TRIUMF in the ARIEL Era

Five-Year Plan 2020-2025

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Deputy Director, Research
Five Year Plan 2020-2025

https://fiveyearplan.triumf.ca/

• Articulates TRIUMF’s vision and mission
• Communicates goals and priorities for 2020-2025 & beyond
• Lays out an action plan, including a high level budget
• Makes the case for core operational funding
• Ensures the continued relevance and success of TRIUMF
How did we get here?

- Internal bottom-up strategic planning process with SWOT analysis for all areas of the lab
- Internal and external consultation through Town Halls, surveys, Science Week, PPAC evaluation
- Prioritization based on risk and opportunity analysis to ensure that plan is optimal
- Strategic Plan and Implementation Plan articulate the outcome of this process
- Five-Year Plan 2020-2025 approved Board of Management
TRIUMF delivers value to Canada across three critical dimensions

- Science and Technology
- People and Skills
- Innovation and Collaboration
Platforms for sustained success
Science and Technology

- **Goal 1:** Make groundbreaking discoveries across TRIUMF’s *multidisciplinary* research portfolio
  - *Why? To strengthen Canadian leadership in science and technology*

- **Goal 2:** Reinforce TRIUMF as a globally leading particle accelerator centre
  - *Why? To make Canada a destination of choice for talent, ideas, and international partnerships*
TRIUMF’s research portfolio, from fundamental to applied:

- Expands the boundaries of human knowledge
- Advances the treatment of critical diseases
- Develops new technologies and innovations
- Deepens our understanding of the natural world
Science and Technology
Unleashing the full power of our accelerator complex

- Complete and operate ARIEL
  - Most powerful ISOL rare-isotope beam facility worldwide
    - 50 kW protons x2
    - 100 kW electrons
  - Purpose-built multi-user RIB facility
    - Cleaner beams, new beams
    - More experiments
    - Longer beamtimes
  - Triple rare isotope capabilities, enabling more science, more training and more commercial activity
Recent Accomplishments

- B1-Level racks completed
- EBIS testing resumed after collector repair
- HRS mapping completed, ready for installation
- RFQ RF-tests
- RIB beamlines, yield station enclosure
- RIB beamlines in ARIEL building
Science and Technology

Establishing TRIUMF as a global centre for nuclear medicine

- Launch IAMI – Institute for Advanced Medical Isotopes
  - Research and production facility for medical isotopes
  - TR-24 cyclotron with state-of-the-art GMP laboratories
  - Global centre for nuclear medicine research and radiopharmaceutical development
November 1, 2018
Science and Technology
Building a modern and inclusive organization
Attracting the best scientists to our world-class facilities

- Strengthen TRIUMF itself
  - Ensure equity, diversity and inclusion are central to every activity
  - Enhance programs to attract, retain, and develop talent
  - Renew site infrastructure to improve productivity
  - Develop continuous improvement culture and improve organizational structure
Operate Safely and Effectively – DDO / COO

- Anne Louise Aboud
  - McGill Engineer, McGill MBA
  - Broad range of prior experience:
    - Technical Sales, Dow Chemical
    - Product Manager, Imperial Chemical
    - Business Development, GE Canada
    - Senior Vice President, TD Ameritrade
    - Senior Vice President, Lifelabs
    - Consultant, Baxter Canada and Rogers Communications
  - Started June 1
Operate Safely and Effectively – CDI

Committee on Diversity and Inclusion

- Conducted baseline demographic survey. 68% response rate

- Gender: 74% male  21% female <1% non-binary

- Indigenous Persons: 1% yes  95% no

- Visible Minority: 25% yes  69% no

- Disabled: 2% yes  92% no
Science and Technology
Investing in state-of-the-art laboratory infrastructure

- Infrastructure Renewal – based on risk and opportunity analysis
  - Accelerator upgrades and refurbishments
    - 520MeV cyclotron (>90% reliable at 400 muA)
    - ISAC targets & beam delivery
  - Upgrade Meson Hall infrastructure
    - MuSR beamlines and experiments
    - Robotic warm cell for BL1A beamline refurbishment & rad-waste management
  - UCN facility phase II & nEDM experiment
  - Renewal and upgrade of detector facilities
Major science & technology priorities

Leveraging our strength in accelerator science and detector technology

- **TRIUMF facilities**
  - ARIEL and IAMl completion and ramp up of operations *(core budget)*
  - 520 MeV Cyclotron & ISAC targetry upgrades *(core budget)*
  - Meson Hall upgrades and BL1A overhaul *(core budget & CFI funding ~2023)*
  - betaNMR facility expansion *(CFI funding ~2021)*
  - UCN source upgrade and nEDM experiment *(CFI funded)*
  - Detector facility upgrades *(CFI funding ~2021)*

- **National and International Projects**
  - ATLAS upgrades *(CFI funded)*
  - SuperCDMS Dark Matter *(CFI funded)*
  - NuPRISM / HyperK *(CFI funding ~2021)*
  - nEXO neutrinoless double-beta decay *(CFI funding ~2021)*
  - HL-LHC cryomodules and beam dynamics *(funded)*
World Class Science – HL-LHC

$10M Funding Announced: Crab Cavity Cryomodules
People and Skills

- **Goal 3:** Become a hub for interdisciplinary education and training
  - *Why? To prepare Canadians to compete in the knowledge and innovation economy*

- **Goal 4:** Inspire Canadians to discover and innovate
  - *Why? To increase access and opportunity, and strengthen Canadian society*
People and Skills

- Strengthen Canada’s STEM pipeline
  - Expand TRIUMF’s unique post-secondary education programs, offering a quality, hands-on, real-world experience
    - Graduate lectures on select topics, summer schools
    - Undergraduate work experiences, Engineers in Training, apprentices
  - Promote diversity and inclusion, for federally designated groups and in accordance with Athena SWAN charter
    - Recruitment and retention strategies with regular review of metrics
    - Targeted recruiting and special scholarships
    - Relationship building with Indigenous communities

SWAN=Scientific Women’s Academic Network
People and Skills

- Strengthen Canada’s STEM pipeline
  - Better prepare postdocs and graduate students for careers outside academia
    - Entrepreneurship education
    - Communications training
    - Project management experience
    - Data science training
  - Leverage partnerships to attract international students and postdocs to Canada
People and Skills

- Empower future generations of discover and innovators
  - Take TRIUMF’s outreach program nationwide
  - Establish TRIUMF as a hub for science communication and public engagement
    - Partner with like-minded organizations to carry TRIUMF’s story into communities across Canada
    - Join with the BC Digital Supercluster to use VR and other digital technologies to engage urban and rural communities
    - Offer professional development experiences to teachers, science communicators, students, and postdocs
Global Physics Photowalk 2018

- TRIUMF image takes podium in both jury and people’s choice competitions in 2018 Global Physics Photowalk
- Featured in Wired UK and symmetry

See more competition photos via #PhysPics18 hashtag
Innovation and Collaboration

- **Goal 5:** Translate knowledge and discovery into innovation
  - *Why?* To develop new technologies to support business-led innovation and improve the lives of Canadians

- **Goal 6:** Increase national and international collaboration
  - *Why?* To strengthen Canadian competitiveness in global discovery and innovation
Innovation and Collaboration

- Expand TRIUMF Innovations into a national centre for commercializing disruptive technologies
  - Medicine and drug development
  - Materials development and testing
  - Accelerator and detector technologies
  - Mining and natural resources
  - Border security
  - Oil and gas exploration
  - Data sciences

- Expand TRIUMF’s national and international networks

- Leverage TRIUMF’s networks to create teams to solve real-world problems and deliver tangible benefits to Canadians
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The Rarest Drug on Earth

AVOCADO VIDEO
Five Year Plan Summary

- Key outcomes
  - Instill equity, diversity, inclusion across laboratory
  - Fully operate ARIEL and IAMI, ensuring international leadership
  - Expand quantum materials and data sciences programs
  - Fully support Canadian university community, SNOLAB experiments and priority international projects
  - Improve TRIUMF site to ensure reliable ARIEL operations
  - Modernize management tools and implement process improvements
  - Give special focus to talent development
  - Strengthen programs in education, outreach, commercialization
Five Year Plan Budget

- Delivering the full Plan requires
  - $353.1M core operating budget
    - Bottom-up budget guided by community priorities
  - $320M core operation funds via NRC
    - $5M/year increase over inflation
  - Supported by
    - $23.1M commercial revenues & cost recoveries
    - $10M Efficiency Savings
  - ~$26M sponsored research funding
    - NSERC, CIHR, Mitacs, …
  - ~$55M capital investments (CFI + Provinces)
  - ~$25M commercial revenues
  - ~$10M WFO cost recoveries

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<td>Salaries and Benefits</td>
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<td>Accelerator Refurbishments and Upgrades</td>
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<td>Training, Outreach and User Support Initiatives</td>
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<td><strong>NRC ASK</strong></td>
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TRIUMF’s Five-Year Plan 2020-2025

• Is ambitious with clear goals and outcomes, delivering success across dimensions
  • Science and Technology
  • People and Skills
  • Innovation and Collaboration
• Enables Canadian scientists to continue making groundbreaking discoveries
• Reinforces TRIUMF’s status as a globally leading accelerator centre
• Is the outcome of extensive strategic planning, consultation and priority setting
• Can be delivered with $320M of core operational funding by the federal government
• Will leverage both commercial revenues (assuming modest growth) and additional competitive funding (CFI, NSERC, CIHR, etc.)

• Ensures the continued relevance and success of TRIUMF
Thank you
Merci

www.triumf.ca
Follow us @TRIUMFLab
Hyper-K Seed Funding Secured
Nature: Lyman $\alpha$ transition observed in antihydrogen

Observation of the 1S–2P Lyman-\(\alpha\) transition in antihydrogen


TRIUMF researchers

Makoto Fujiwara
David Gill
Konstantin Olchanski
Art Olin
Andrea Capra
Rob Collister
Andrew Evans
Alex Khramov
Joseph McKenna
Mario Michan
ttH coupling observed at $6.3\sigma$

TRIUMF researchers

Alexander Held
(TRIUMF/UBC)

Jelena Jovicevic
(TRIUMF)

Oliver Stelzer-Chilton
(TRIUMF/UBC)
TRIUMF:
20 Member Universities

Three new since 2013. And more underway....
Accelerators, Detectors, and Data Sciences

Outer Space
- Cosmology & Dark Matter
- Nuclear Astrophysics
- Electronics & Radiation Testing
- Nuclear Medicine

Inner Space
- Particle Physics
- Nuclear Physics
- Molecular & Materials Science

TRIUMF
Board governance review progressing

- Led by Vivek Goel, VPRI, Toronto
- Foundational to Five-Year Plan
- Assisted by Watson Advisors, Gowling WLG
  - Move from Joint Venture to Incorporated Non-Profit Charity
    - Still university owned and operated
  - Members’ Council, Science Council, Board of Directors
- Approved in principle at June Board of Management Meeting