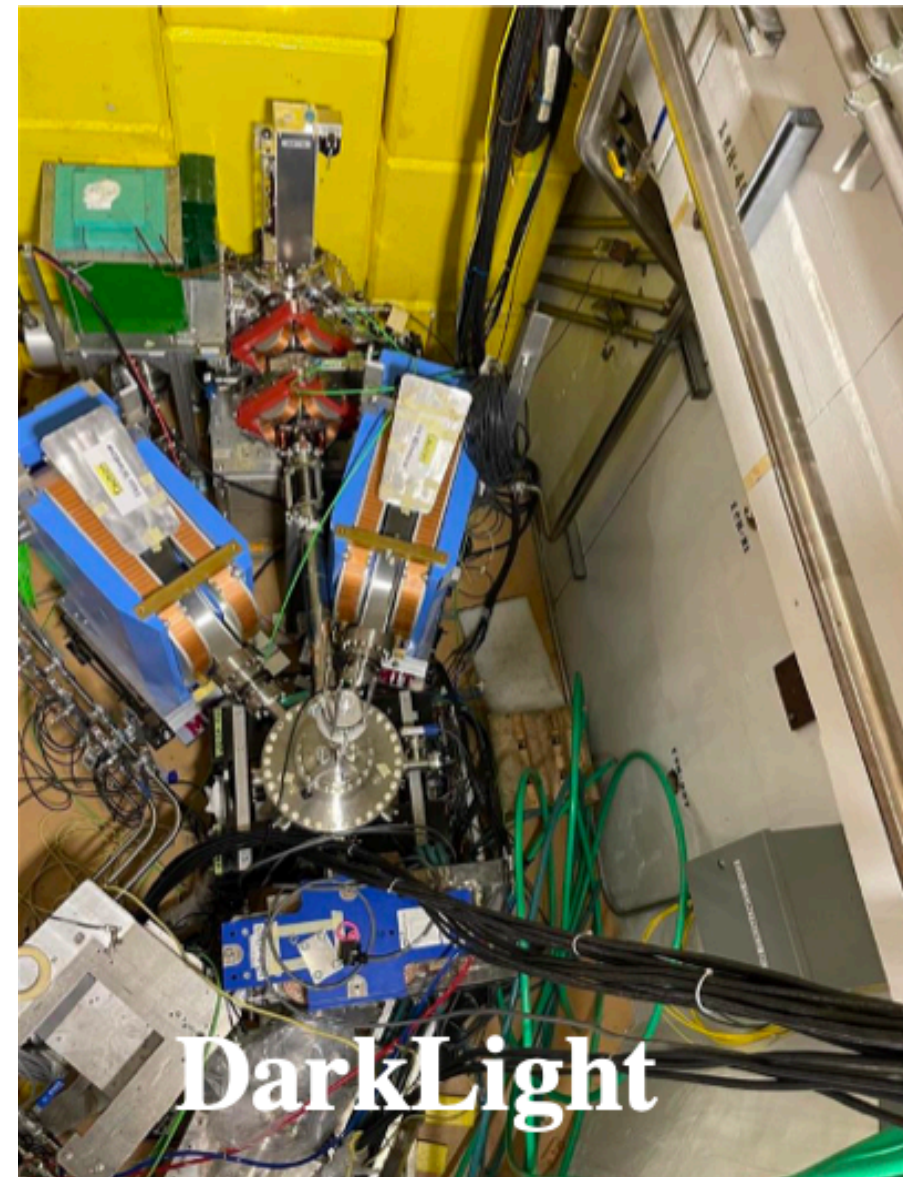
DarkLight @ ARIEL eLINAC

Search for a new dark boson : X17

- Installation completed in 2025
- Beam commissioning started in December 2025

Offshore particle physics experiments

- High-energy frontier : ATLAS @ LHC - CERN
- Precision tests of fundamental interactions
- Matter - Antimatter asymmetry: ALPHA @ CERN (Antihydrogen Laser Physics Apparatus)
- Neutrino Oscillation : T2K-HyperK
- Lepton universality test : PIONEER @ PSI



Particle physics @ SNOLAB

- SuperCDMS (Super Cryogenic Dark Matter Search) @ SNOLAB
- Low mass dark matter detection from elastic scattering with nuclei

Storage of unpolarized neutrons inside one 25-l EDM cell

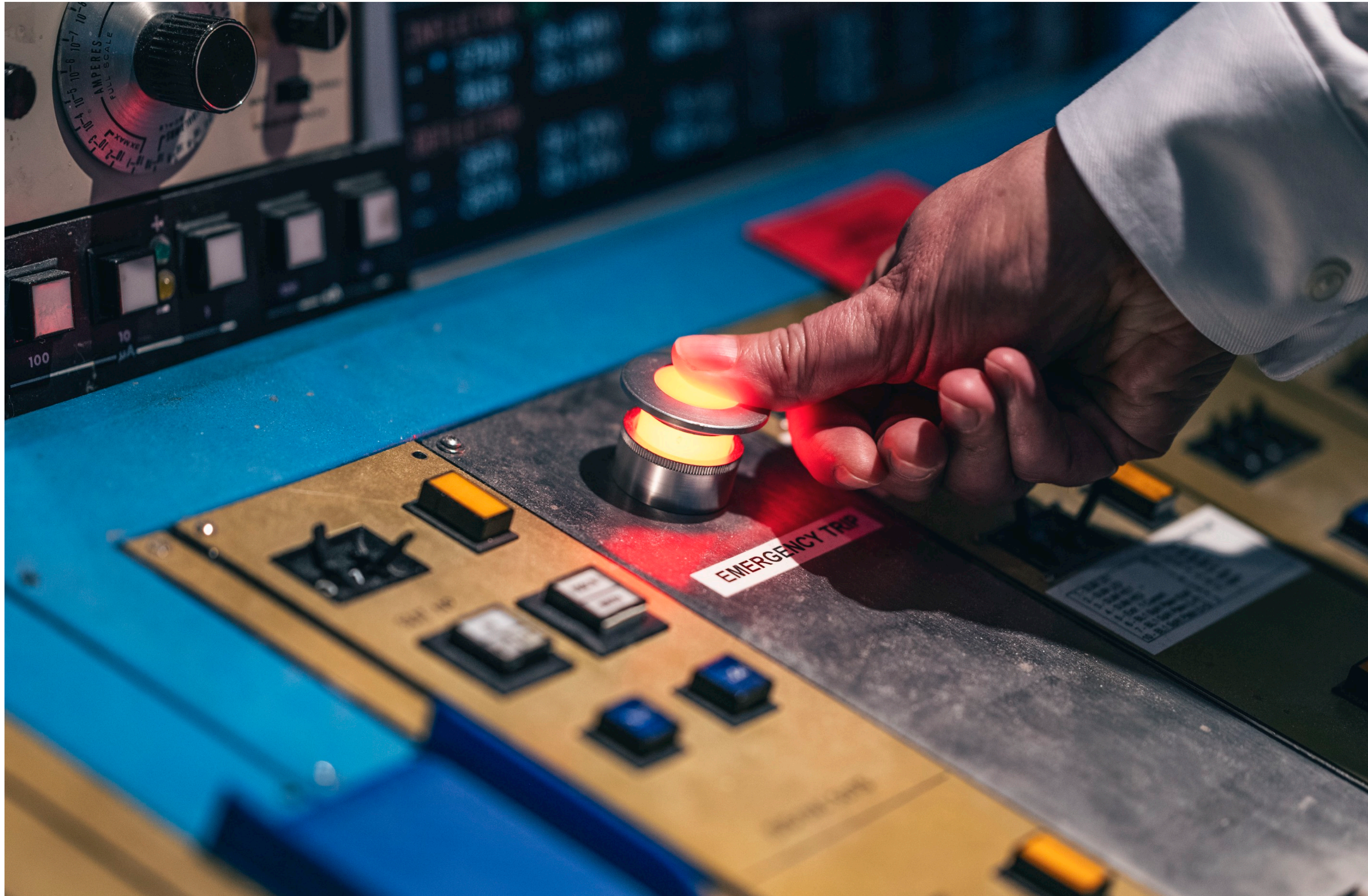
UCN counts

Not available for distribution

Successful UCN production with D₂ moderator in January 2026

•Statistical sensitivity of 10^{-27} ecm (1-sigma) looks to be in reach with future double-cell EDM setup

“Long” Shutdown 2026 is underway



New Infrastructure: Institute for Advanced Medical Isotopes (IAMI)

The Institute for Advanced Medical Isotopes (IAMI) is multi-institutional medical isotope facility. Valued at a total of >\$80M, initial IAMI funding announced in November 2018, and the building reached substantial completion in summer 2022. \$32M of additional investment into the facility was announced in January 2024.

Once completed, IAMI will enable research into next-generation medical isotopes and radiopharmaceuticals, and will:

- Unlock development of next-generation cancer therapies
- Enable clinical trials and cutting-edge medical research
- Advance technological innovation and skills training
- Provide isotope security through production

Building envelope has been complete since July 2022; a new TR-24 cyclotron is located in the building. Facility commissioning began in late 2023, with additional lab build-out projects also underway in partnership with provincial partners.

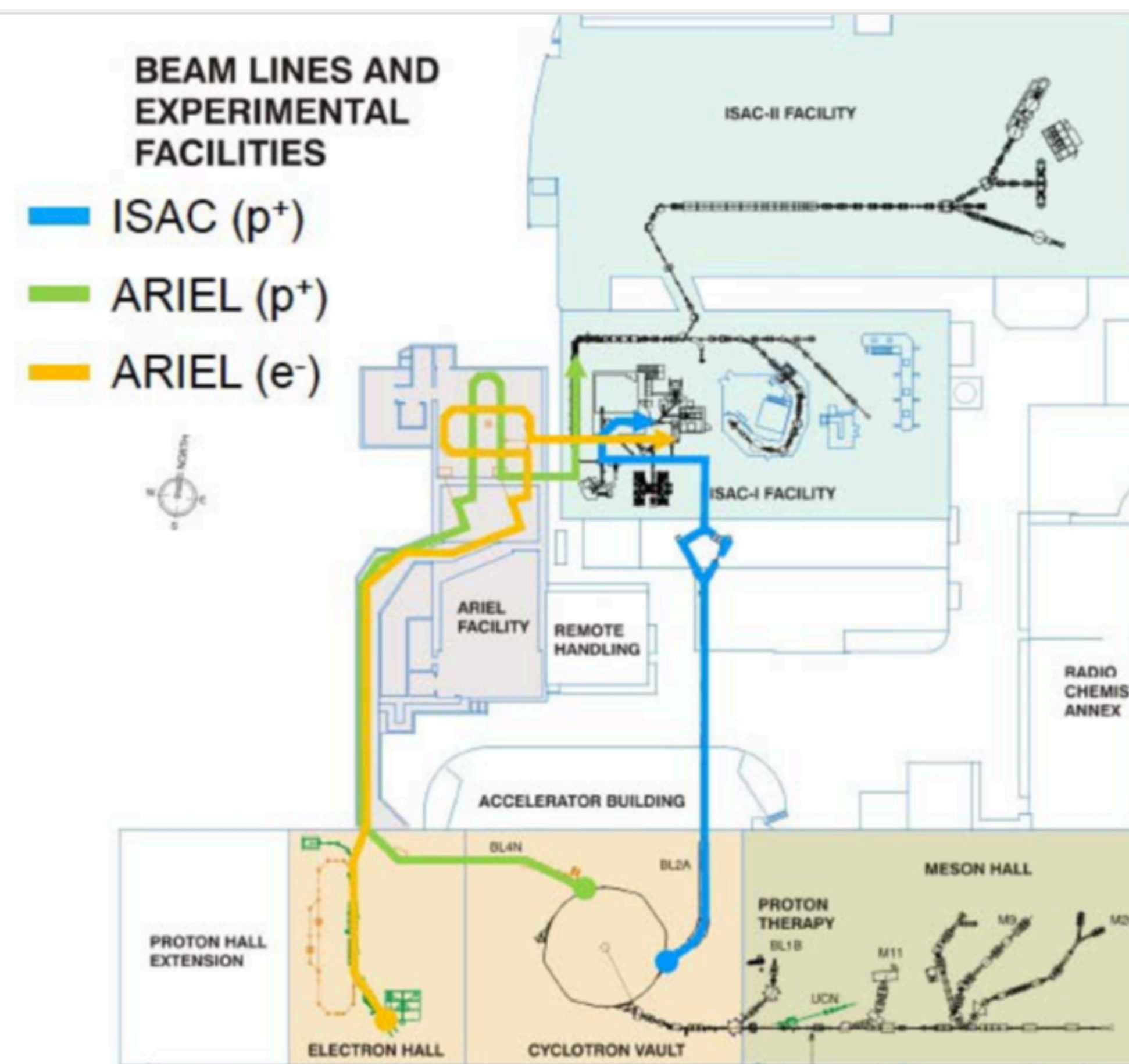
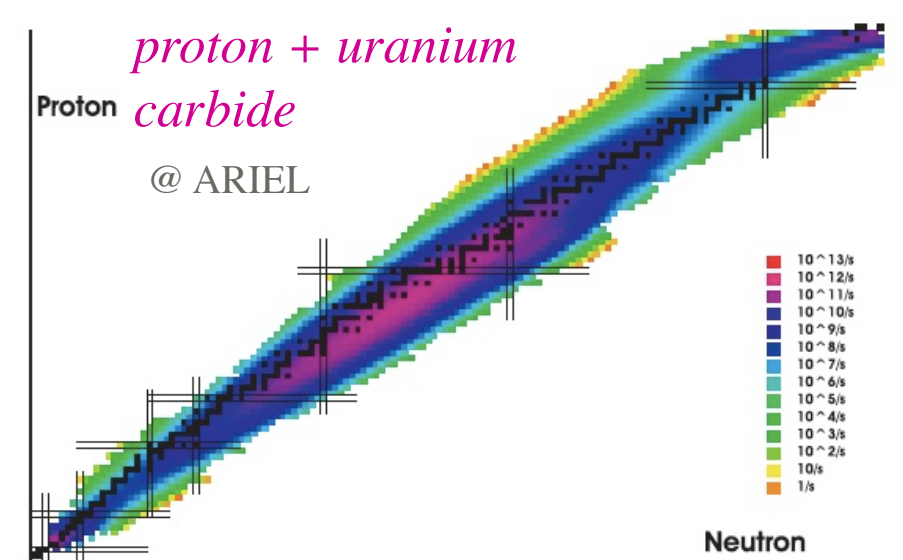
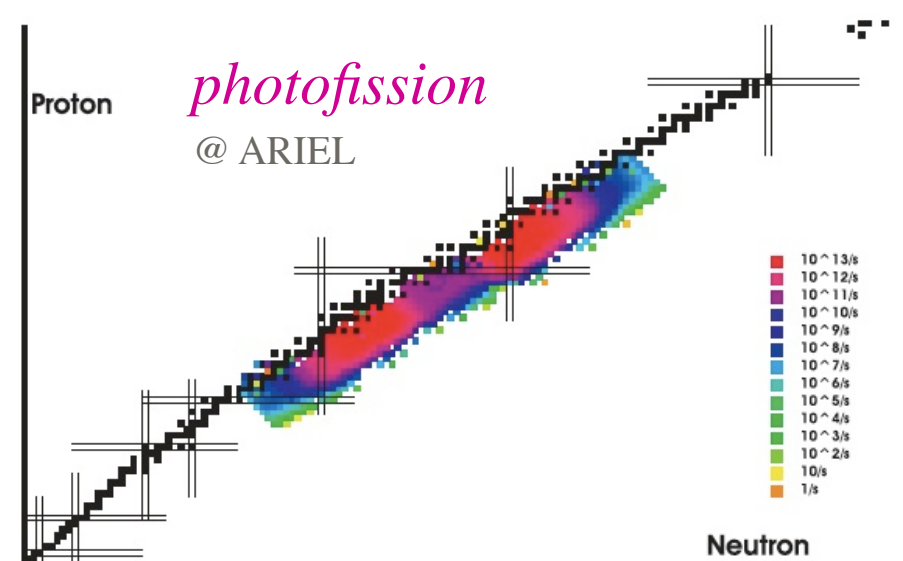
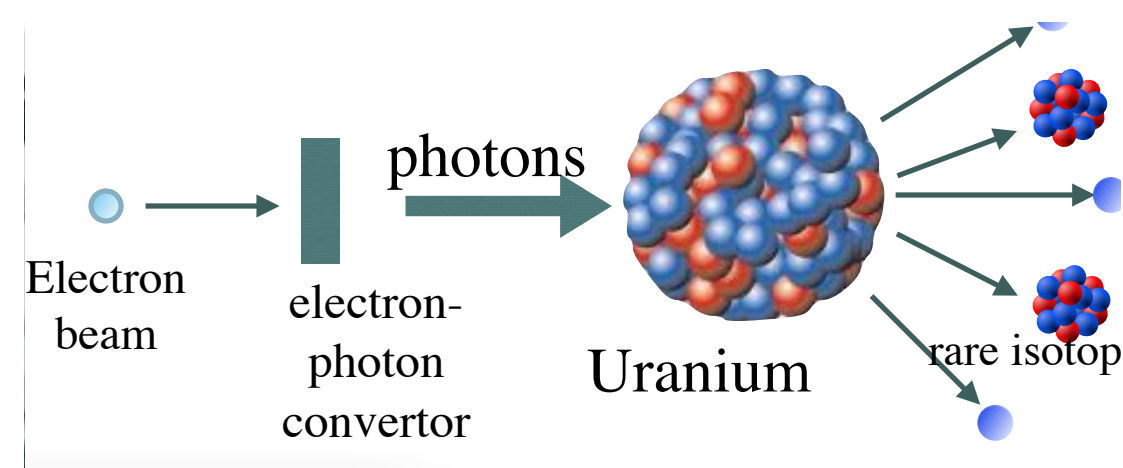
IAMI is expected to be operational by late 2026.



New Infrastructure: Advanced Rare Isotope Laboratory (ARIEL)

ISAC is TRIUMF's flagship facility of rare isotopes for fundamental science and applications. It is North America's only and highest beam power ISOL (Isotope Separator Online) facility

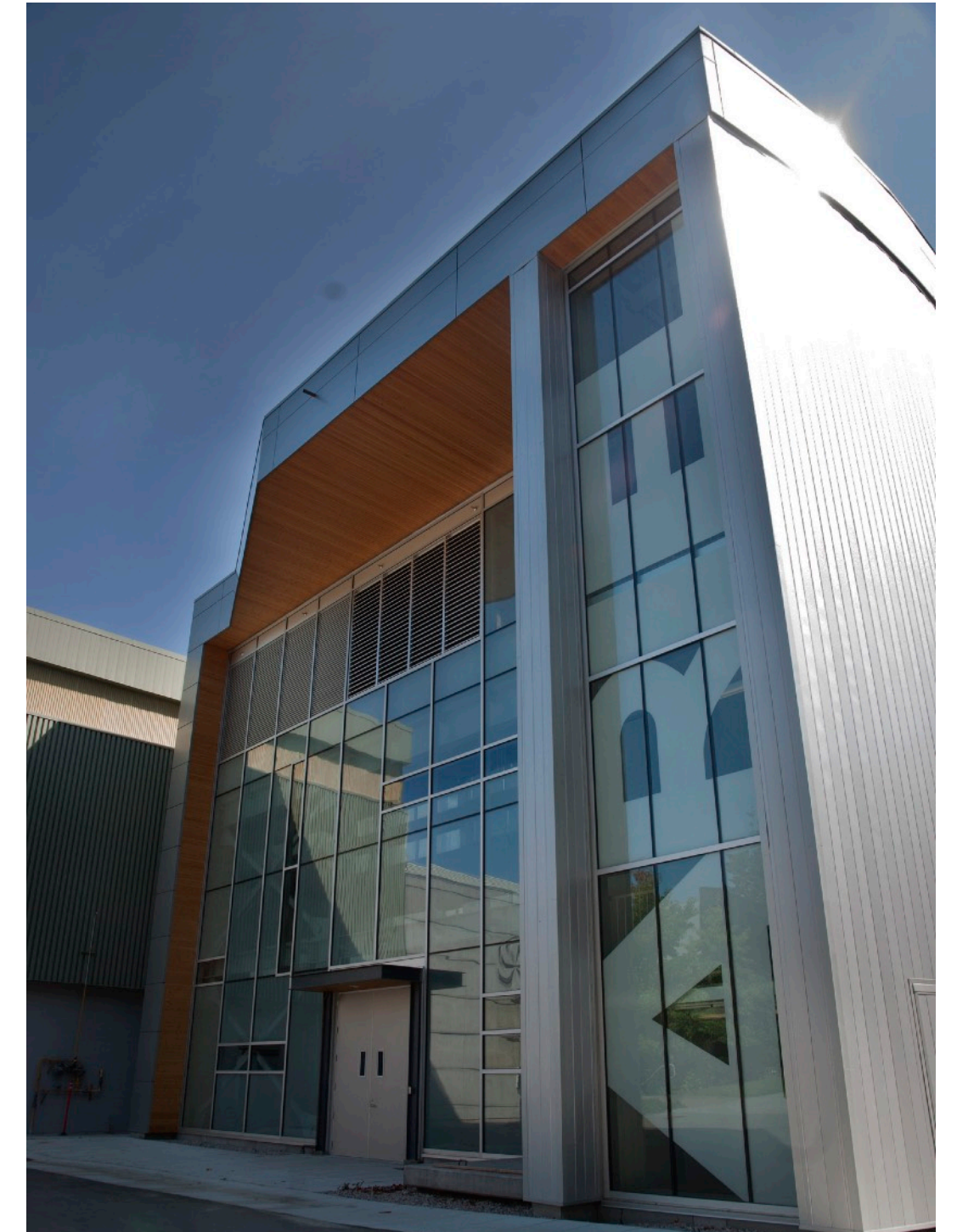
- ARIEL will add two new production targets and provide three independent radioactive-ion beams for experiments and triple the present rare isotope science capabilities (world unique).



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- ARIEL will add two new production targets and provide three independent radioactive-ion beams for experiments and triple the present rare isotope science capabilities (world unique).
- Uses state-of-the-art, made-in-Canada super-conducting RF (SRF) accelerator technology, providing up to 100 kW of beam power on target.
The SRF technologies is relevant for instance for the Electron Ion Collider (EIC)
- Represents ~\$100 million capital investment by federal and five provincial governments and additional investment of ~750 FTE years (valued at ~\$100M).
→ Completion of ARIEL in 2027 and regular beam delivery to experiments starting in 2028.
- Supported by 21 university partners from across Canada



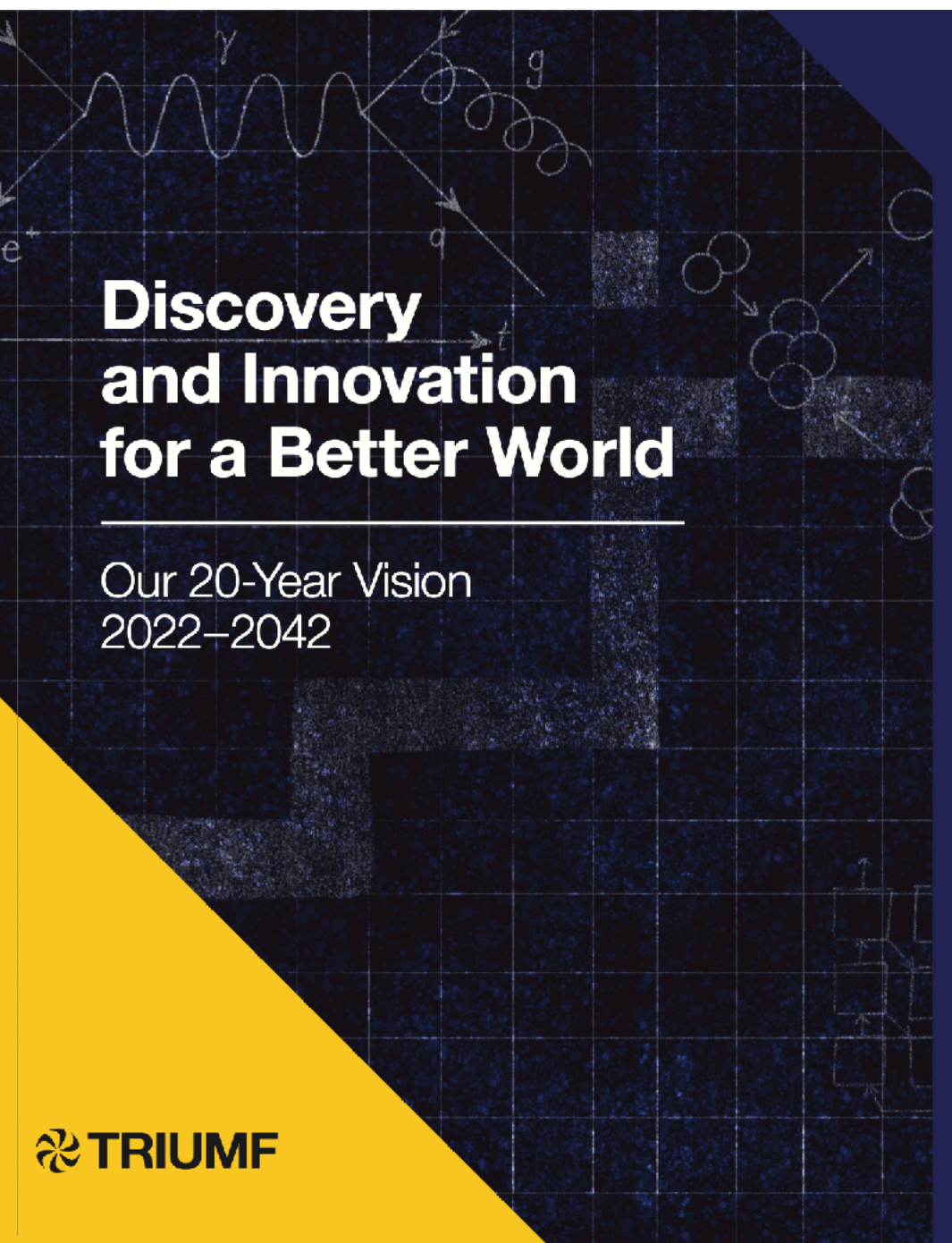
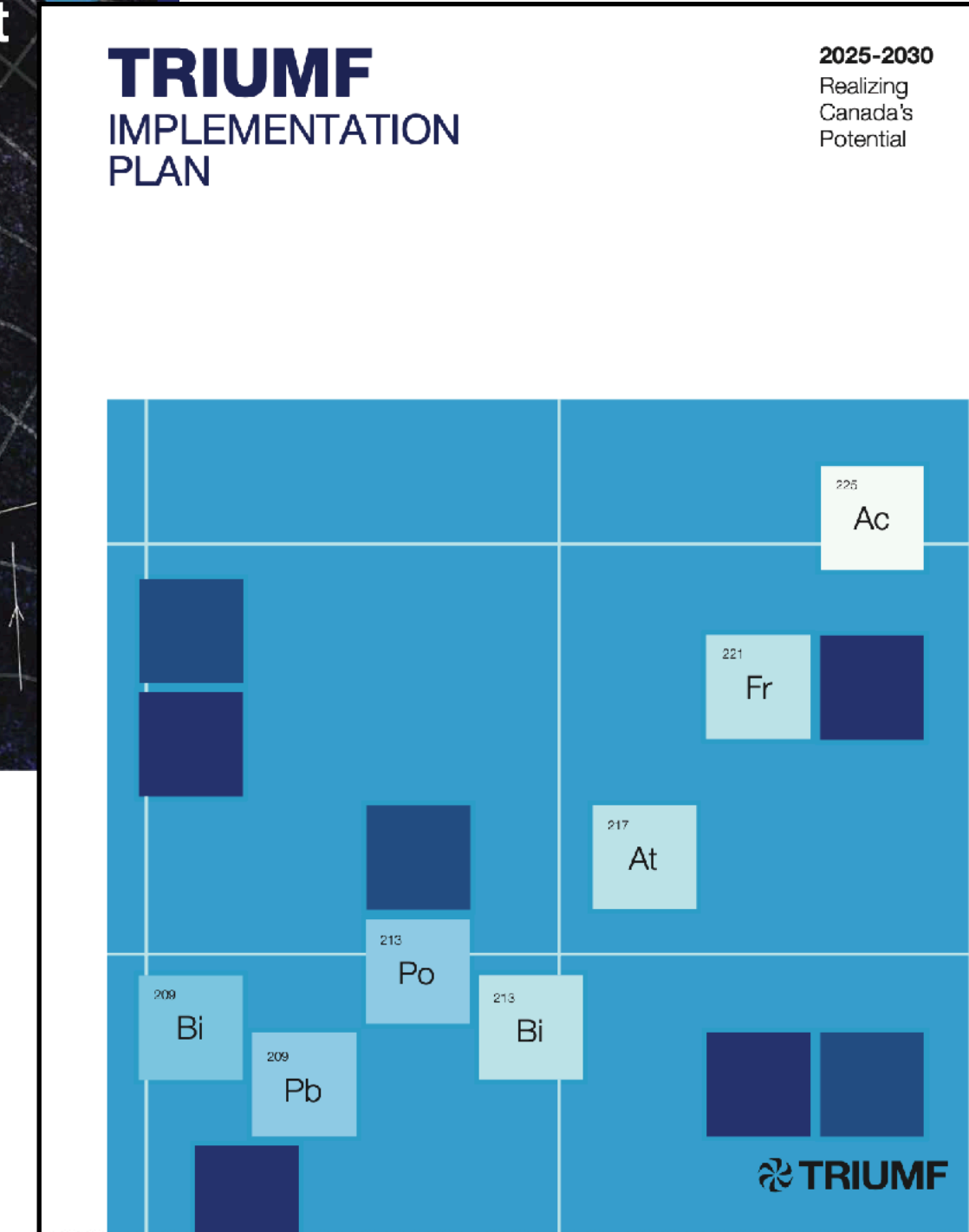
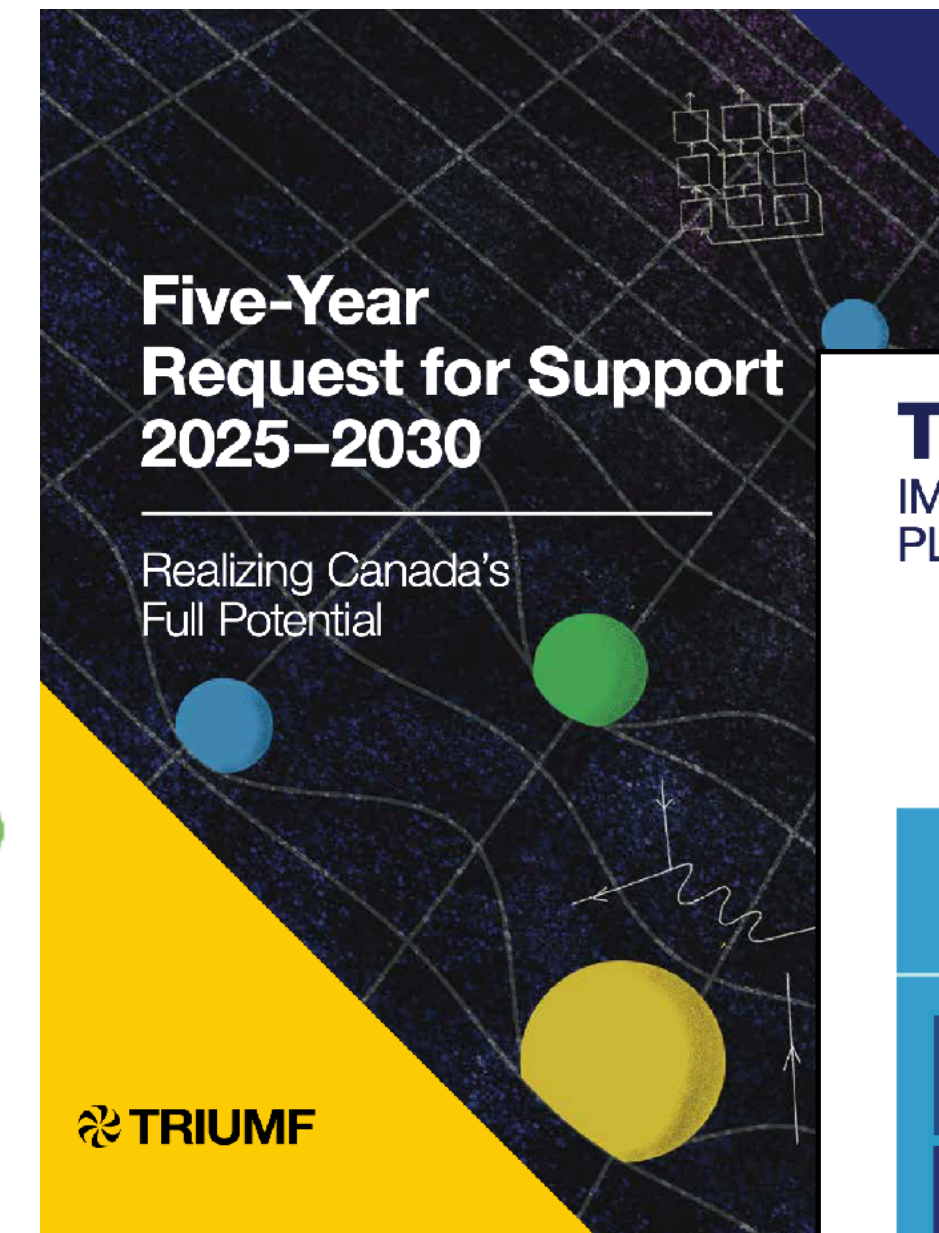
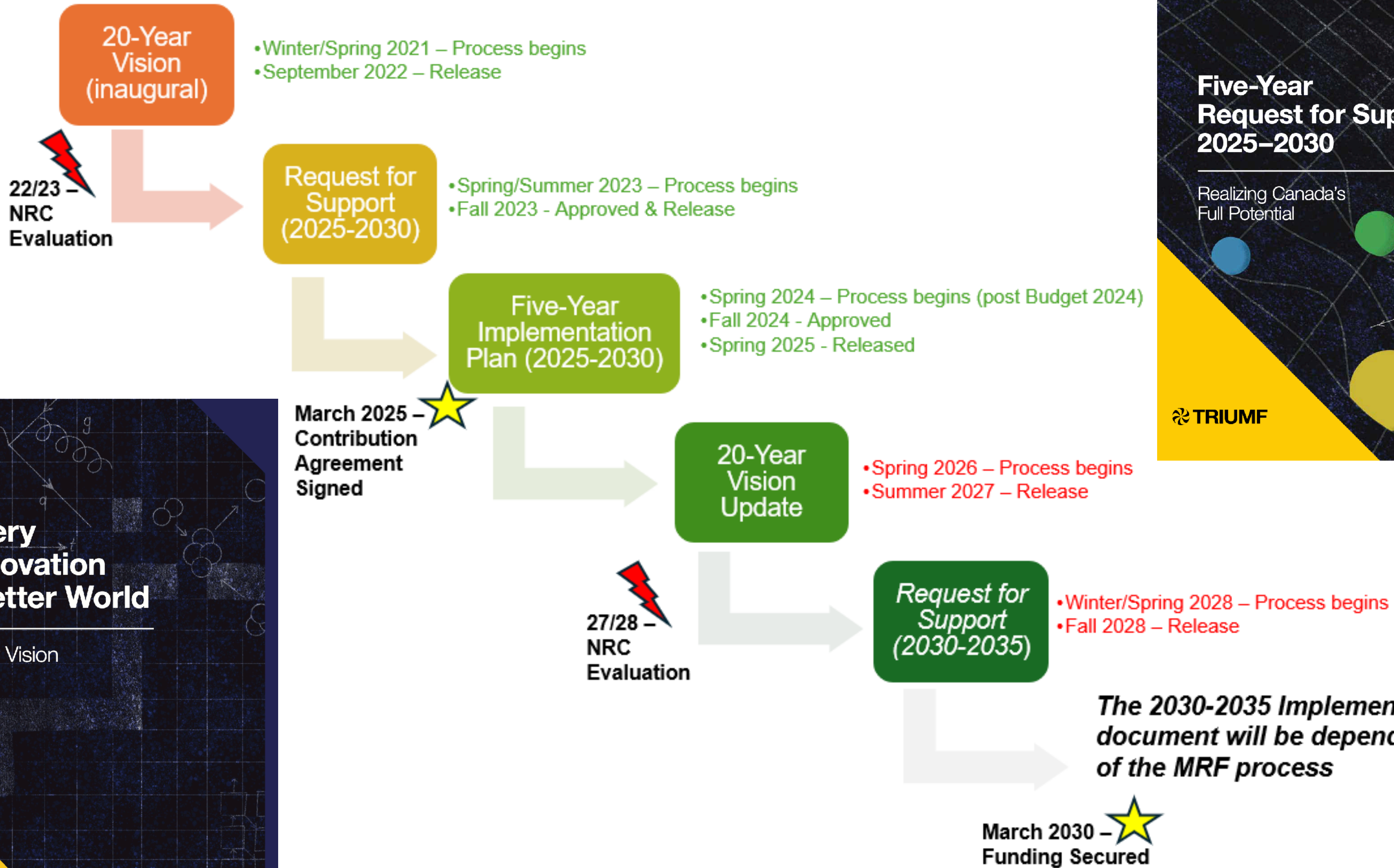
ARIEL target module



Superconducting electron linac

TRIUMF Strategic Planning

TRIUMF Strategic Planning Cycle



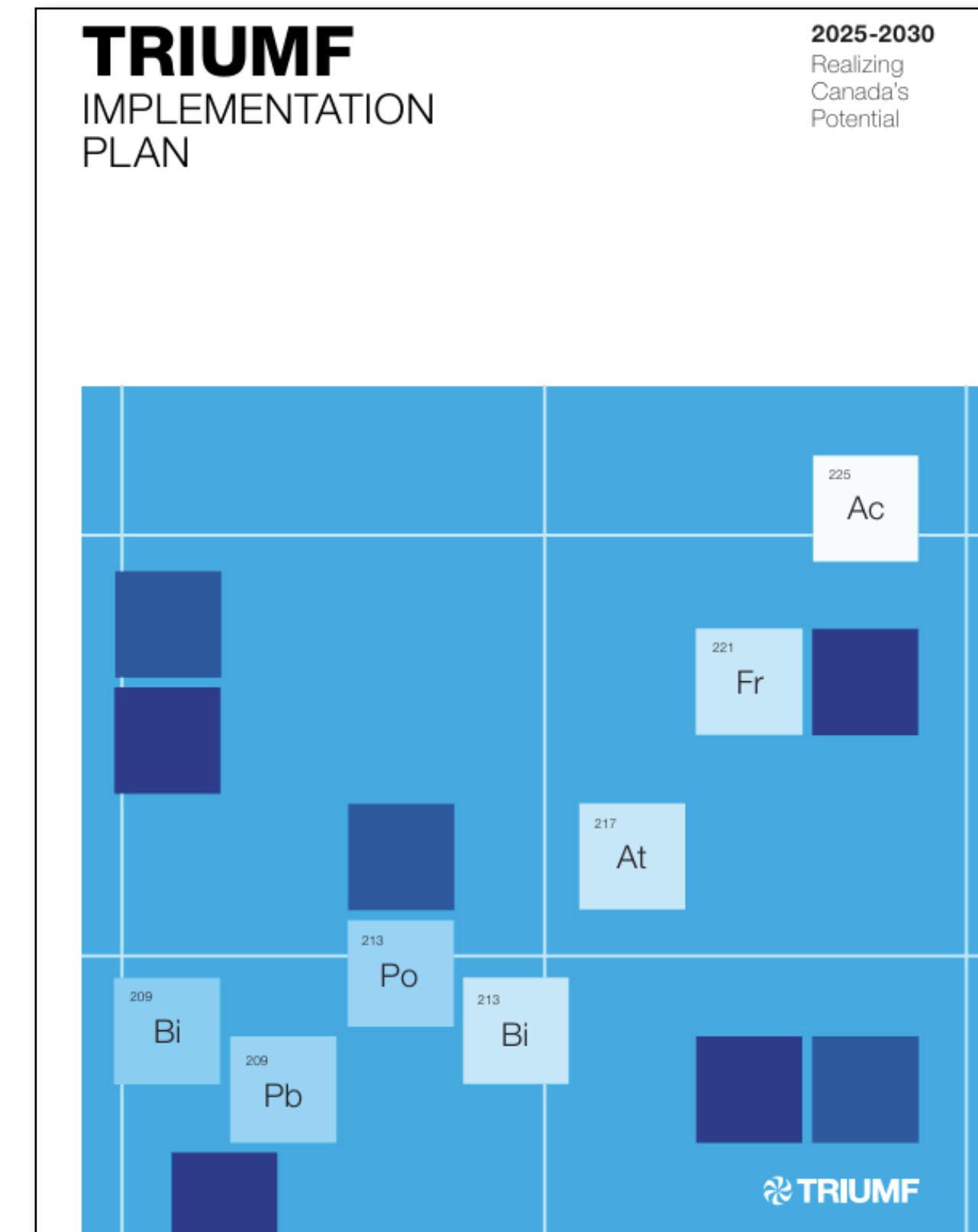
TRIUMF Priorities & Deliverables - as per government contract

TRIUMF's 2025-2030 Implementation Plan is based around the following thematic priorities:

- Delivering new infrastructure for research and scientific impact
- Ensuring operational excellence <- **already implemented compensation structure change**
- Training the diverse talent of tomorrow
- Refurbishing legacy facilities
- Evolving TRIUMF's program towards the future and addressing societal challenges

The Plan commits to the following core deliverables, which are encoded in our Contribution Agreement with NRC:

- Delivery of 5000 hours of radioactive isotope beam to ISAC in the 2029 operational year
- Initial operations of the IAMI facility in 2026
- Ensuring ARIEL is ready for Gate-4A in the TRIUMF project management process in 2027
- Replacement of key components of Beamline 1A, supporting material sciences and isotope production, during planned shutdown periods



TRIUMF has implemented an extended shutdown of its main accelerator and beams in early 2026 (for ~16 months) to marshal necessary resources to deliver on the Implementation Plan.

Four-year look—ahead: Science

- Core focus is on ensuring we deliver the requirements of the contract with government, completing major infrastructure upgrades
- ARIEL strategy relies on developing a broader research community, underway within Canada through joint appointments and internationally through community connections. [ARIEL Science Workshop \(Nuclear\) - April 20-23, 2026.](#)
- IAMI Strategy is well advanced: business plan now in place, funding and financial modelling underway
- International connections remain a core focus, both from ‘de-risking’ our research ecosystem, also from Canadian mission
- Concurrently need to develop the next 20-year Vision and Five-year Request

Four-year look—ahead: Strategy

- Two core aspects of strategic direction impacted by the transformation of the research ecosystem and Canadian priorities over the last eight months
- **Mission Driven:** intention to evolve TRIUMF into a true ‘national laboratory’ as utilised within other countries for the benefit of the nation
 - Alignment with national resilience mission, whilst retaining the core nature of TRIUMF as a research facility
- **Major Research Facility (MRF) evolution:** maximise the benefit of public investment in the MRF ecosystem by ensuring a coherent and effective network of facilities
 - Requires evolving the MRF support mechanisms with government and Canada Foundation for Innovation (CFI), and evolving the current ad hoc approach to these major investments

Community Strategic Planning

Canadian Subatomic Physics Long Range Plan

Current SAP LRP (2022 - 2026)

- Historically, the Canadian community has self-organized, developing 5-yearly LRPs for guidance to government and funding agencies (but actual grant funding is merit-based, not mission driven):

- Science Recommendations

	<i>Flagship projects with broad physics outcomes</i>	<i>Flagship projects with strategic physics outcomes</i>
FROM QUARKS AND GLUONS TO NUCLEI	TRIUMF ARIEL-ISAC experiments, EIC	JLab 12 GeV program, Offshore RIB experiments
MATTER IN THE WEAKLY COUPLED UNIVERSE	T2K/HK, IceCube, SNO+	DEAP, PICO-500, SuperCDMS
BEYOND THE ELECTROWEAK ENERGY SCALE	ATLAS(LHC/HL-LHC), Belle II	ALPHA/HAICU, MOLLER, TUCAN

- Recommendations for the ecosystem follow the 2017 Fundamental Science Review undertaken by the Federal Government.
 - ❖ Need for Major Research Facility framework (underway) and a Capstone Research organization for international agreements (noted in recent 2025 budget).
 - ❖ NSERC SAP envelope is unique and critical.
- Limited growth : Inflationary pressure on graduate students and postdocs. funding

Future SAP LRP (2027 - 2034)

- Will cover 7 years (usually 5 years) to align with TRIUMF 5-year plan (2030 - 2035) with an outlook to 2041.
- Mandate :
 - ➔ The committee is asked to **identify subatomic physics ventures and priorities** that should be pursued by the community on a 7 - 14 year horizon and that would ensure Canadian global leadership.
 - ➔ Budgetary estimates for new capital investments and operation must be provided, including funding ranges for prioritized endeavors.
- What is new :
 - ➔ CFI is developing the Major Research Facility framework : SNOLAB (Phase-I), TRIUMF(Phase-II?)
 - ➔ McDonald Institute : 2 years funding, NSERC Review in fall 2025, then next 3 years funding released.
 - ➔ Global uncertain times with rapidly changing environment in the USA (DOE, NSF and elsewhere)
Future impact developing fast, eg. on karge projects : FCC, XLZD, EIC, nEXO, DUNE

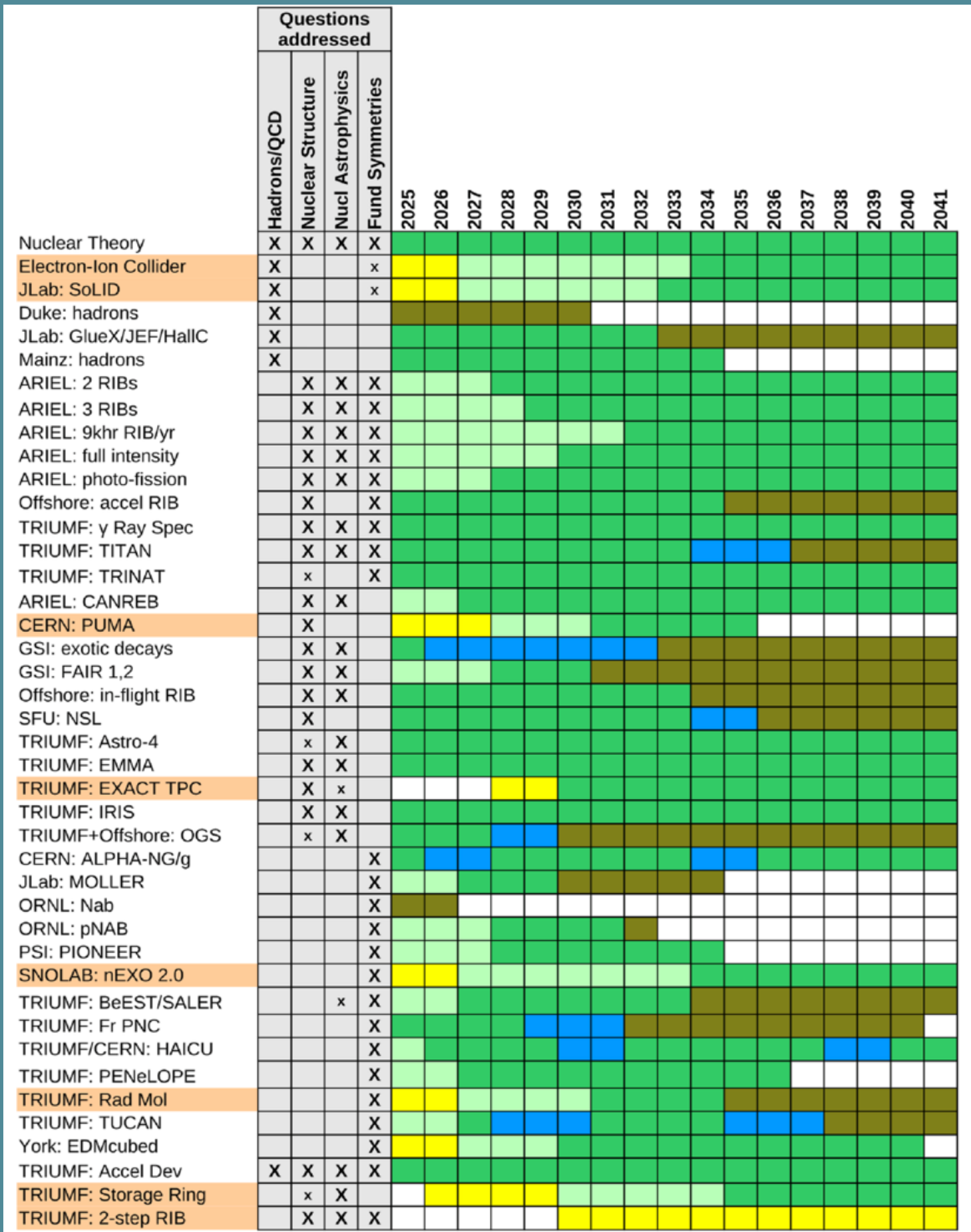
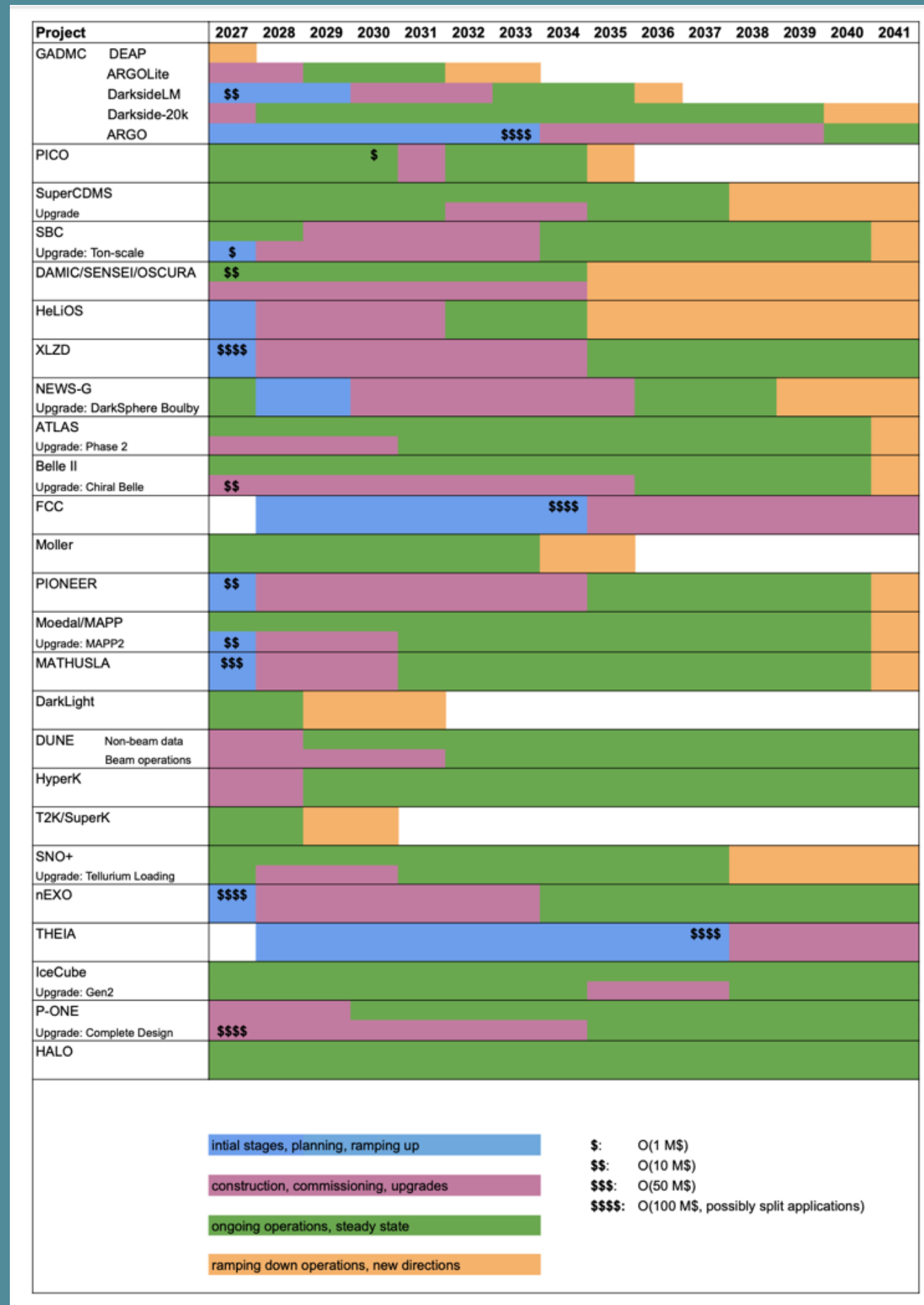
Future SAP LRP (2027 – 2034)

IPP Brief:

https://particlephysics.ca/wp/wp-content/uploads/IPP_Brief_to_the_2025_2026_Long_Range_Planning_Committee_Dec1.pdf

CINP Brief:

<https://cinp.ca/subatomic-physics-long-range-plan>



Future LRP timeline

- Jan: community survey and data collection
- Feb-Mar: Townhall meetings
- April: update from CINP+IPP including latest SAP-ES results
- June: CAP 2026 presentation of draft to community
- Sept: Final LRP documents released

Future SAP LRP (2027 - 2034)

Voting Members



Alison Lister

LRP Co-chair



Paul Garrett

LRP Co-chair



Torben Ferber



Alfredo
Galindo-Uribarri



Darren Grant



David Hornidge



Katelin Schutz



Hirohisa Tanaka



Nicole Vassh



Simon Viel

Non-voting Members



Carsten Krauss

IPP Director



Garth Huber

CINP Exec Director



Kevin Lapointe

NSERC - SAPES
Program Manager



Sarah Overington

NSERC - Director
Discovery, research and
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Olivier Gagnon

CFI Subatomic Physics
Associate Director of
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Special Funds



Mark Lagace

CFI Director of Programs



Rituparna
Kanungo

SAPES Co-chair



Maria
Chamizo-Llatas

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Ex-officio Members



Nigel Smith



Jodi Cooley



Tony Noble



Marcela Carena

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HAY CẸ:P QƏ

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