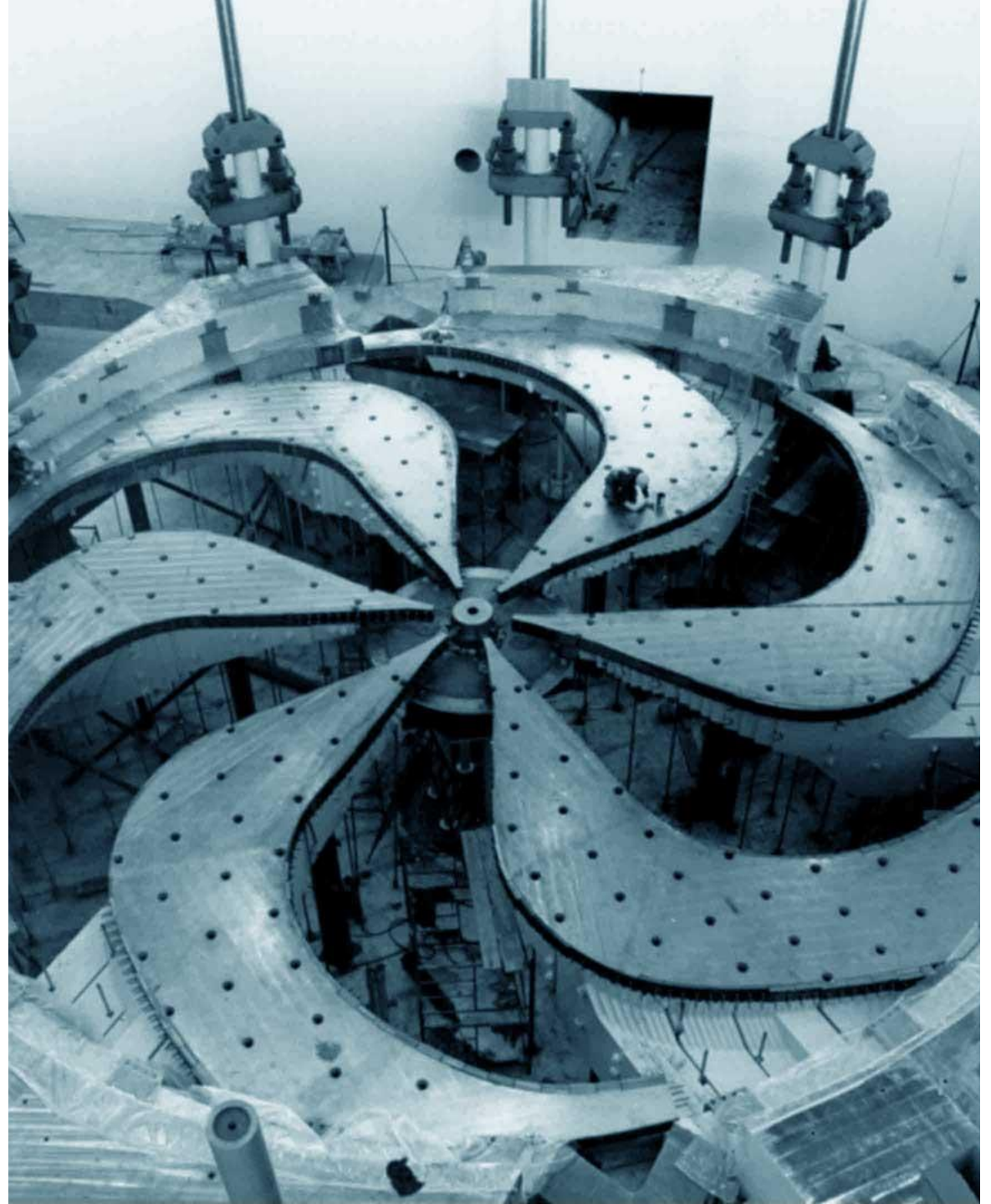# TRIUMF

Scientific Computing Department
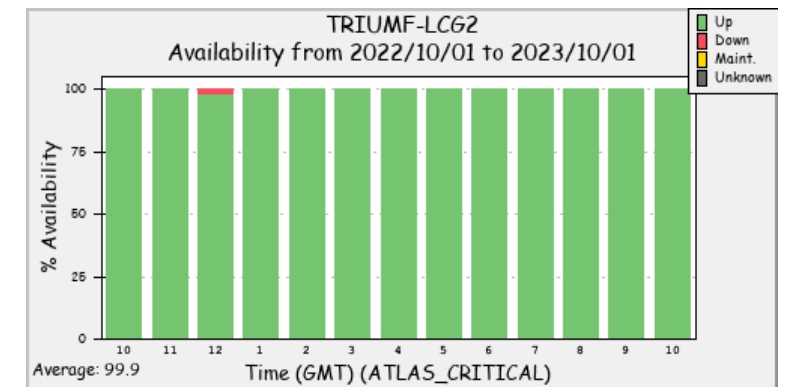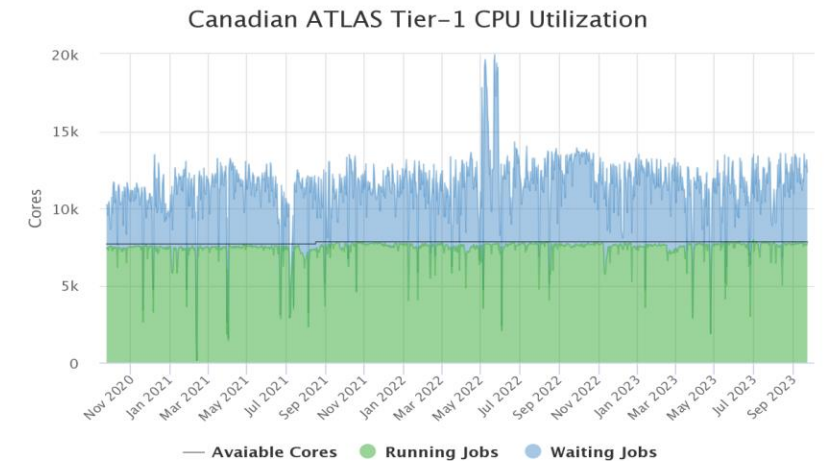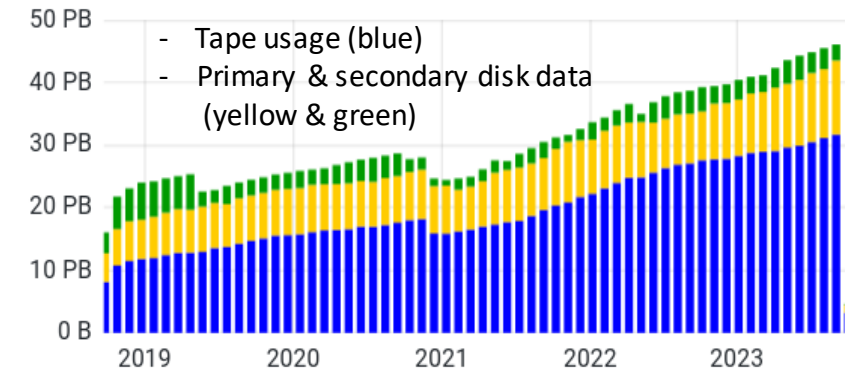
Highlights for ACOT

Fall 2023 Meeting

2023-11-24

Discovery, accelerated

ATLAS Tier-1 Status & Activities

- Somewhat smooth operations with resources fully utilized
  - In August, SFU Cedar/Alliance core network migrated from Huawei to Arista Networks (process delayed due to COVID & supply chain)
  - Additional 11.5 PB tape capacity ordered in early fall and deployed into production recently
  - Seeing large number of tape drives failures. In discussions with IBM for deeper analysis (some shipped to Arizona).

- No funds secured through CFI IF 2023 competition
  - Working on risk mitigation strategy / full rescoping of IF 2020 funds
  - Significant impact for 2025+: two-year delay
  - NSERC proposal submitted in October to cover partial operations

- Supercomputing 2023 conference (Nov 12-17, Denver CO)
  - demo of dynamic circuit provisioning. Collaboration between TRIUMF, CERN, FNAL, KIT and network providers

- Tier-1 presentations at HEPiX Fall 2023 conference (Victoria BC, Oct. 16-20)

- Evaluating CERN Tape Archive suite (CTA) and comparisons with the TRIUMF in-house developed system (Tapeguy). This is for future considerations for the challenging HL-LHC environment

- Tape usage (blue)
- Primary & secondary disk data (yellow & green)

Canadian ATLAS Tier−1 CPU Utilization

TRIUMF-LCG2
Availability from 2022/10/01 to 2023/10/01

Average: 99.9

Leadership in Machine Learning and Quantum Computing

- Supporting projects and enhancing science output across PSD and Accelerator Division. (Hyper-K, ATLAS, NA62, ALPHA, ISAC, TIIGR)
    - Including cutting edge (Quantum – assisted ML)

- Public results in last 6 months:
    - NA62 ("Improved calorimetric particle identification in NA62 using machine learning techniques"); Accepted (JHEP)
    - More publications in the pipeline QML/ATLAS, ISAC (NIM)

- Securing research funds and Fostering national and international collaboration:
    - NRC Applied Quantum Computing Challenge program
        - $400k/2 years
        - w/ M. Swiatlowski (TRIUMF), B. Stelzer (SFU/TRIUMF); R. Melko (Perimeter), O. Stelzer-Chilton (TRIUMF), A. Lister (UBC), C. Gay (UBC), E. Paquet (NRC)
        - RA hired (J. Toledo)
    - Helmholtz Association / HAICU collaboration

- Training HQP (6 PD, 4 grads, 7 Coops + 4 UG/Exchange)
    - Hosted UBC Master of Data Science (w/ D. Bryman / NA62)
    - Hosting UBC EngPhys capstone (w/ M. Swiatlowski / ATLAS)
    - Coops: >50% women or non-binary; >50% POC

SFU SIMON FRASER UNIVERSITY

PI PERIMETER INSTITUTE

UBC

TRIUMF

Scientific Computing Next Five-Year Planning

- **ATLAS Tier-1 & Distributed Computing (dedicated project & scope)**
  - Existing personnel complement throughout 2025-2030, continuing 24x7 operations
  - Initial plan was to hire temporary personnel to work on HL-LHC software and computing challenges developments but need to rescope existing CFI funds
  - Developing next funding application and exploring avenues within DRI ecosystem.

- **ML, AI and QC applications**
- Goals:
  - Enhance TRIUMF science program, research output and operational excellence
    - Continue support for existing program
    - Expand into areas not well 'serviced', Nuclear Physics, Material and Life Sciences
  - Expand connections with universities, national and international partners
  - AI Center proposed
    - Alignment with TRIUMF 20-Year Vision
    - Incorporated into 'Five-Year Request for Support 2025–2030'
  - Personnel and funding profile proposed:
    - 1 FTE P&S is existing (W. Fedorko); 2 new FTE P&S to be hired staggered 2025-27
    - Capital investment for on-site computing every 3-4 years

Extra Material

Scientific Computing Department

- Common umbrella for existing activities:
  - Big data & Distributed Computing (ATLAS Tier-1) (R. Tafirout)
  - Machine Learning & Quantum Information Systems (W. Fedorko)

- Head / Deputy: R. Tafirout / W. Fedorko
  - Tier-1:

    A. De Silva   X. Liu

    R. Debhandari   D. Qing

    F. Fernandez Galindo   Y. Shin

    V. Kondratenko   A. Wong

  - QML: Javier Toledo (RA)

Affiliated Scientists:

C. Senko (Waterloo)

R. Islam (Waterloo)

P. Haljan (Simon Fraser)

J. Sirker (Manitoba)