sPHENIX Status
RHIC Coordination Meeting

May 13th, 2025

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Cooling Issues

- We have had issues with ECW chillers (#3/#4) since the start Run 25
  - Carrier (vendor) attempted to fix
  - Completely down from 5/2 to 5/9 to fix chiller #3 and install rental chiller
    - DAQ work continued during downtime w/some racks opened and passively cooled
    - Rental chiller did not operate, vendor is replacing
  - We are now using chiller #3 (faulty pump)
    - Parts to finish the repair chillers #3/4 are arriving (5/16), long lead items ordered months ago
- AC shop (F&O) diagnosed a bad condenser fan motor for AC3 AC unit and repaired it on 5/6
  - Failed again over the weekend → Fuses replaced
  - AC Shop replaced fan and loose connections on 5/13
- CAD and F&O have been very responsive under the leadership of the liaison engineer
- Concern is that cooling is essential to run sPHENIX and we have not yet entered a completely stable state with beam soon and the warm season approaching

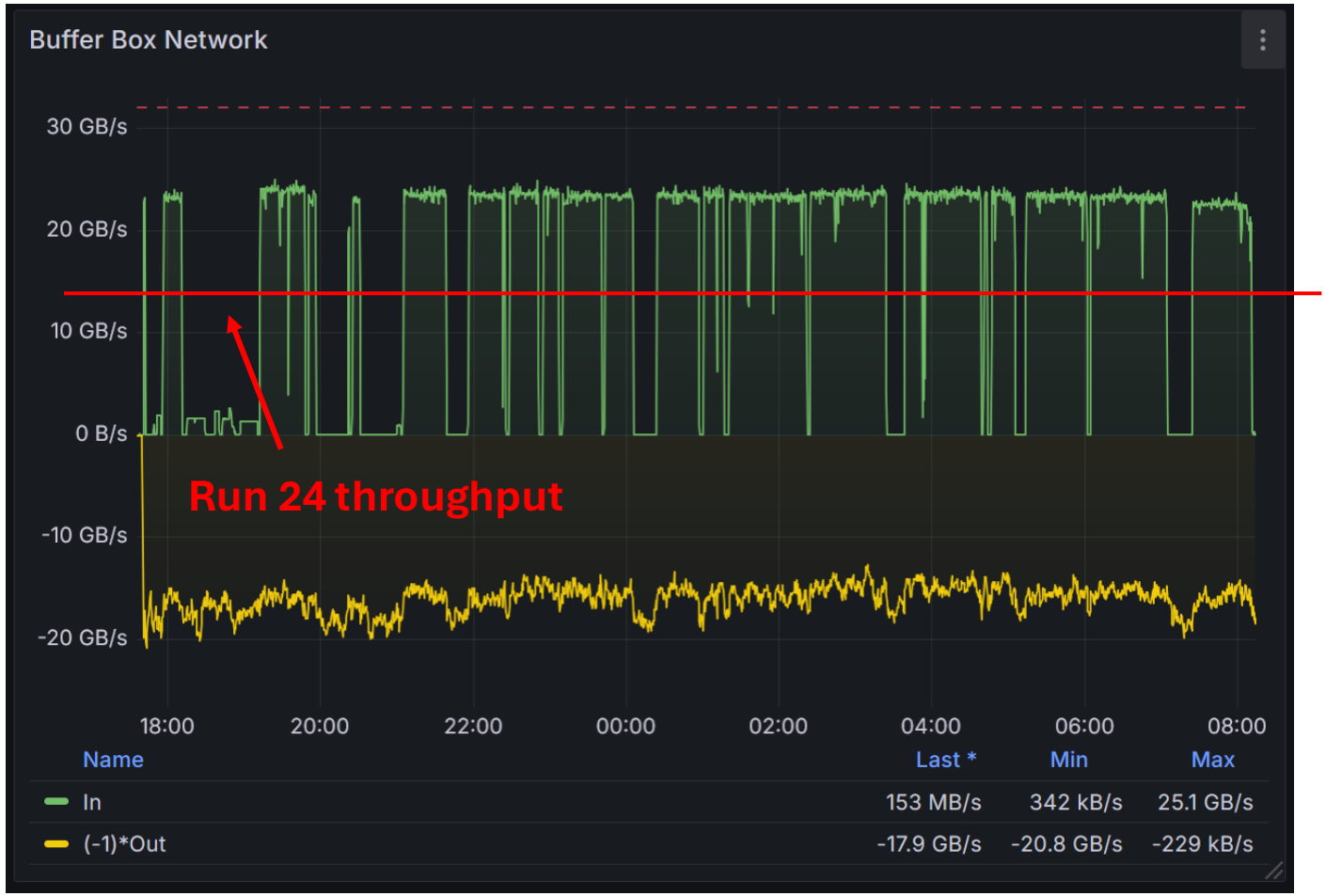
sPHENIX Dry Run

- With most summer tasks completed, we wanted to test sPHENIX to verify that we're ready for data and find any remaining issues
- Campaign 1 – throughput
  - Remove TPC Zero Suppression (ZS) threshold and tune EMCal ZS threshold to mock Au+Au data size
  - Use random triggers to increase rate
- Campaign 2 – tracking
  - Run HCal coincidence trigger to select events with cosmics through tracking detectors
  - Increase rate via random triggers
- Run the electronics and software in planned operation mode
  - Verify monitoring plots
  - Verify offline analysis

sPHENIX Dry Run

- DAQ system has been well tested
  - Fixed a number of small issues that improve uptime (a lot of work has been done to improve things, now seeing how well it all plays together)
  - Maximum data transfer to SDCC is ~35 GB/s, exceeding goal by almost a factor of 2
- Initial tracking results
  - Low-level GL1 INTT and MVTX matching shows no data dropping issue
  - Clear correlation between TPOT and trigger
  - Updated MVTX hot pixel map to be generated
- Offline results for full tracking analysis in progress

sPHENIX Dry Run



- Green line: sPHENIX Runs emulating 9 kHz Au+Au collisions
  - About twice the throughput of Run24!
- Yellow lines: Bufferbox → SDCC copy throughput
  - In Run24, it had to be stopped during data taking

To-Do Before Beam (Unordered)

- Digital Currents development ongoing, firmware tests underway
- Full Line Laser run (3 hours) to demonstrate shift crew can operate machinery and offline data reconstruction is ready
  - Repeated during down times by our shift crew (fill volume with increasing precision)
- TPC Trip Threshold scan to determine current limit and time-over-threshold trips (validated with beam, current set up is fine for cosmics)
- Last updates to improve DAQ uptime
  - Felix busy → Next week due to expert availability
  - Diffuse Laser busy → Next week due to expert availability

RHIC Science Mission

- sPHENIX is ready and excited for beam!
- Assuming RHIC starts at end of May the RHIC luminosity projections from our BUP24 needed to complete the 7 nb^{-1} Au+Au program requires running until Nov 2025-April 2026 (max – min)
- PAC24 report:
  - “The PAC recommends a Au+Au run in which sPHENIX collects at least 7 nb^{-1} of data as the highest priority for Run 25.”
  - “The PAC has received beam use requests for running pp, p+Au, and O+O collision systems. The PAC sees all three of these proposed runs as fully aligned with RHIC’s core scientific mission, and in fact as key elements of completing that mission. Each of these three proposed runs is necessary to address central open RHIC Science questions in a decisive way.”