sPHENIX status

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RHIC Coordination Meeting
May 28, 2024

Luminosity delivered to sPHENIX

Delivered collision rate improving significantly

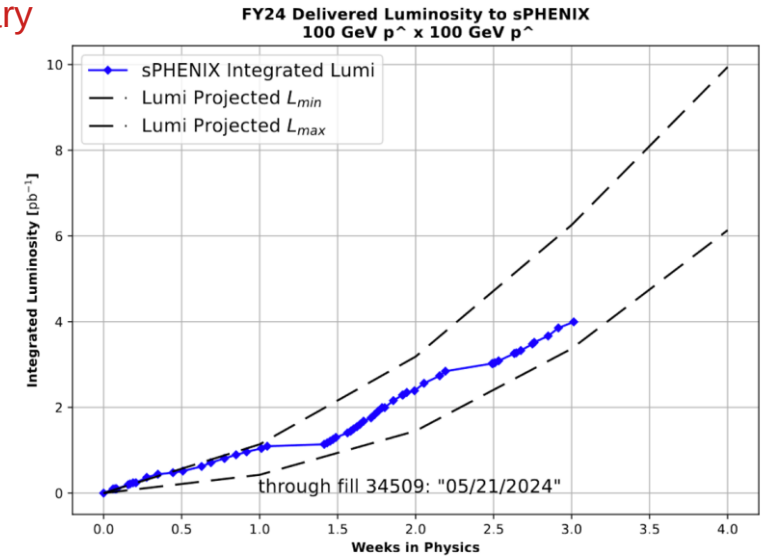
sPHENIX ZDCNS (coincidence) 2kHz -> 3-4kHz at start of physics

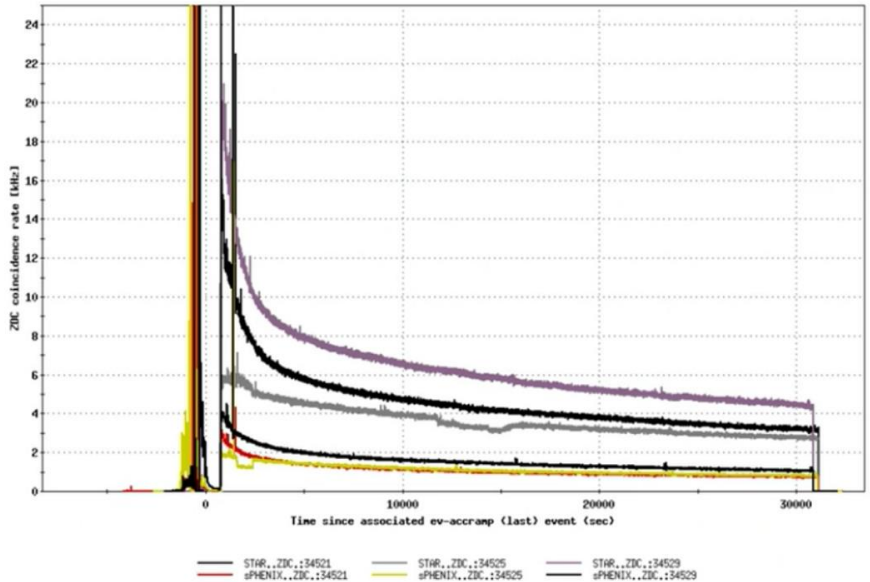
Increased number of bunches per beam: 84x84, 111x111

Reduced emittance since Saturday.

Luminosity is most important to sPHENIX,

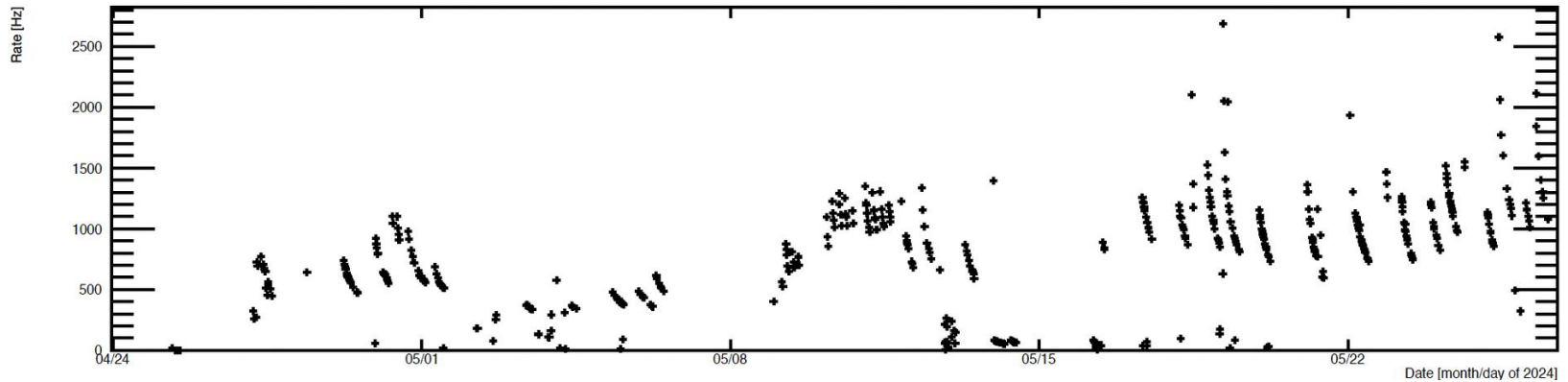
Polarization is secondary

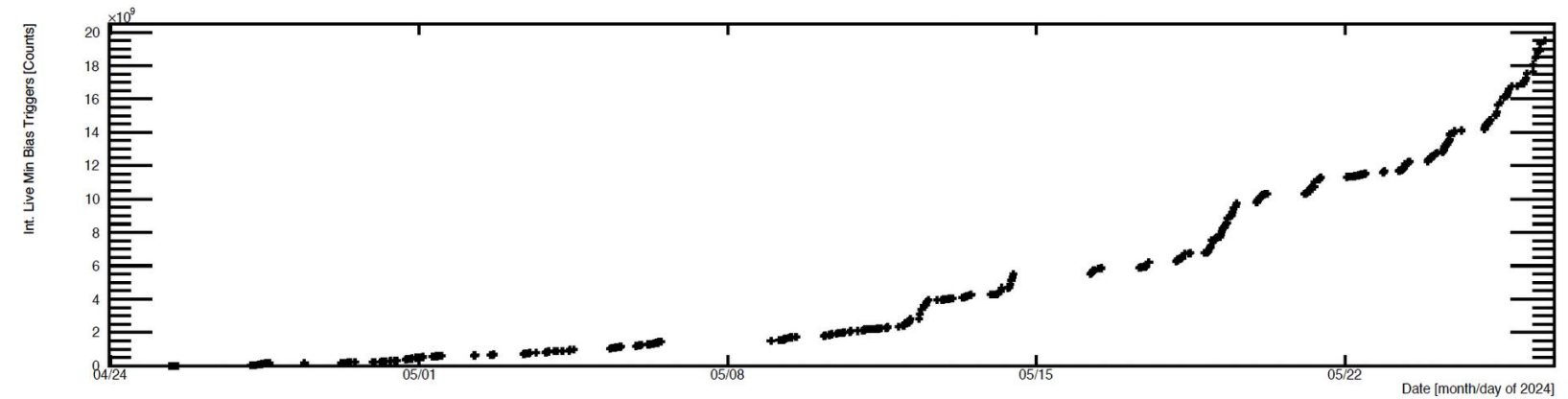




Recorded luminosity for Minimum Bias

20 Billions Minimum Bias collisions recorded since April 24



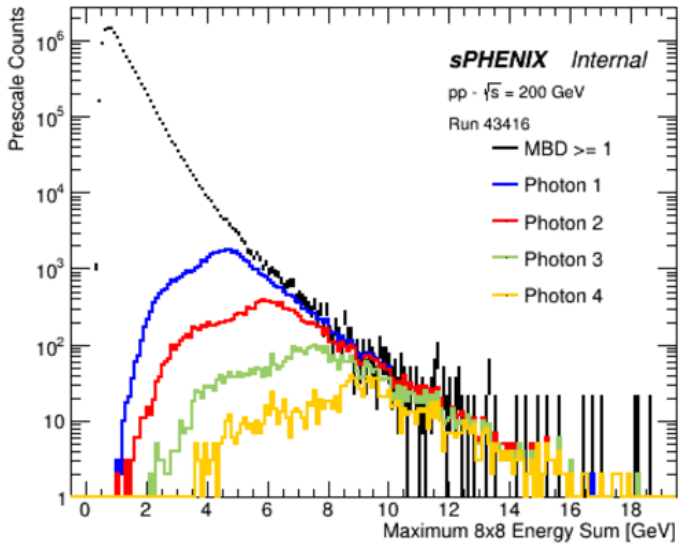


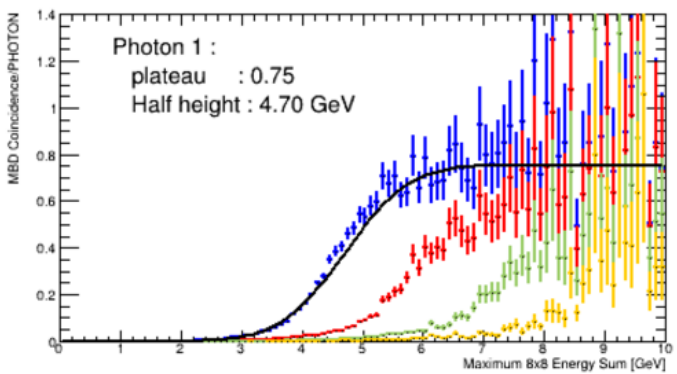
Rare triggers (1)

Photons and Jet triggers in place
Running 4 photon and 4 jet triggers with increasing threshold

Turning curve good for now, but need to push the threshold down for Upsilon physics, when all tracking detectors are ready

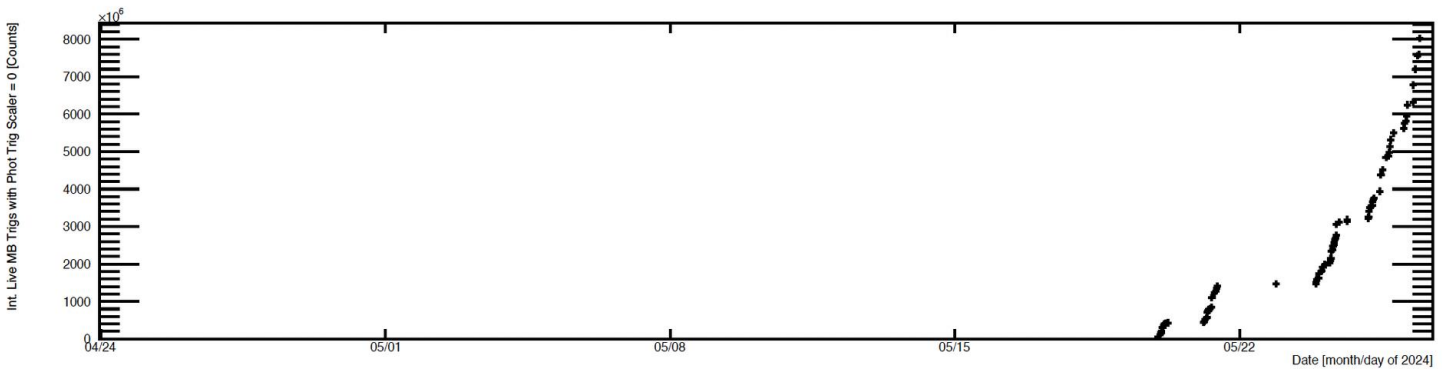
Rejections need work based on hot towers / calibration.
Multi Event Buffering disabled during the week-end because of causing DAQ instabilities
Under investigation
Compensated by downscaling MB trigger to keep rare triggers live time high, at 80-90% live time



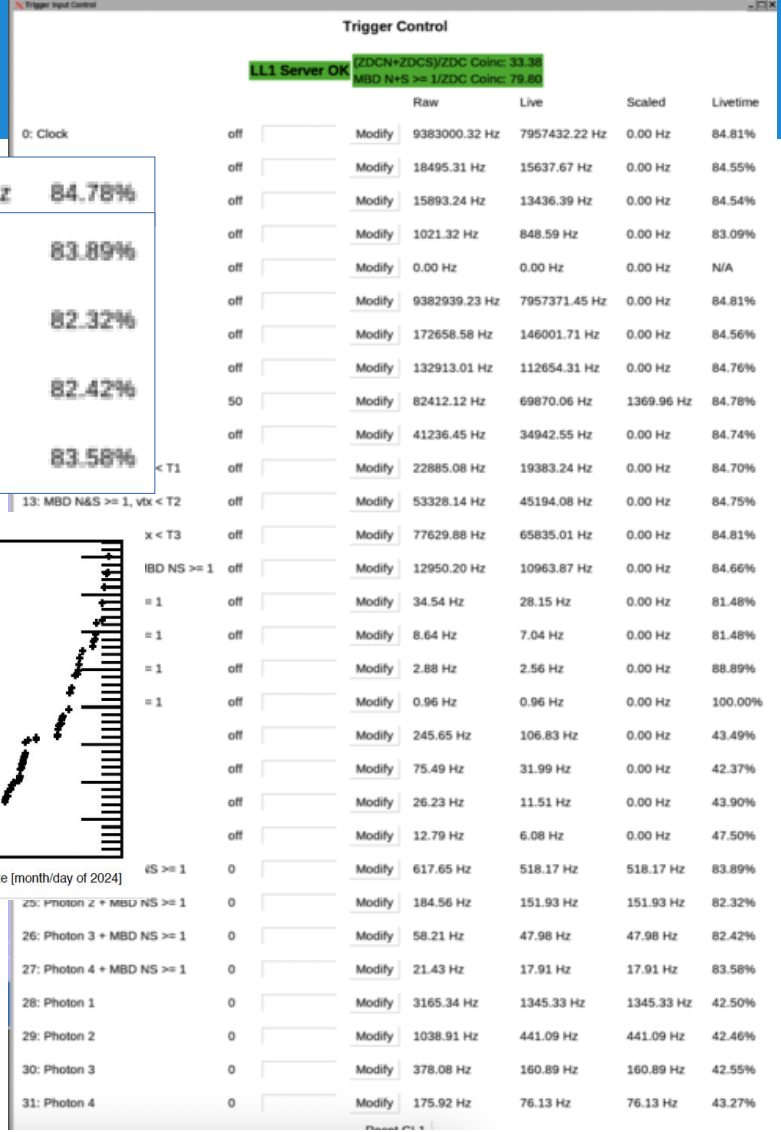


Rare triggers (2)

10: MBD N&S >= 1	50		Modify	82412.12 Hz	69870.06 Hz	1369.96 Hz	84.78%
24: Photon 1 + MBD NS >= 1	0		Modify	617.65 Hz	518.17 Hz	518.17 Hz	83.89%
25: Photon 2 + MBD NS >= 1	0		Modify	184.56 Hz	151.93 Hz	151.93 Hz	82.32%
26: Photon 3 + MBD NS >= 1	0		Modify	58.21 Hz	47.98 Hz	47.98 Hz	82.42%
27: Photon 4 + MBD NS >= 1	0		Modify	21.43 Hz	17.91 Hz	17.91 Hz	83.58%



Sampled luminosity (events) for photon triggers (scale-down = 0), since May 20.



Physics data taking

Updated instructions at begin of store, when PHYSICS is declared to go into routine data taking more rapidly
First run with minimum set of susbystem to check

- ZDC/MBD trigger rates
- vertex positioning,

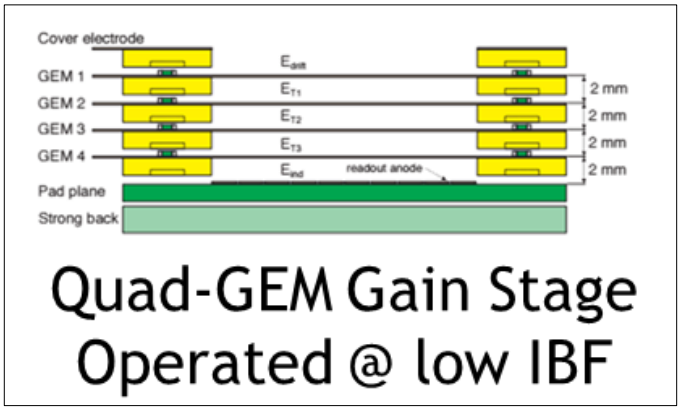
while other detectors still ramping up.
Then start big partition runs with all subsystems

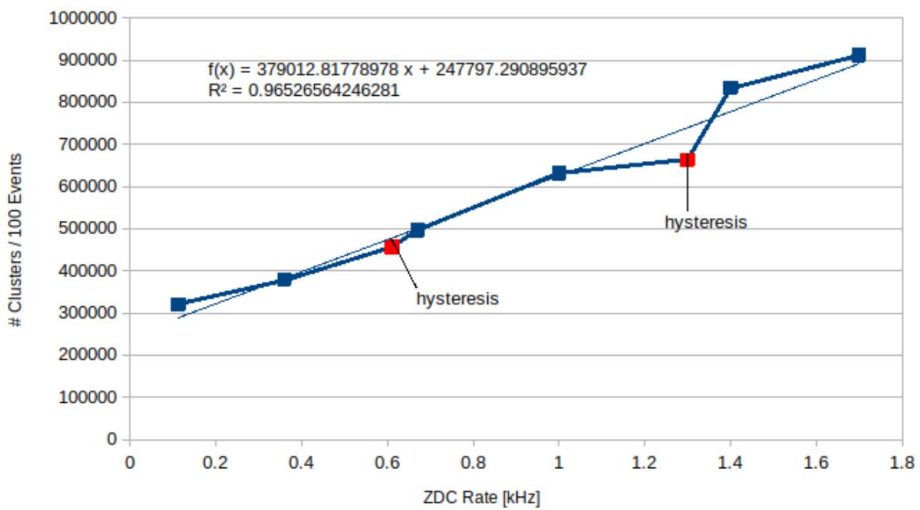
Actions	DAQ operator	Monitoring operator	Detector operator	Shift leader	Notes
Turn on MBD HV			Turn on MBD HV		
Run with only GL1 + MBD + ZDC/sEPD	Select subsystems / Begin run		Keep turning on other subsystems		
Check trigger rates & timing	Check ZDC & MBD trigger rates	Check MBD / ZDC timing			If any checks fail Call DAQ/Trigger experts
Check MBD z-vertex		Check MBD z-vertex		Call MCR if the |vz| > 2cm	
ONLY AFTER THE ABOVE CHECKS ARE VERIFIED : Go to the next step for big partition physics running					
Big Partition running	Select subsystems / Begin run		Check the subsystems for big partition are ready for data taking	Check SCM which subsystems to include	
After run started / during the run	Check trigger rates / Counter Status	Check MBD & DAQ monitoring --- Begin monitoring other subsystems	Start regular monitoring of detectors		If MBD or DAQ checks fail → Need to end the run and take further actions

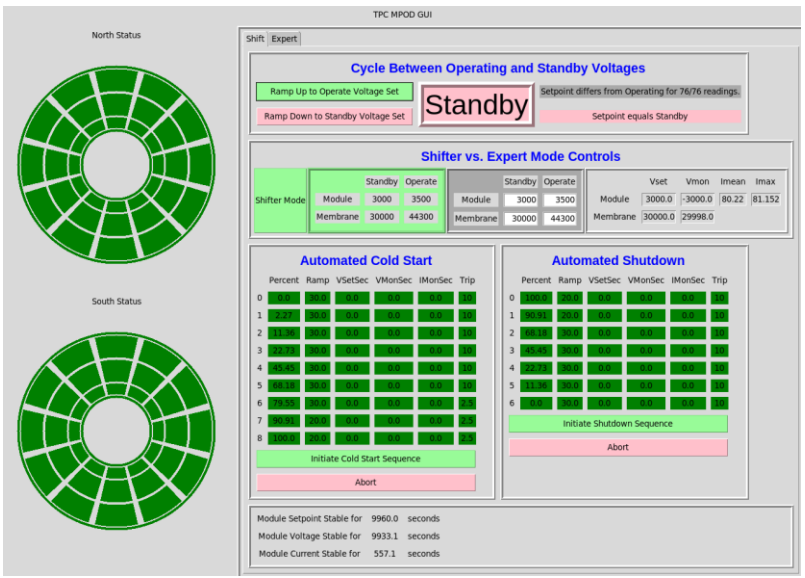
Also improved communication between shift crews at change of shift.

TPC

On Wednesday May 22 (maintenance day), swapped resistor chain back to original configuration, with larges gain on the bottom-most GEM, optimal for low Ion Back Flow (IBF), following mini-review on Monday
Transitioning toward having the shift crew handle High Voltage routinely
On Friday, beam displacement scan together with CA-D: distinguish whether TPC 'activity' scales with collisions or total beam (beam background)
Analysis ongoing

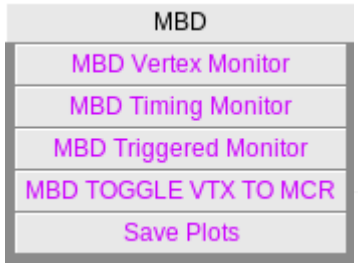


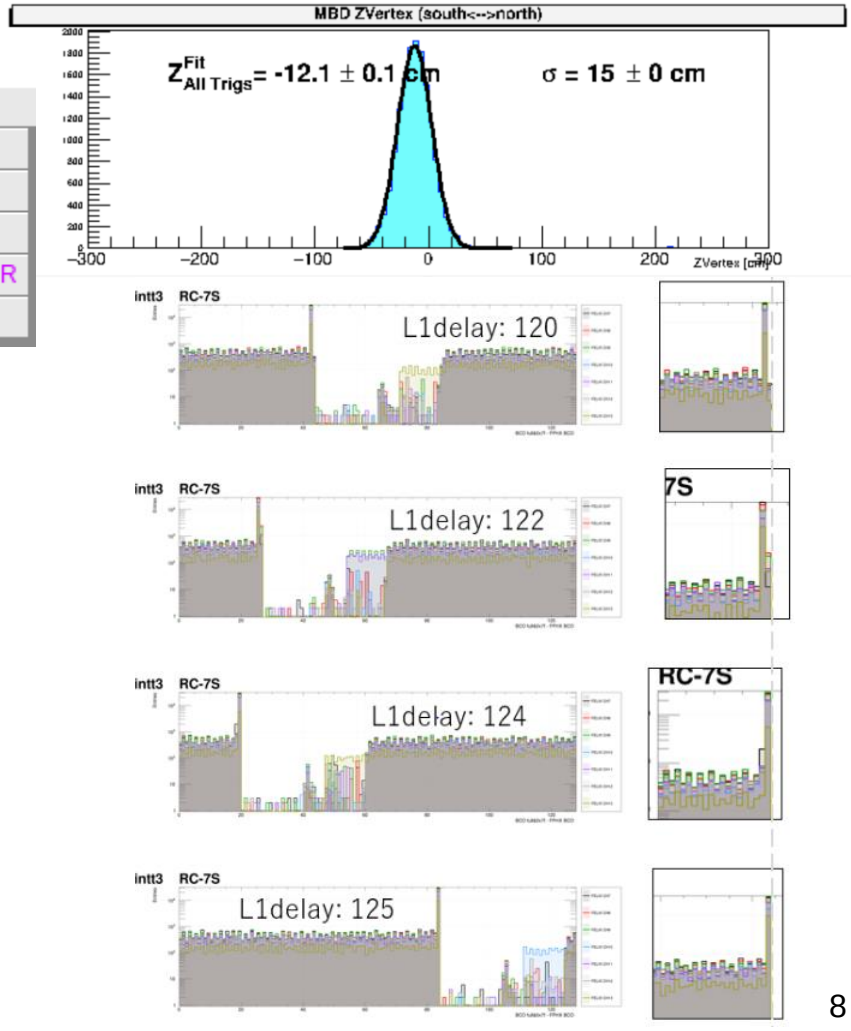




Others

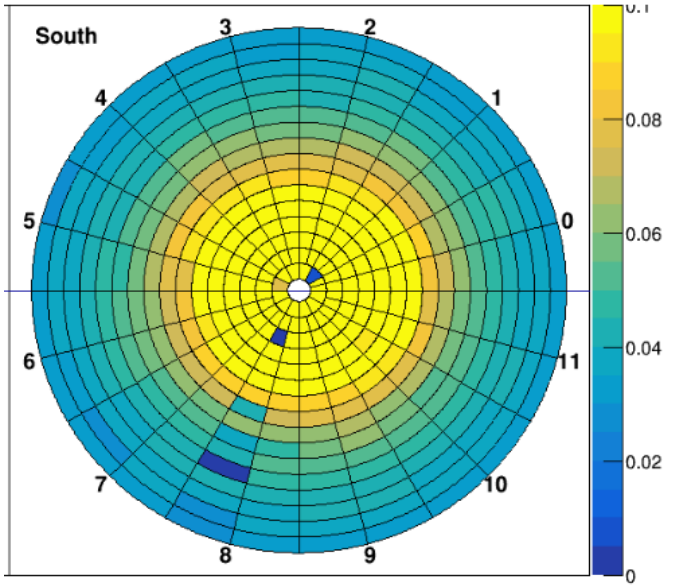
- Now sending vertex mean and RMS to CA-D routinely (operated by Shift Crew)
- Should start making use of this this week ?
- MVTX running with 10us strobe length
- INTT is timed in
- All Calorimeters run with Zero Suppression

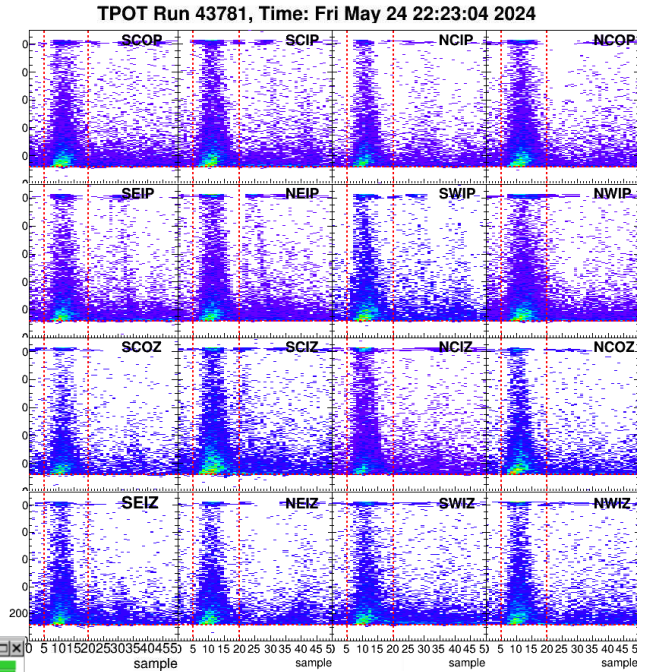


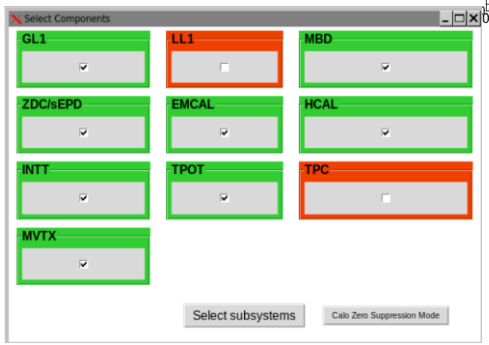


Others (2)

- sEPD bias adjustment is complete
- Zero Suppression tests ongoing for TPC, TPOT
- TPOT included in big partition

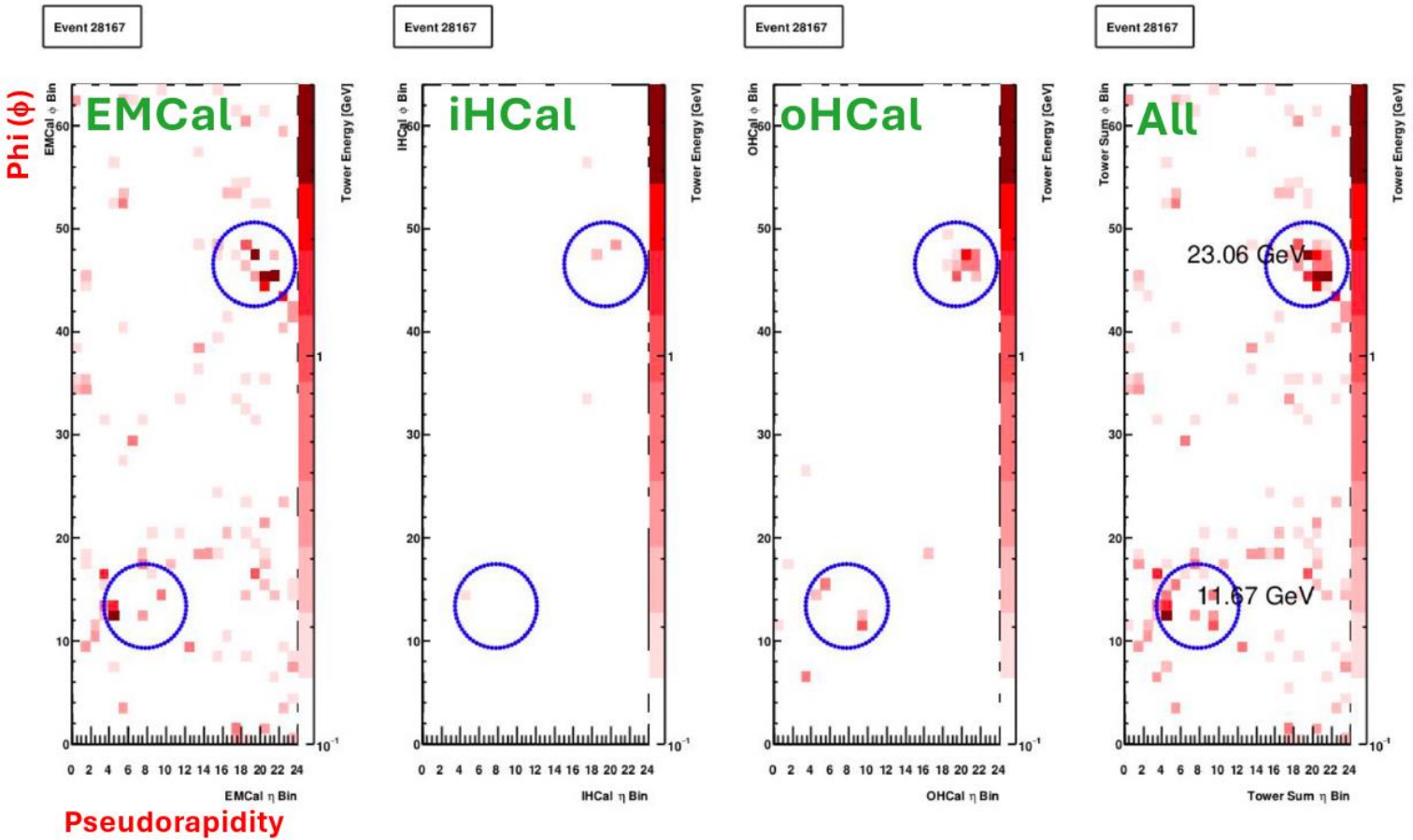






Very smooth running over the week-end
Entering second week of PHYSICS running for Jet and Photon program

Bonus: Di-Jet events in calo system



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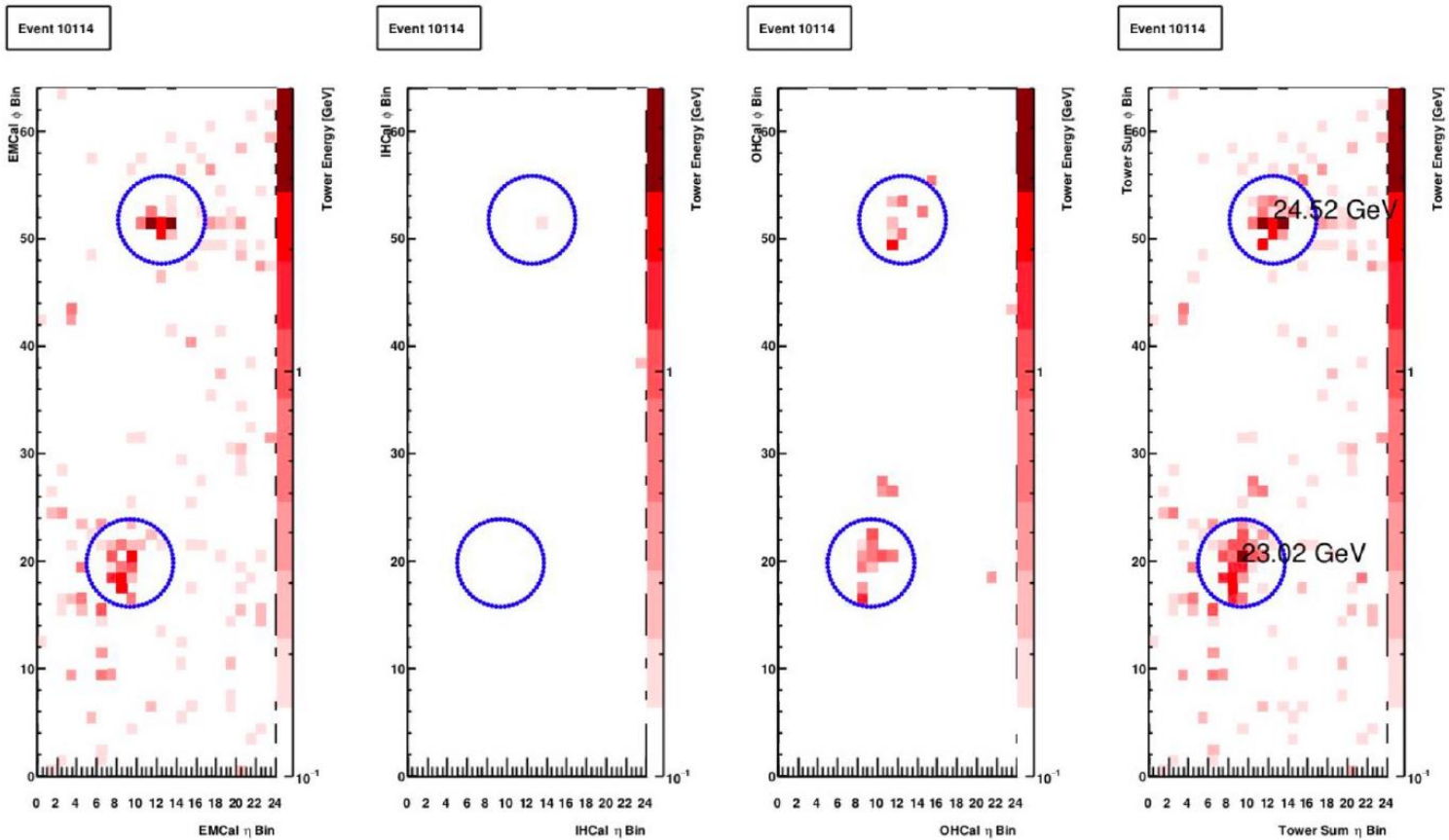

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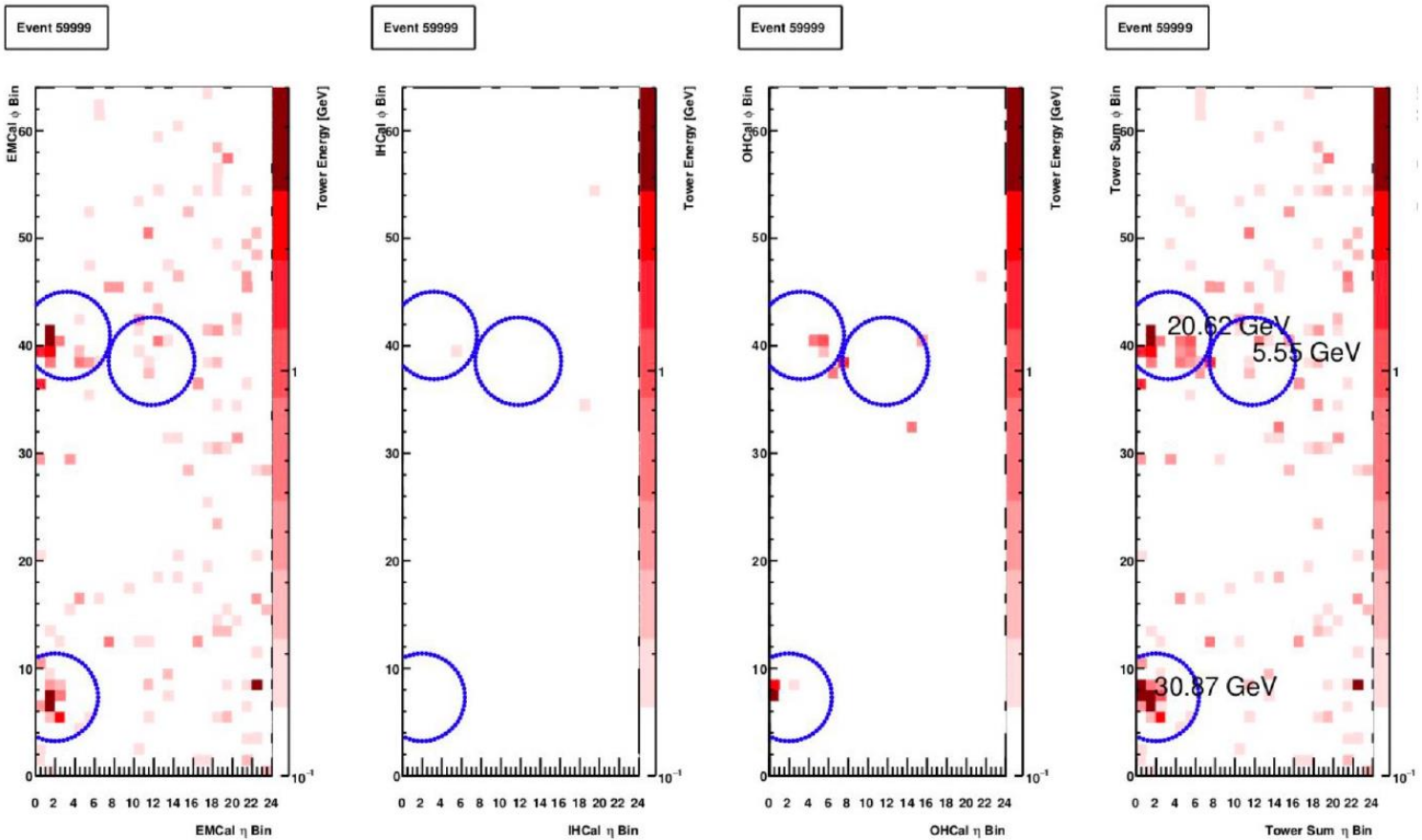
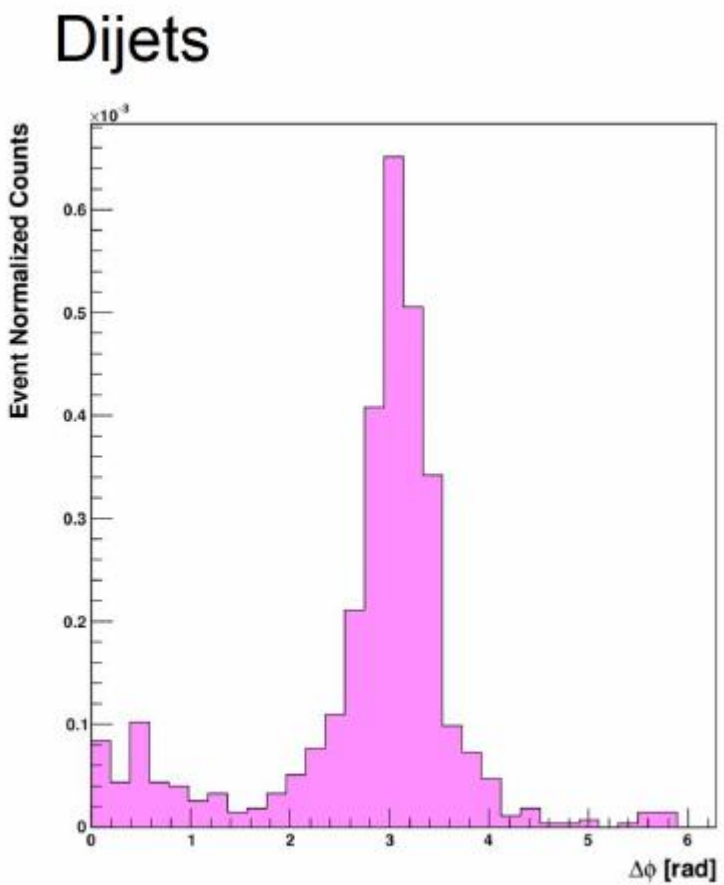


Azimuthal correlation



Using FASTJET for jet reco (R=0.4)
events with two jets >5 GeV
Most of the time the two jets are back-to-back in azimuth ($\Delta\phi = \pi$)

Thank you !