Update from the McDonald Institute

Joint IPP/CINP Meeting
CAP Congress
June 12th / 2025

Arthur B. McDonald
Canadian Astroparticle Physics Research Institute

CANADA FIRST RESEARCH EXCELLENCE FUND

NSERC CRSNG

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The McDonald Institute is **Canada's network for astroparticle physics research**, uniting scientists, engineers, and technical experts within one Pan Canadian Partnership

We strive to be:

A globally recognized centre for research and learning, coalescing Canadian and international expertise in underground astroparticle physics.

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Now a partnership of 11 Universities and 6 institutes>

University of Victoria

SFU
SIMON FRASER UNIVERSITY

UdS Université de Sherbrooke

CITA | ICAT
Canadian Institute for Theoretical Astrophysics | L'institut Canadien d'astrophysique théorique

New

NSERC CRSNG

Queen's University

SNOLAB

CIFAR
CANADIAN INSTITUTE FOR ADVANCED RESEARCH

Carleton UNIVERSITY

INSTITUTE OF PARTICLE PHYSICS

Laurentian University / Université Laurentienne

McGill

PI PERIMETER INSTITUTE

UBC THE UNIVERSITY OF BRITISH COLUMBIA

TRIUMF

UNIVERSITY OF ALBERTA

Université de Montréal

UNIVERSITY OF TORONTO

CANADA FIRST RESEARCH EXCELLENCE FUND

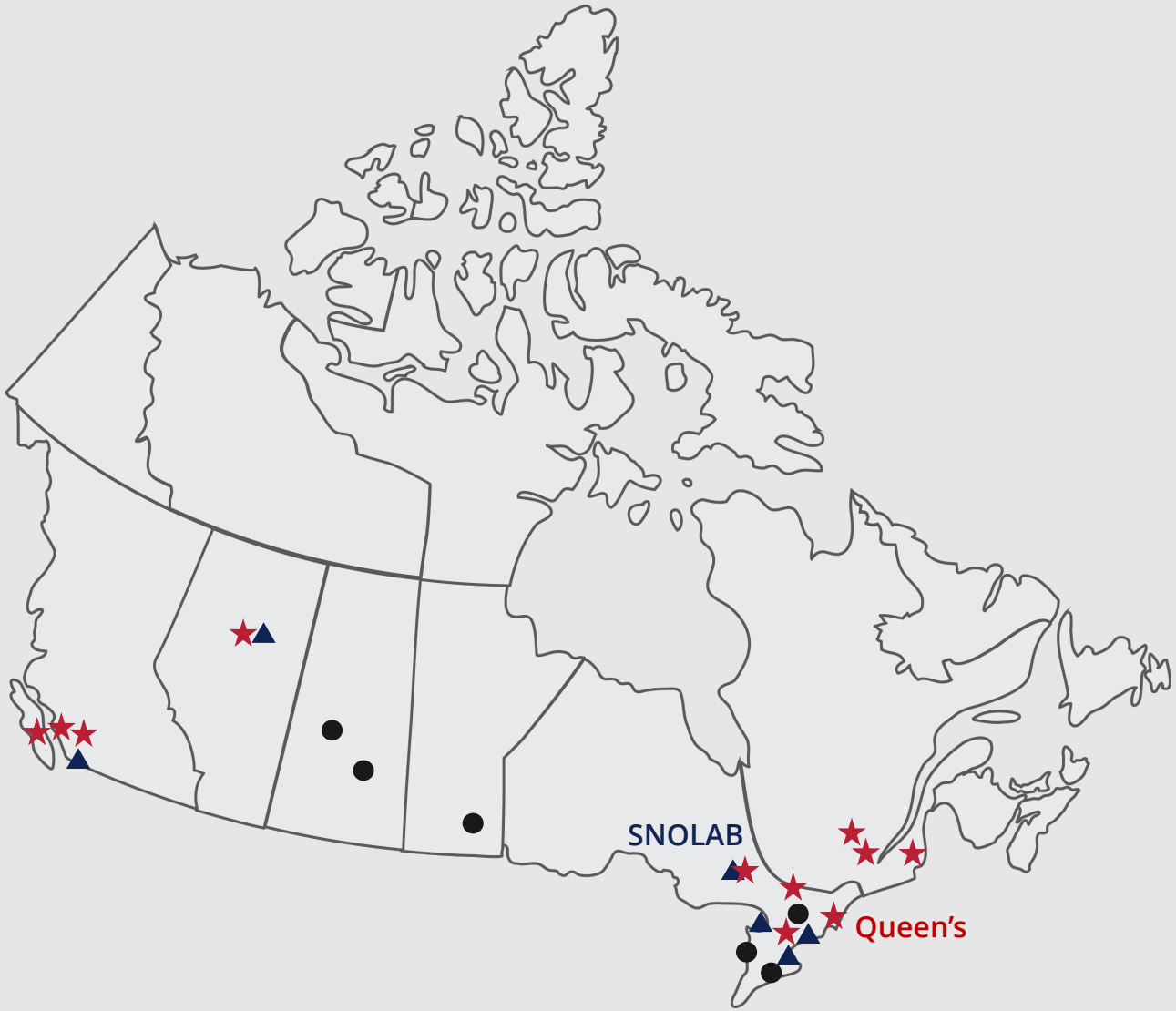
A Pan-Canadian Partnership

- SNOLAB – **Premier facility** in the world
- **Pan-Canadian** scientific effort leveraging **world-class facilities**
- **Partnerships:**

★ **11 Universities**
- Alberta
- Carleton
- Laurentian
- McGill
- Montreal
- Queen's
- Sherbrook
- Simon Fraser
- Toronto
- UBC
- Victoria

▲ **6 Institutes**
- CIFRA
- CITA
- IPP
- PI
- SNOLAB
- TRIUMF

● **Collaborators**
- McMaster
- Regina
- Saskatchewan
- Waterloo
- Winnipeg
- York



CFREF Funding Winding Down:

Scientific Capacity Building:

- 15 new Faculty in cross-disciplinary positions hired by McDonald Institute. Now University supported.
- This spawned about 12 more faculty positions to build on these groups.
- New faculty members developed interest in astroparticle physics. Over 80 faculty have had significant engagement with MI during the CFREF period.
- Initiated substantial growth in astroparticle physics theory
- Many hundreds of HQP supported across Canada
- Substantial support for key projects via faculty, HQP, engineering and technical resources.
- Community support & Network development

NSERC-MRS Funding Winding UP:

Addressing the Gaps:

- Significant new engineering, and technical support through an MRS like “Integrated Project Delivery Office”. Hubs strategically placed across Canada with 17 personnel supported.
- Pool of talent will include mechanical, structural, cryogenic, electrical, project management…
- Allocated through Prioritization Board.
- Strong continued support for research programs through HQP, other personnel
- New partnership with Sherbrooke, Simon Fraser, Victoria and CITA
- Technology development

Funding Situation

- **CFREF winding down;** On track to be able to close the books in September/October 2025.

- **NSERC-MRS Ramping up:**
  - First two years (18.2 M$) approved by ISED and given to NSERC who has become the agency providing oversight.
  - NSERC released funds of 18.2 M$ and I received them at Queen's late last fall. Most institutions now have early agreement in place to spend these funds.
  - Next three years (27.3 M$) is now approved, and NSERC again will be the agency adminstering the funds. We will need to go through a review before these funds are released.

Scope: The Institute is providing support for the initial research & development of projects and for the ongoing science delivery, primarily at the Universities where the initial R&D is occurring.

Focus: The Institute was initially created with a focus on ensuring Canadian scientists were leading in the science that benefits from having the premier underground facility, SNOLAB, in their backyard.

Physics objective focus on:

- Dark Matter
- Fundamental Properties of neutrinos
- Neutrinoless double beta decay
- Multi-messenger Physics

In addition to SNOLAB we also now benefit from the underwater facilities at Ocean Networks Canada.

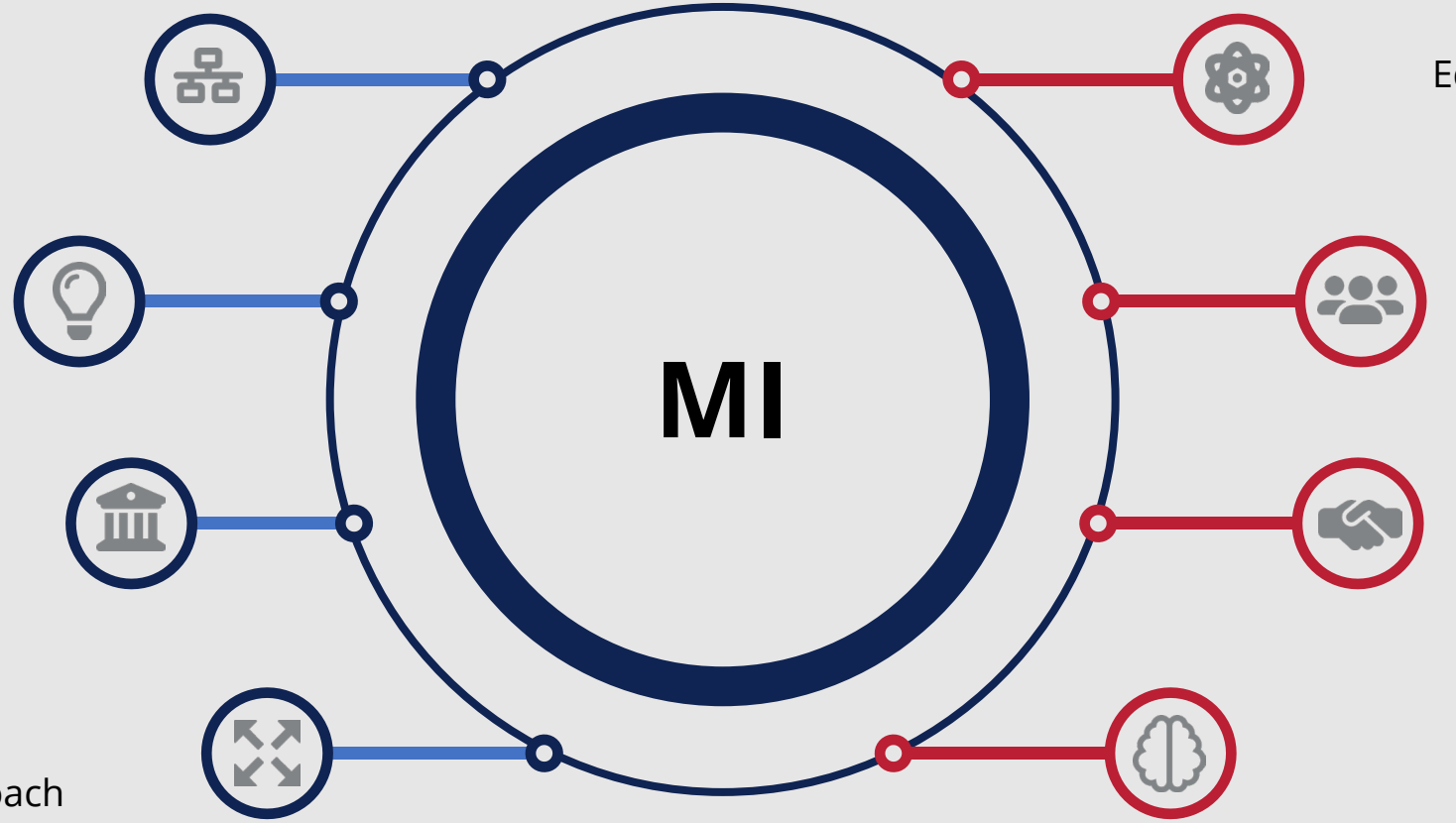
Delivering the Science: McDonald Institute

Integrated Project Delivery Office

Catalyzing critical innovations

Enhancing accessibility and scientific training

Disruptive research: cross-disciplinary approach



Education and outreach

HQP professional training, and ECR development

EDII integration in all activity/governance

Facilitating knowledge translation

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Integrated Project Delivery Office

A well identified gap in the Canadian astroparticle physics ecosystem is the lack of engineering and technical resources at the Universities. Such a resource:

- Would enable Canadian researchers to take on major leadership responsibilities within large international collaborations to deliver significant components of those projects. Hence elevating the stature of the Canadian contributions.

- Will provide a blend of technical skills accessible by the entire community where having all those skills locally would be impossible.

- Allows the community to retain the expertise in underground physics while the various projects move through the typical life cycles of design, fabrication, and commissioning where significant engineering resources are most needed.

Managing the IPDO

- Prioritization Board (current thinking). To be launched in September 2025
  - Relevant proposals are first reviewed by a panel with appropriate engineering and technical expertise to evaluate the technical feasibility of the request. This may involve some iteration with the proponents.
  - The Prioritization Board evaluates the scientific merit of feasible proposals and makes a recommendation on the appropriate level of support.

- Sharing with SAP MRS Consortium?
  - An open question to my mind. Would it be useful/practical to have some level of collaboration/integration with the existing SAP MRS consortium (Alberta, Montreal, Carleton, Winnepeg, UVic)

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Current Program Activities

Pooled Funding Competitions:

- Theory postdoctoral fellowship program (MITF). Awarded
- Graduate student pooled funding competition. In final stages of adjudication. ~50 applications !
- Experimental postdoctoral fellowship competition: about to be launched
- Cross-Disciplinary Internship program. Currently active.

Early Career Researcher Program.

- To be launched soon: Funds international exchange targeted at ECR faculty

Engineer in Training Program.

- Pairs recent graduates in Engineering with mentors in the IPDO Engineering Hubs
- To be launched ~concurrent with the IPDO in September

Other Initiatives

Long Range Planning Contribution: A white paper for submission to the LRP

DESIRED OUTCOMES: *The 2025 white paper lays out the 5-year and 15-year horizon of science opportunities in Canada and identifies priority astroparticle physics topics, strengths/opportunities, and challenges over both timespans. The white paper identifies the vision of the community, and specific roles for the McDonald Institute in support of that vision. The white paper informs the McDonald Institute's 2025-2035 Strategic Plan and discussions for long-term community support at Canadian universities.*

Initial outline to be developed with working group leaders (to be solicited) panning their communities.

Followed by town hall discussions and iteration on the white paper.

Close to being kick-started

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Other News

- **National Meeting**
  - August 6 – 8 in Ottawa. Hold the date.
  - Additional programming for HQP

- **CERCs**

Queen's University
"Unravelling the mysteries of the universe"
CERC in Astroparticle Physics

Carleton University
CERC
in
Experimental Particle Physics


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Thank You