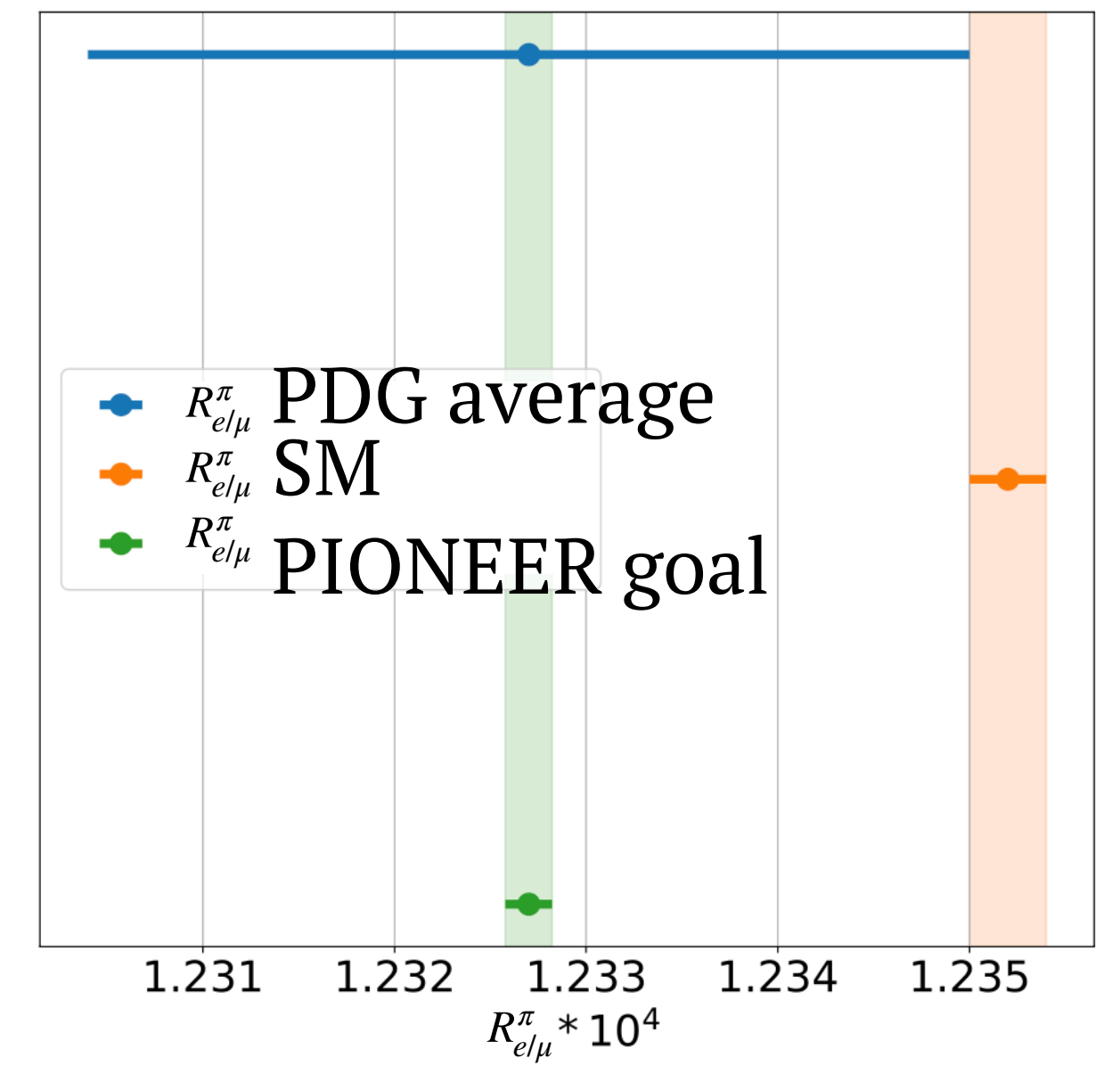


PIONEER

- New experiment addressing tensions in the flavor sector (LFUV, V_{ud}) using low energy pions (~ 70 MeV/c) at the Paul Scherrer Institute (Switzerland).
Phased experiment - Phase I **approved with high priority** at PSI
- Timescale : 10-15 years. Commissioning of the experiment planned for ~ 2031
- PIONEER builds on the techniques refined in previous pion decay experiments: PIENU@ TRIUMF
- PIONEER will employ **emerging technologies** which are **synergistic** with other developments at TRIUMF (Noble Liquid calorimetry, VUV photosensors, LGADs, in nEXO, NA62, ATLAS)
- TRIUMF process:
Gate 0 and Gate 1 passed (in 2023 and 2024)
Awaiting final TRIUMF endorsement for CFI IF 2025
- Canadian group (McGill, TRIUMF, UBC) involved in all aspects of the experiments with focus on the **LXe calorimeter**

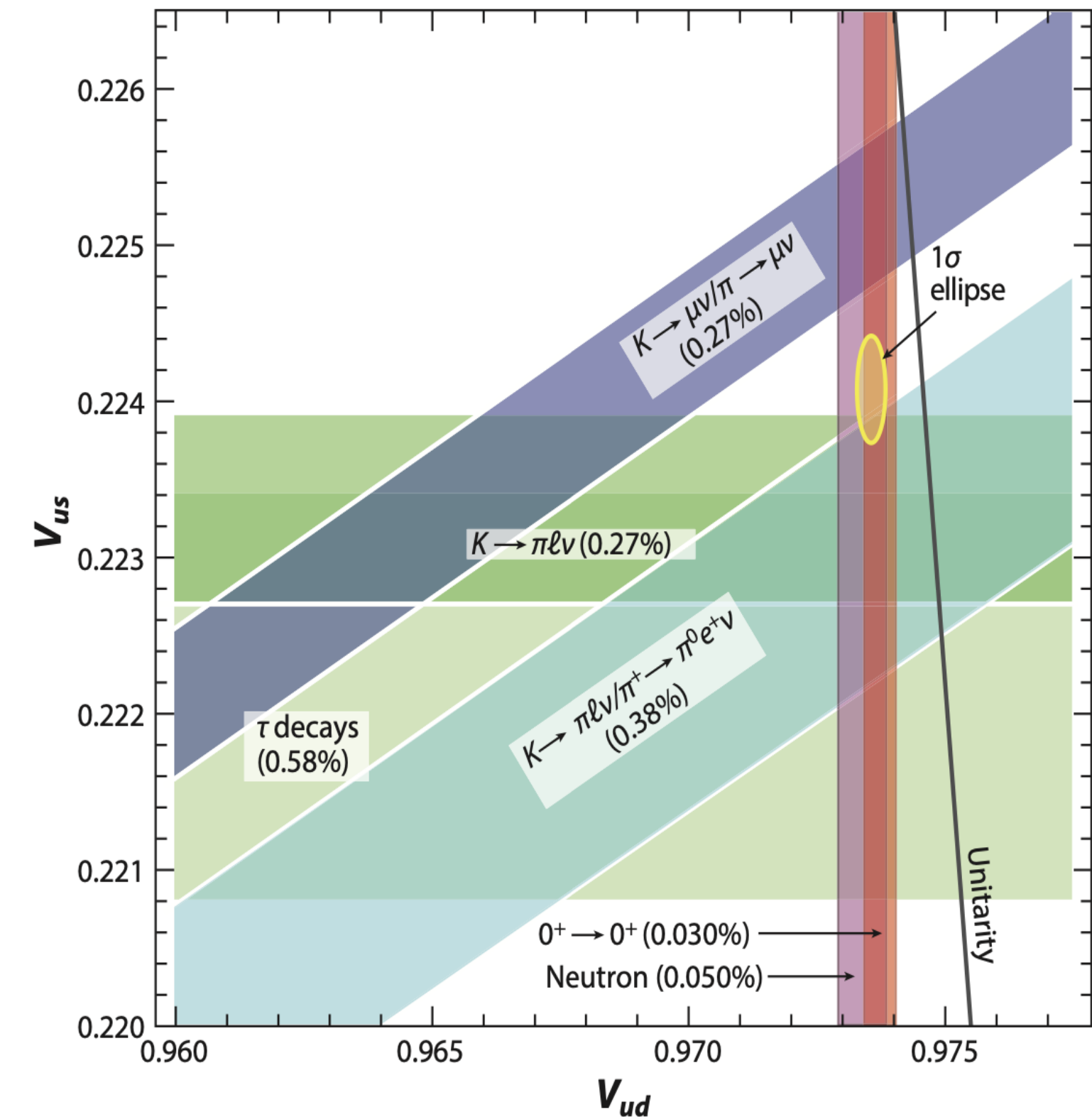
Phase 1:

$$R^\pi = \frac{\pi \rightarrow e\nu(\gamma)}{\pi \rightarrow \mu\nu(\gamma)}$$



Phase 2 and 3 :

$$B(\pi^+ \rightarrow \pi^0 e^+ \nu)$$

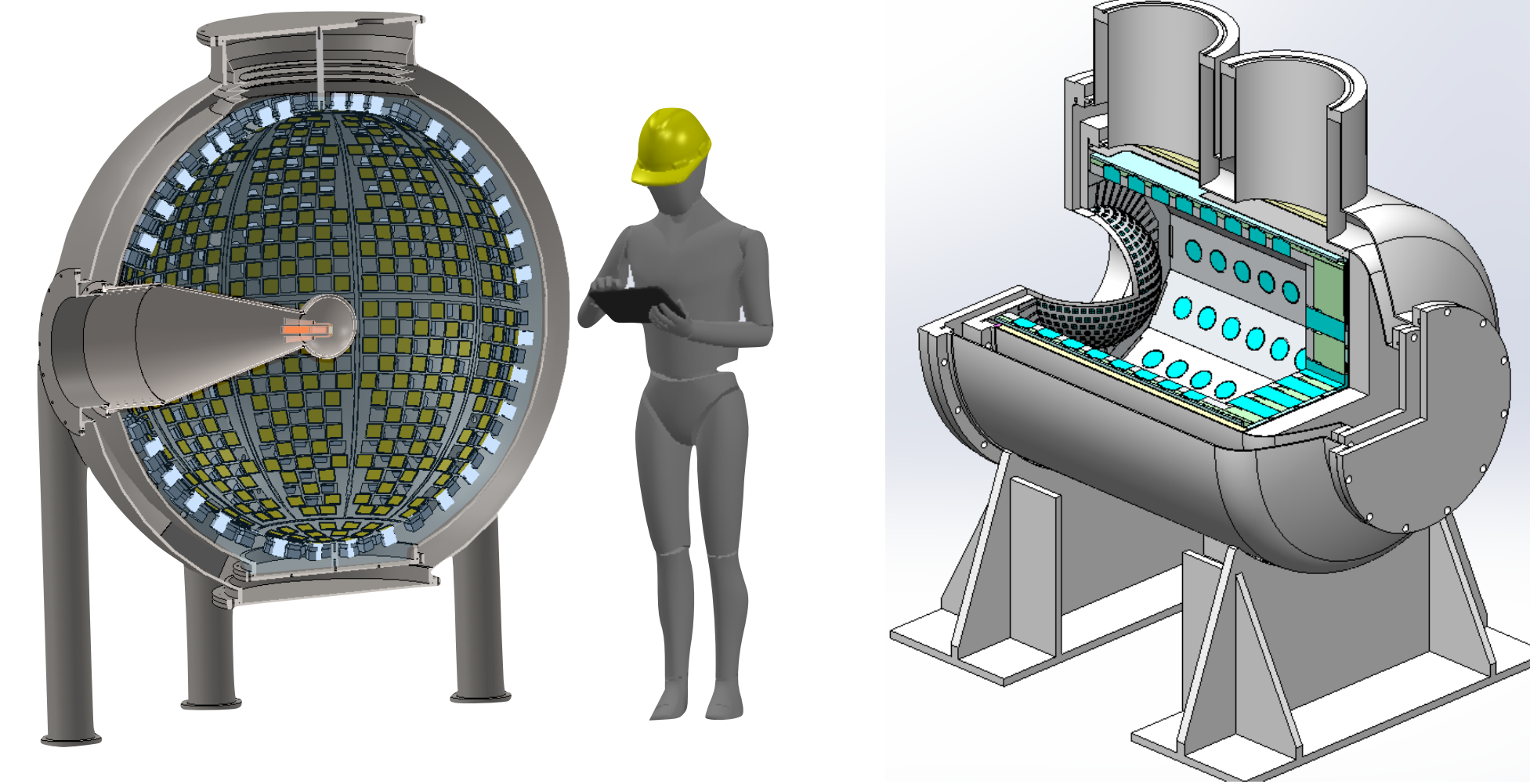


Existing tensions in the 1st-row CKM unitarity test.

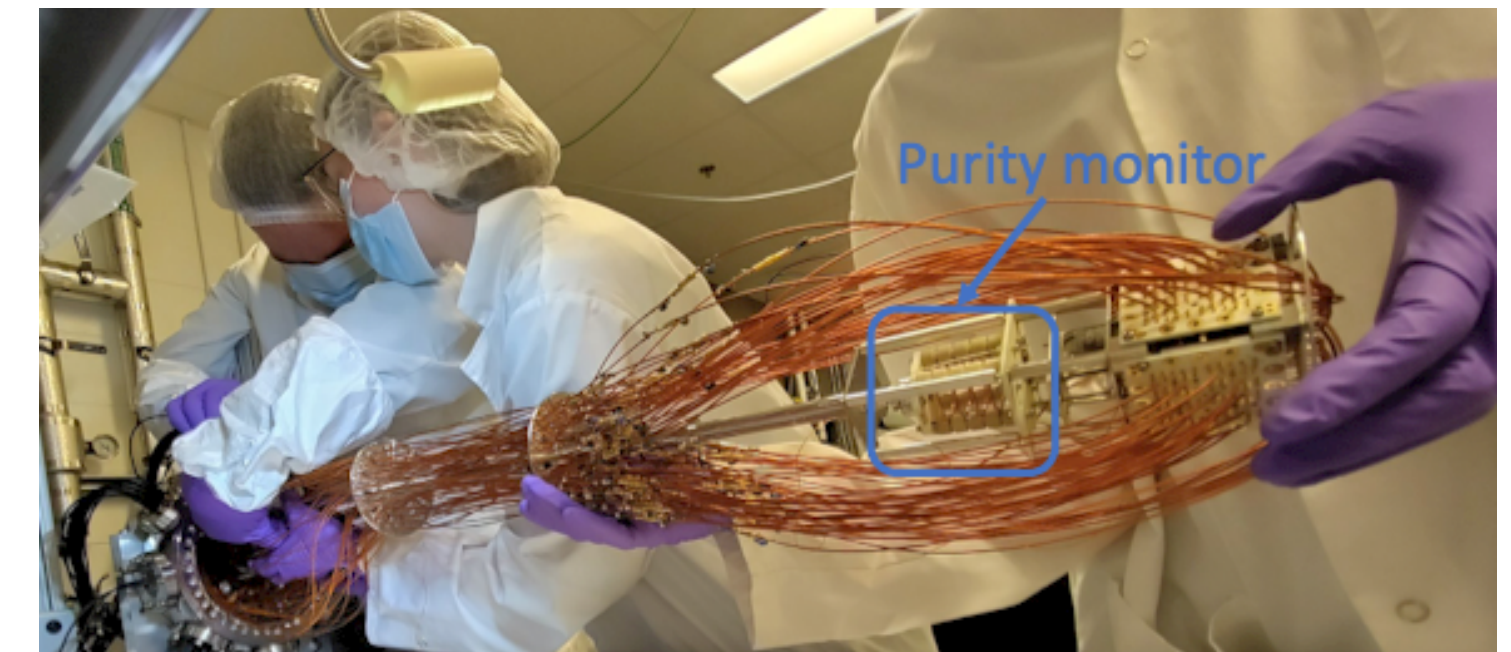
PIONEER

Conceptual design (cut-out view) of PIONEER's LXe calorimeter

PIONEER's LXe facility (CFI 2025)



Installation of PIONEER's purity monitor prototype in LoLX (McGill)



• FUNDING:

The group is NSERC funded through 2026
Preparing CFI IF 2025 proposal (University envelopes of \$3.8M) to fund the LXe facility for PIONEER

• 3rd collaboration meeting at TRIUMF (January 2025)

• **TEAM:** PIs: T. Brunner [McGill], C. Malbrunot [TRIUMF, McGill, UBC] (Deputy spokesperson, NSERC PI), D. Bryman [UBC] (Founding spokesperson)

HQPs at TRIUMF

• Research Associate

• Bob Velghe

• Postdoc:

• Ben Davis-Purcell started Nov 1st 2023
Recipient of an NSERC fellowship (starting April 1st 2024)

• PhD student

• Emma Klemets (UBC) started her PhD Sept 1st 2023
Recipient of an NSERC CGS-D scholarship (starting Sept 2024)

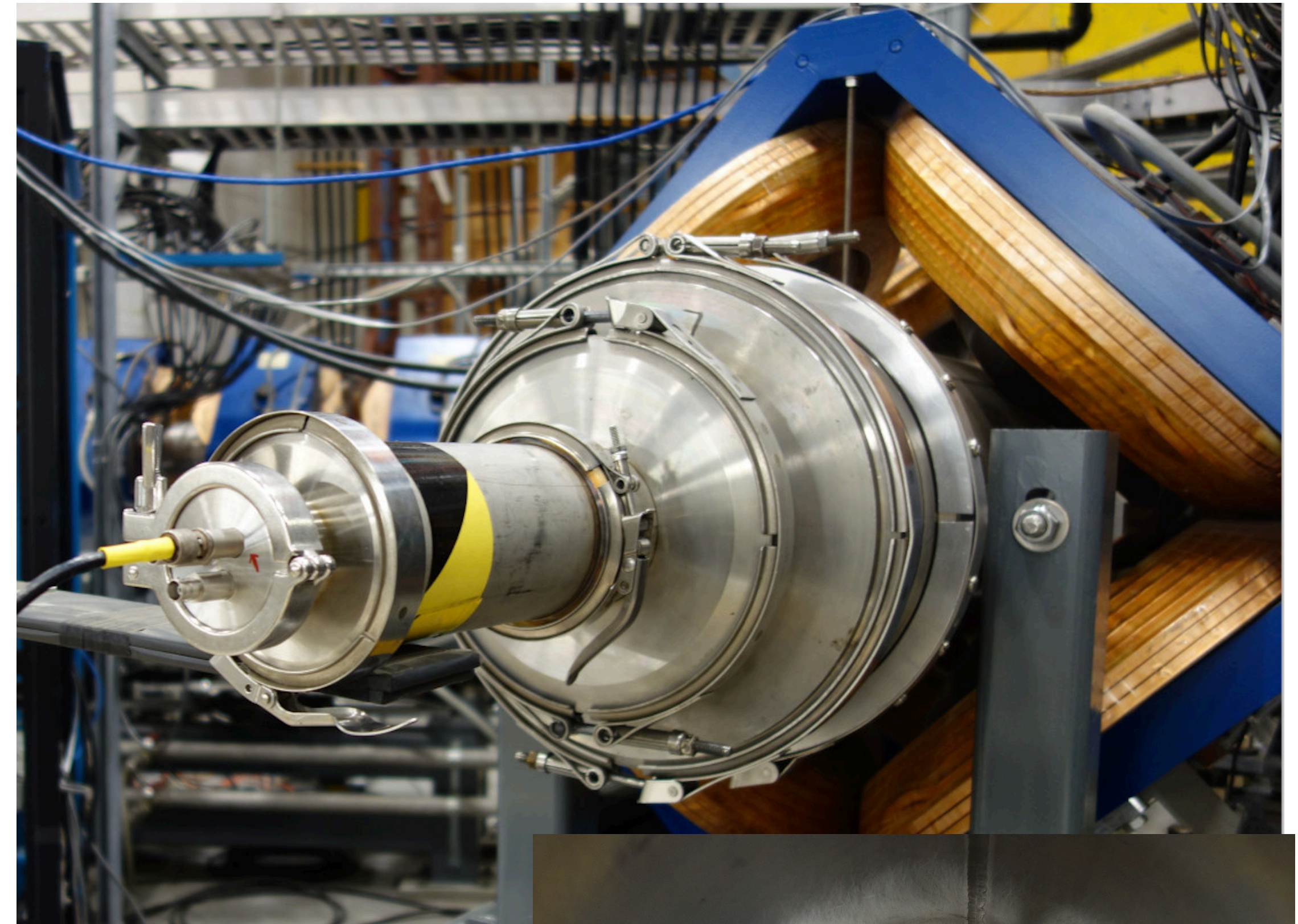
• Many undergraduate students (co-op students, MITACS)

PIONEER

- Potential experiment at TRIUMF in connection with PIONEER : improved measurement of the **pion lifetime**. Effort led by B. Velghe. May 2024 PP-EEC endorsed the updated LOI including request for further validation measurements.

Thanks to PIF/NIF coordinator C.Belanger-Champagne and Gerald Morris (CMMS) and to the accelerator team for their strong support and availability.

Nice support/synergy across the lab!



test in M20 beamline

