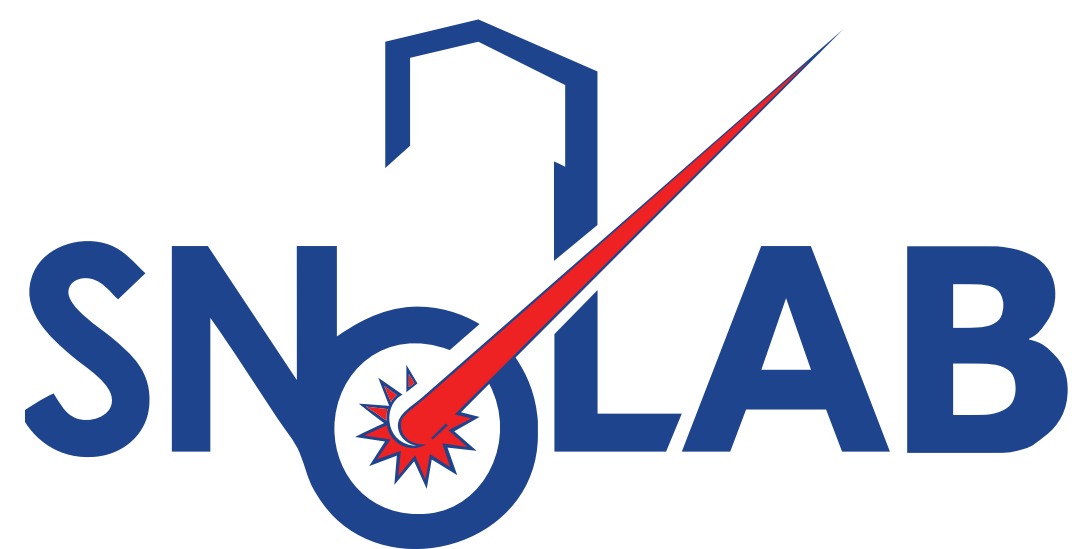


Data Quality & Run Selection for SNO+



Erica Caden

on behalf of The SNO+ Collaboration
ecaden@snolab.ca

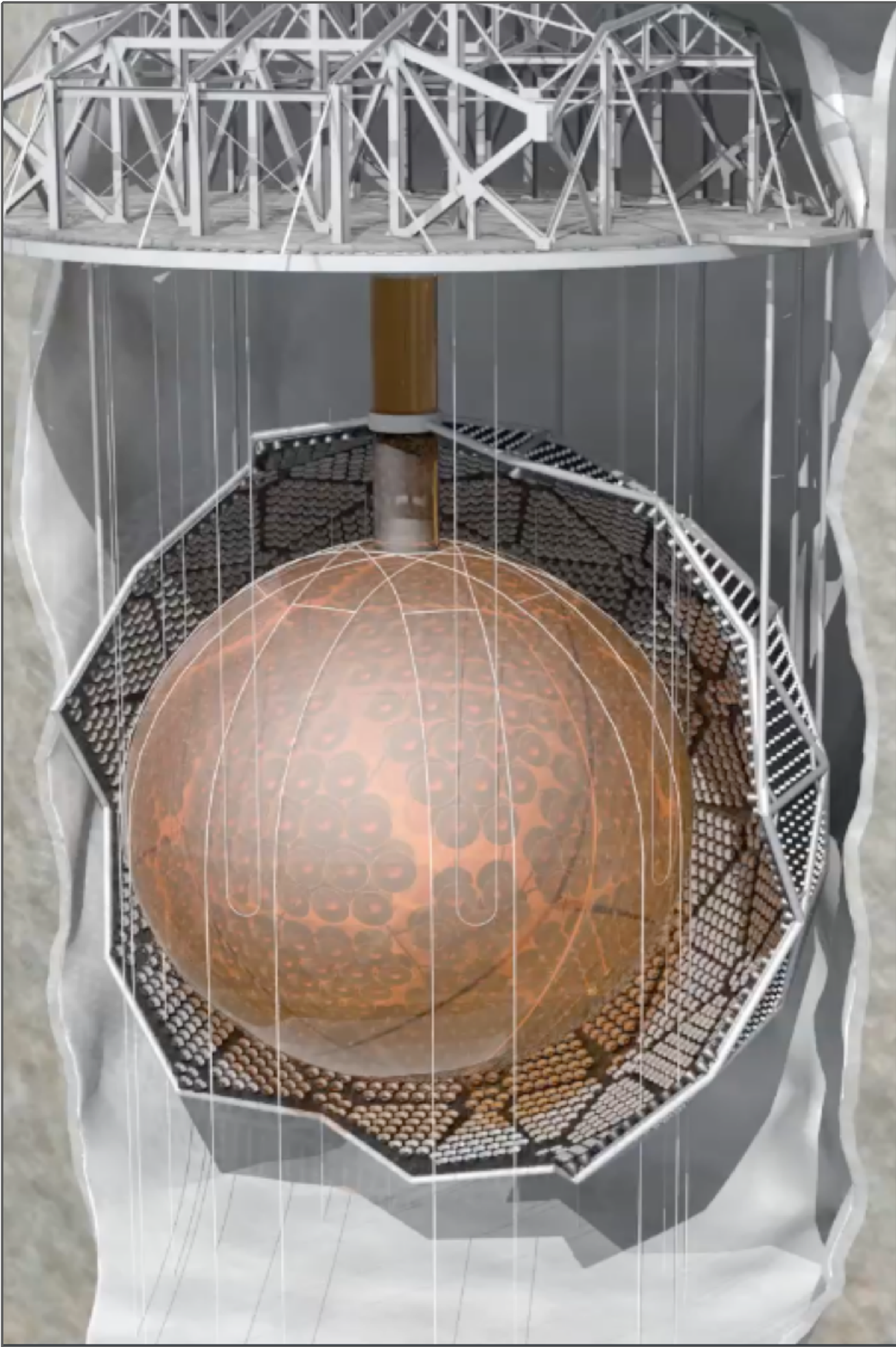


Laurentian University
Université Laurentienne

SNO+ Detector

SNO+ is a multipurpose liquid scintillator neutrino detector, with the main goal of searching for $0\nu\beta\beta$ decay in Te-130, as well as studying solar and supernova neutrinos and geo- & reactor- anti-neutrinos. Located 2 km underground at SNOLAB, SNO+ is currently running in water phase to study backgrounds and perform a search for nucleon decay.

- Upgraded DAQ
- Refurbished Calibration System
- Urylon liner: Rn seal
- Low Radioactivity Hold Up Ropes
- New Optical Monitoring & Calibration System
- Hold Down Rope Net
- Acrylic Vessel
 - Φ 12 m
 - 5 cm thick
- 780 t LAB + PPO + 3.9 t Te
- Water shielding
 - 1700 t inner
 - 5300 t outer
- ~9400 PMTs, 50% coverage



Low Level Data Quality Checks

- High Voltage Coverage
- Low Voltage Coverage
- Run Length
- Detector State
- PMT Status
- Operator Input

Run State	
Type	Physics Bubblers ON Cavity Recirculation ON
Start	2017/12/21 02:57:29
End	2017/12/21 03:57:31
Duration	1:00:01.933455
Notes	
List	gold

DQLL	
Crate DAC 16B	Passed
Crate DAC A	Passed
Crate HV 16B	Passed
Crate HV A	Passed
Duration	Passed
No alarm: HV current near zero 16B	Passed
No alarm: HV current near zero A	Passed
No alarm: HV over current 16B	Passed
No alarm: HV over current A	Passed
No alarm: HV setpoint discrepancy 16B	Passed
No alarm: HV setpoint discrepancy A	Passed

112789

Back at HW. Setting triggers. 3 mins.

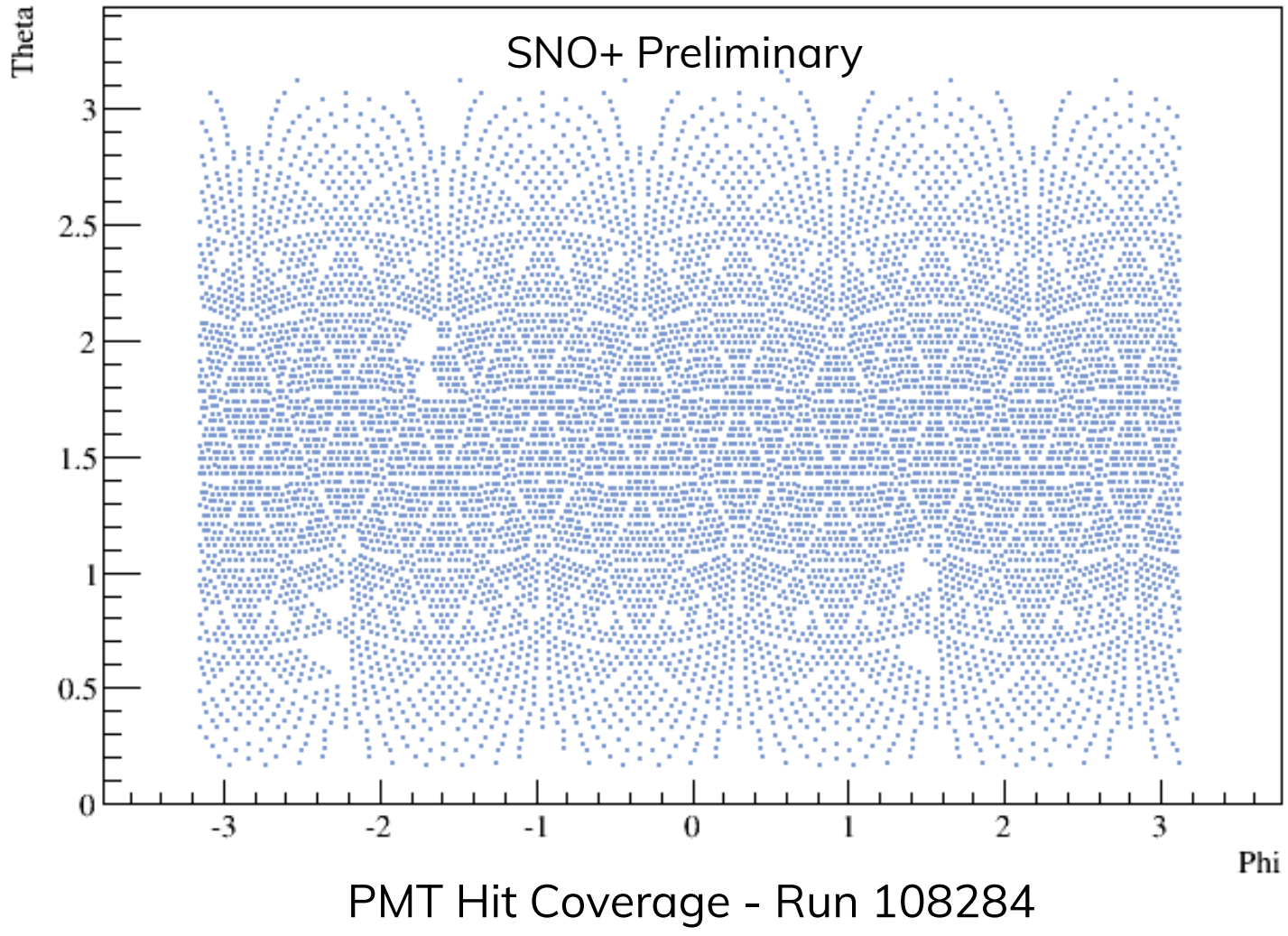
112790

good physics (no_n100n). Bubblers and Cavity Recirculation ON. 68 mins.

High Level Data Quality Checks

High Level Data Quality checks the output of Run, Time, PMT, and Trigger processors. The Event Rate and Retrigger Fraction must fall within a certain window, proper Trigger and Run Type words must be masked in, and PMT Coverage must be uniform across the detector.

Time Processor Checks - Run 108284	
Event Rate Check	Pass
Global Trigger Check	Pass
Retrigger Check	Pass
First Event Time Check	Pass
10 MHz Clock Check	Pass
Event Order Check	Pass
Average Event Rate	826.39 Hz

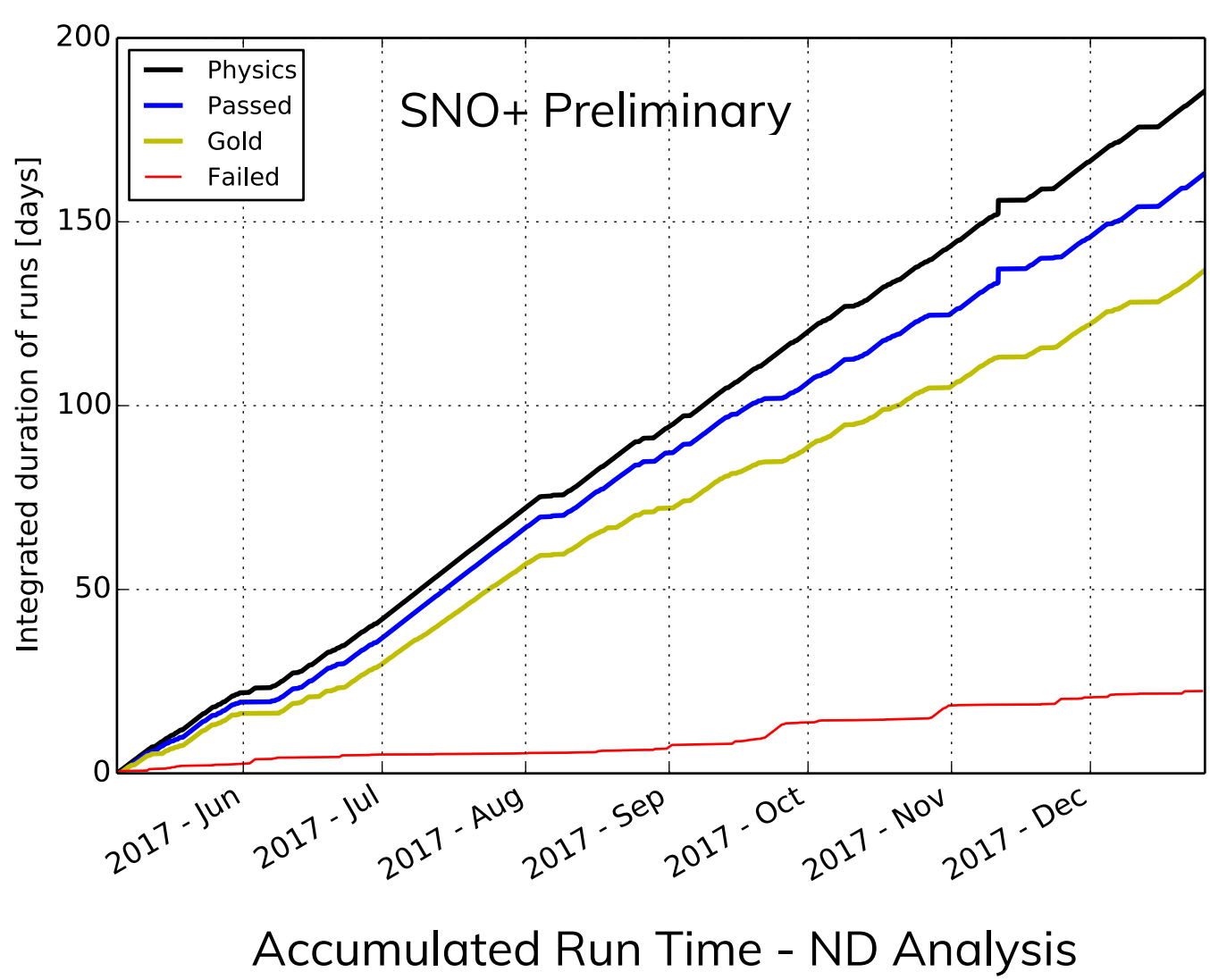
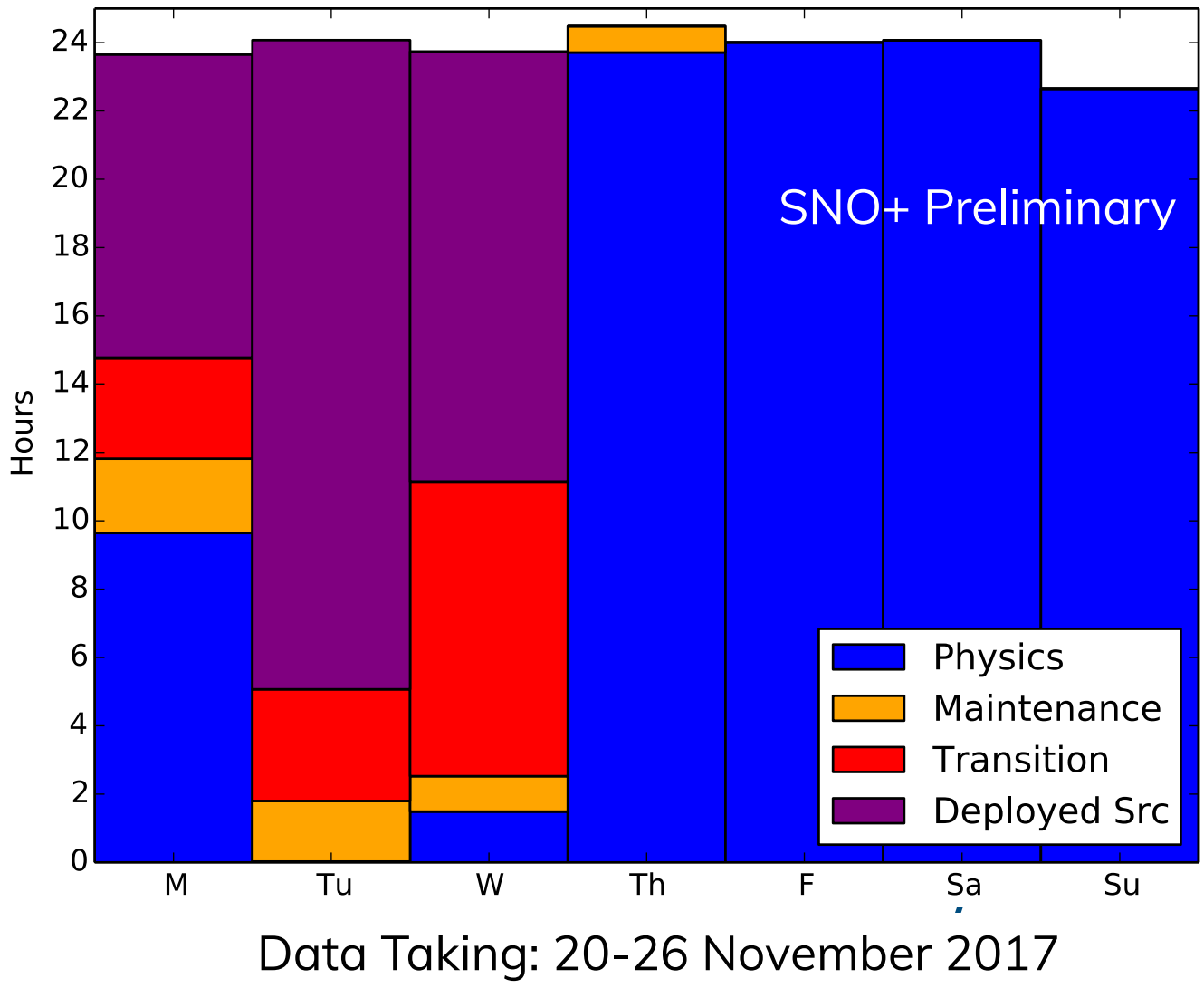


Data Taking Efficiency

- Sample week during N16 Calibration Scan

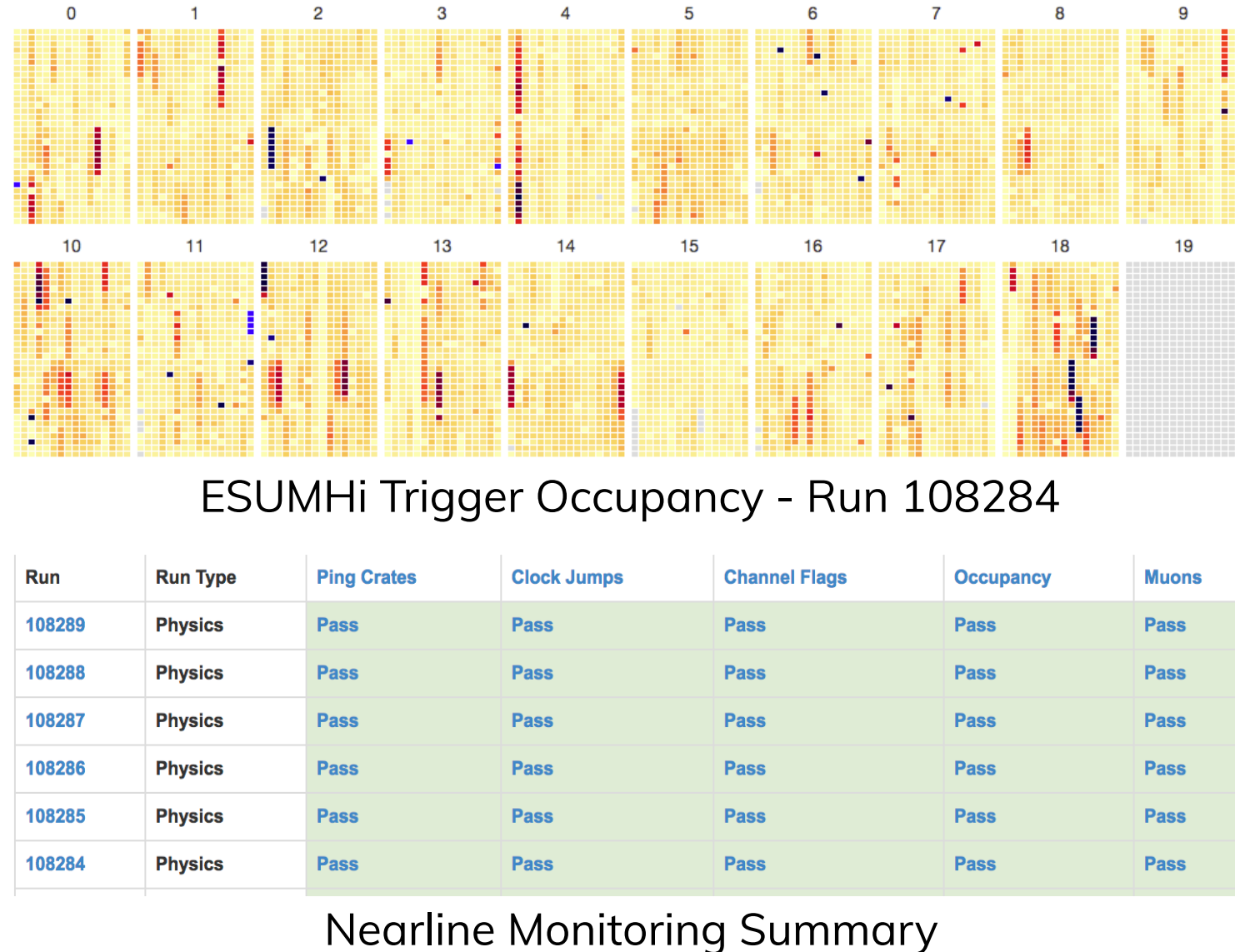
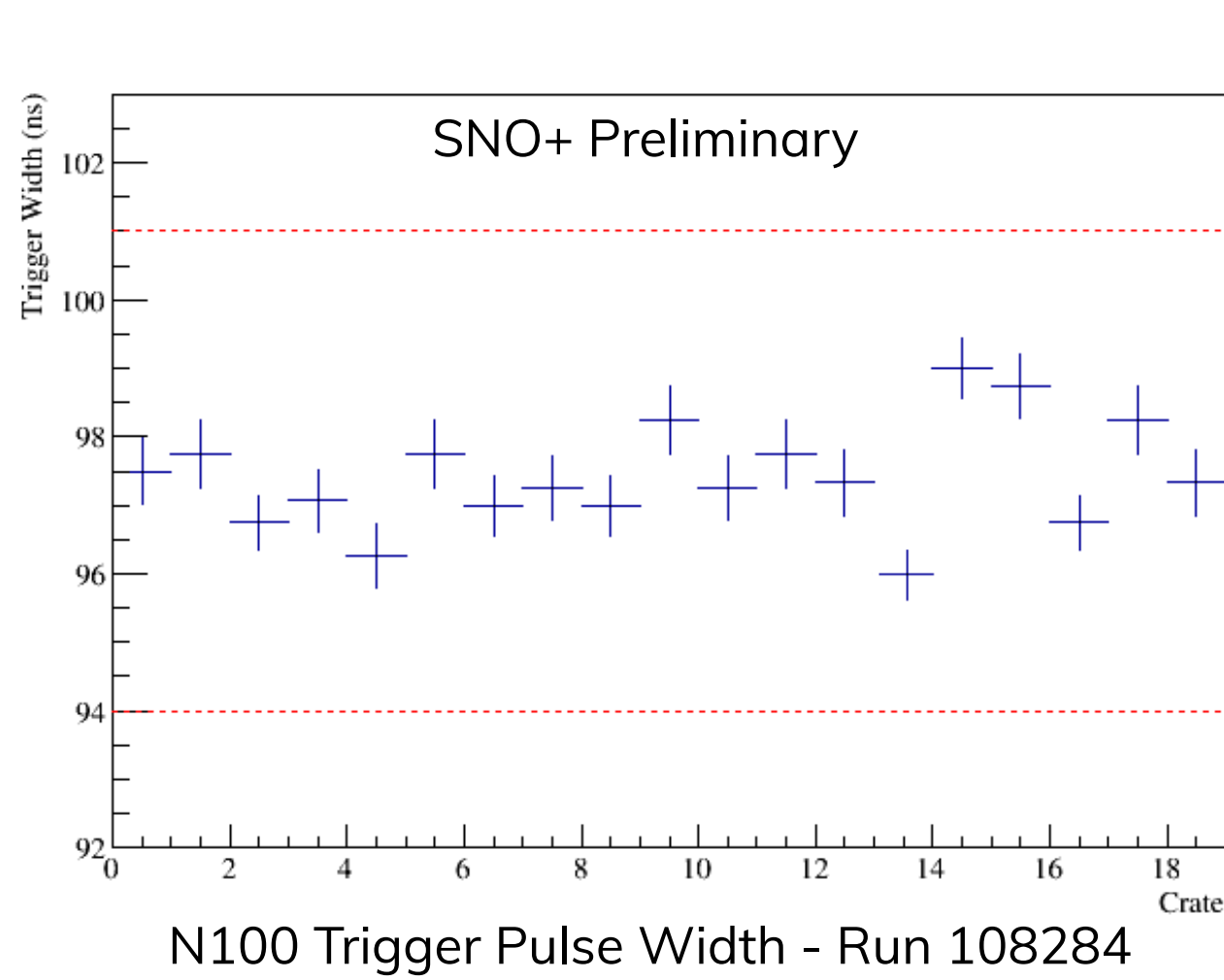
Nucleon Decay Data Set

- Duration: 236 days
- Physics: 185 days
- Passed RS: 163 days
- Failed RS: 22 days
- Golden Runs: 136 days
- Run time Passed: 87.9 %
- Run time Gold: 73.7 %
- Passed Runs from automated checks
- Gold Runs finalized after shift report review



Nearline Processing Checks

Checks are made to ensure the initial processing is successfully completed. If the width of the analog trigger pulse varies, or if the trigger occupancy deviates from a pre-approved normal, then the run is failed.



Conclusions & Acknowledgements

For the Nucleon Decay Analysis, SNO+ has taken over 185 days of physics data, with ~74% of that making it to the golden analysis run list. The hardware configuration, slow control status, trigger settings and data handling are all continuously monitored. We have developed automated checks to perform the final decision on run quality before inclusion into the analysis list. SNO+ is supported by AS RIP, CIFAR, CFI, DF, DOE, ERC, FCT, FedNor, NSERC, NSF, Ontario MRI, Queens University, STFC, UC Berkeley and benefitted from services provided by EGI, GridPP and Compute Canada. For their valuable support, we thank Vale and SNOLAB.