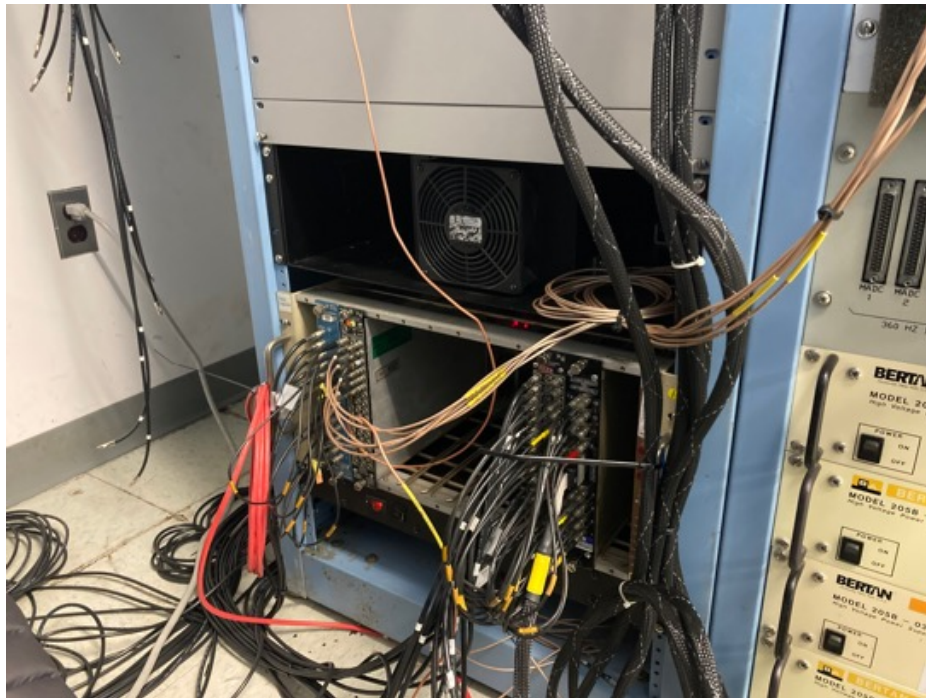


Run24 Preparation for Spin

RIKEN/RBRC
Itaru Nakagawa



SMD Electronics



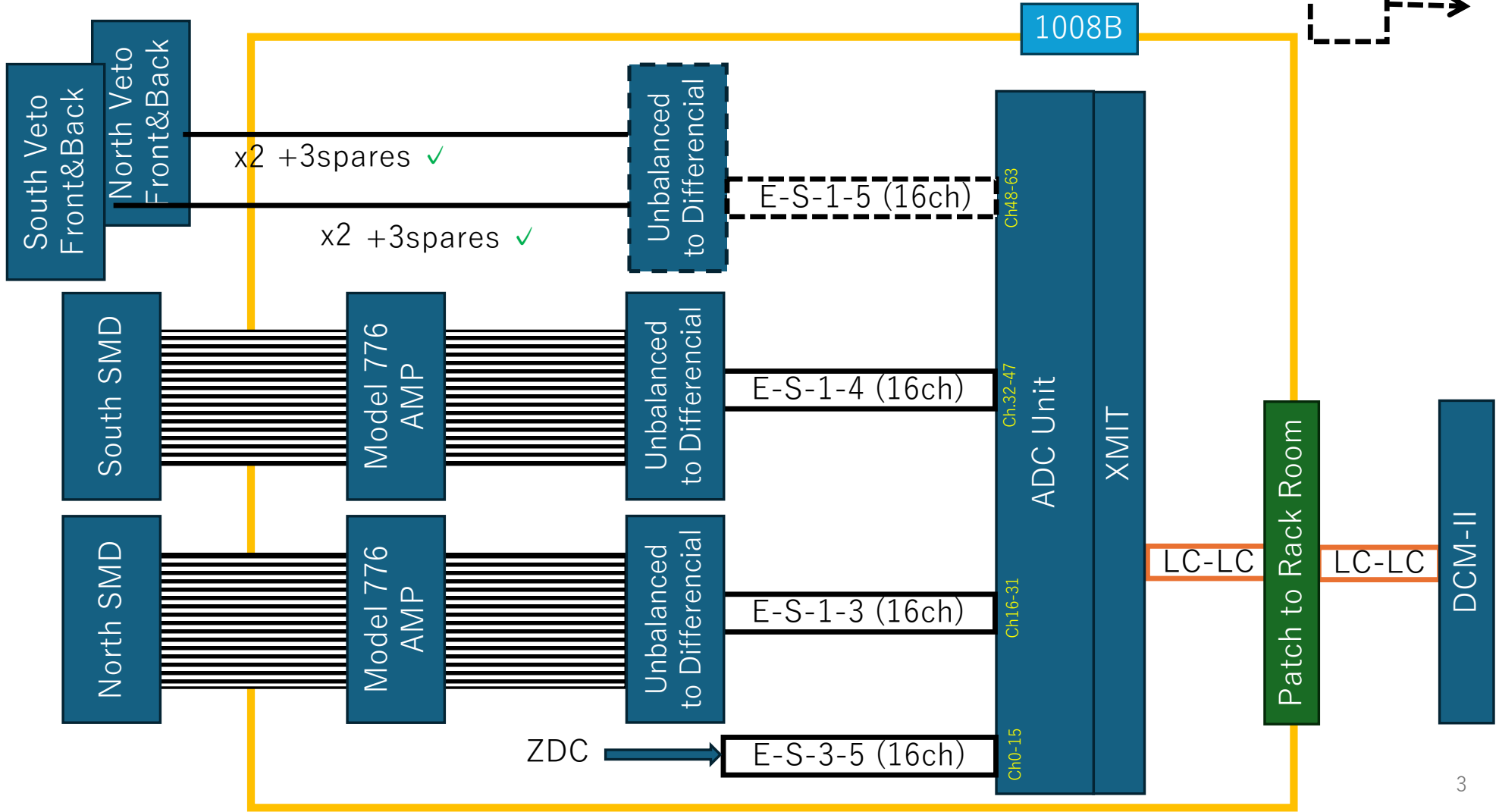
SMD raw signal and amplifiers



ADC module
(identical to the rest of sPHENIX calorimeters)

SMD/Veto Readout Electronics

To be installed/tested



Remaining Hardware To be Prepared

Items	Person in Charge	Status
Light Tower for North Tunnel	Mike Lau	Done (2/20)
Differential Module	Steve Booth (via John)	Done (3/9)
HV Power Supply Module x 2	Steve Booth (via John Haggerty)	Design completed. Board is to be delivered soon. To be assembled in BNL.
AC-DC converter x2		
Install power extension cables x2	Itaru	Done (2/20)
5 meters HV cables x4	John Haggerty	

Veto Counters Recovery

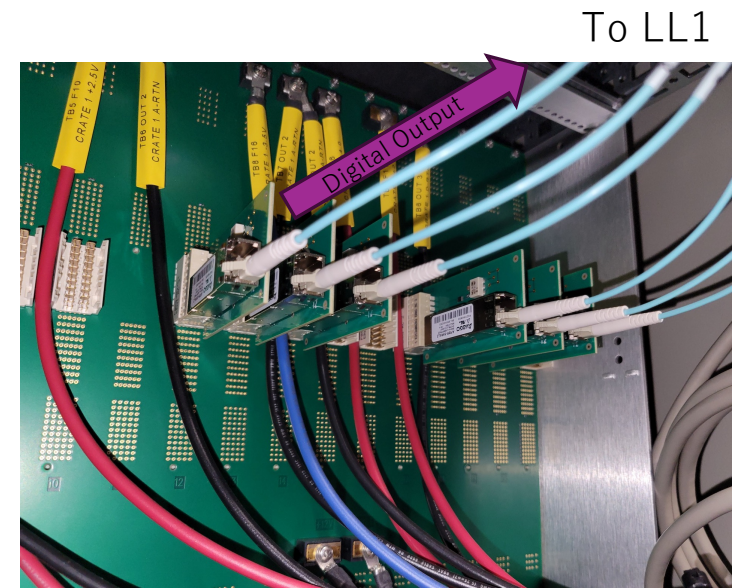
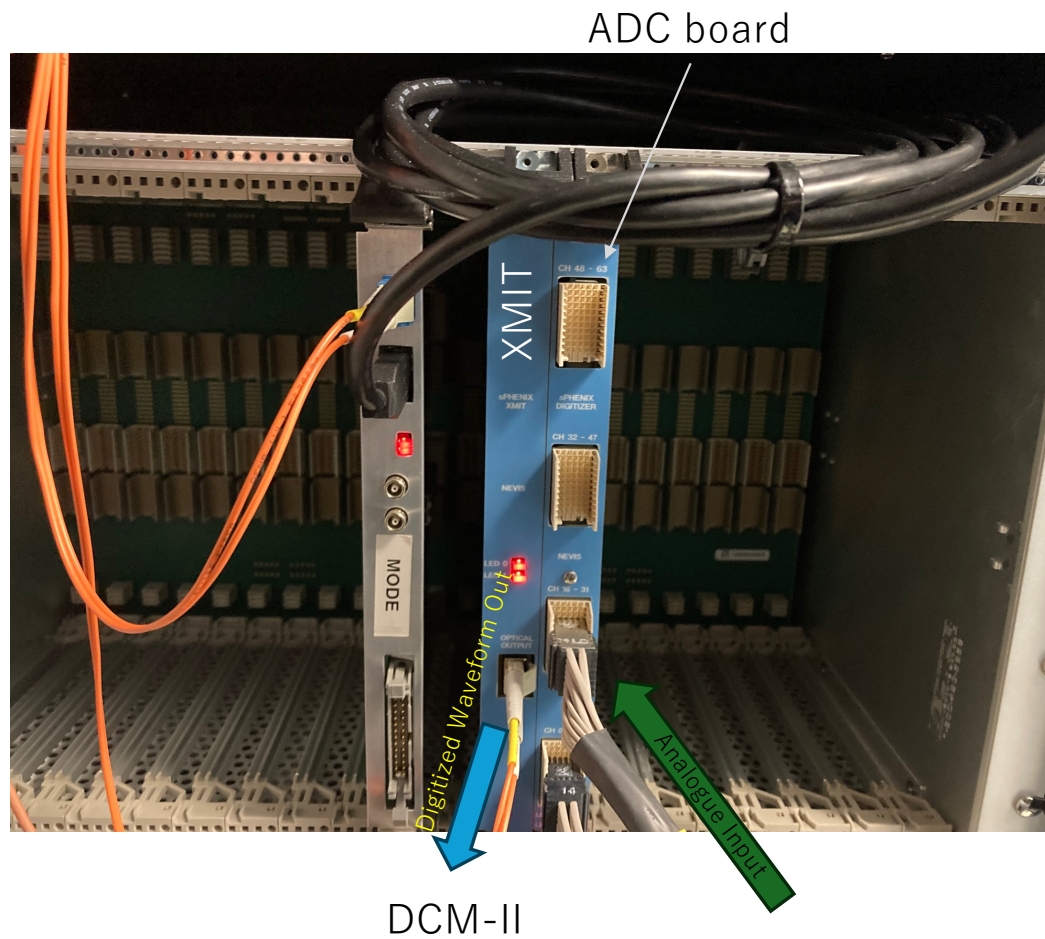


Arm	Counter	Symptom	Cause	Solution	Status
North	Front	No issue			Good
	Back	Very noisy	Light leak at the tip of scintillator	Additional lapping with black tape	Good
South	Front	No issue			Good
	Back	Low gain	Broken contact between PMT and the light guide	Re-assembled with optical glue	Good



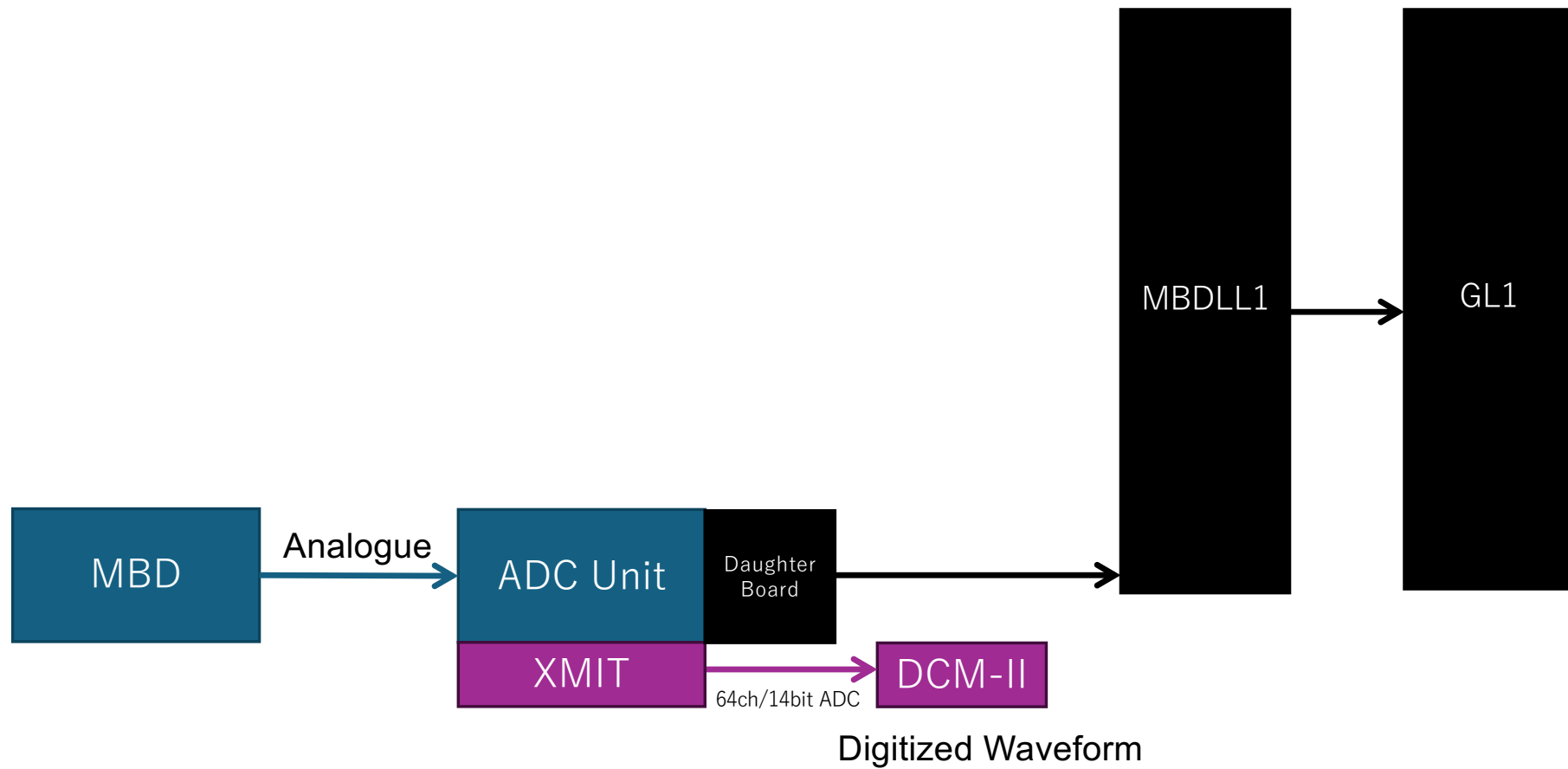
Local Pol Scaler Status

Calorimeter ADC Unit




Backplane daughter transmitter boards

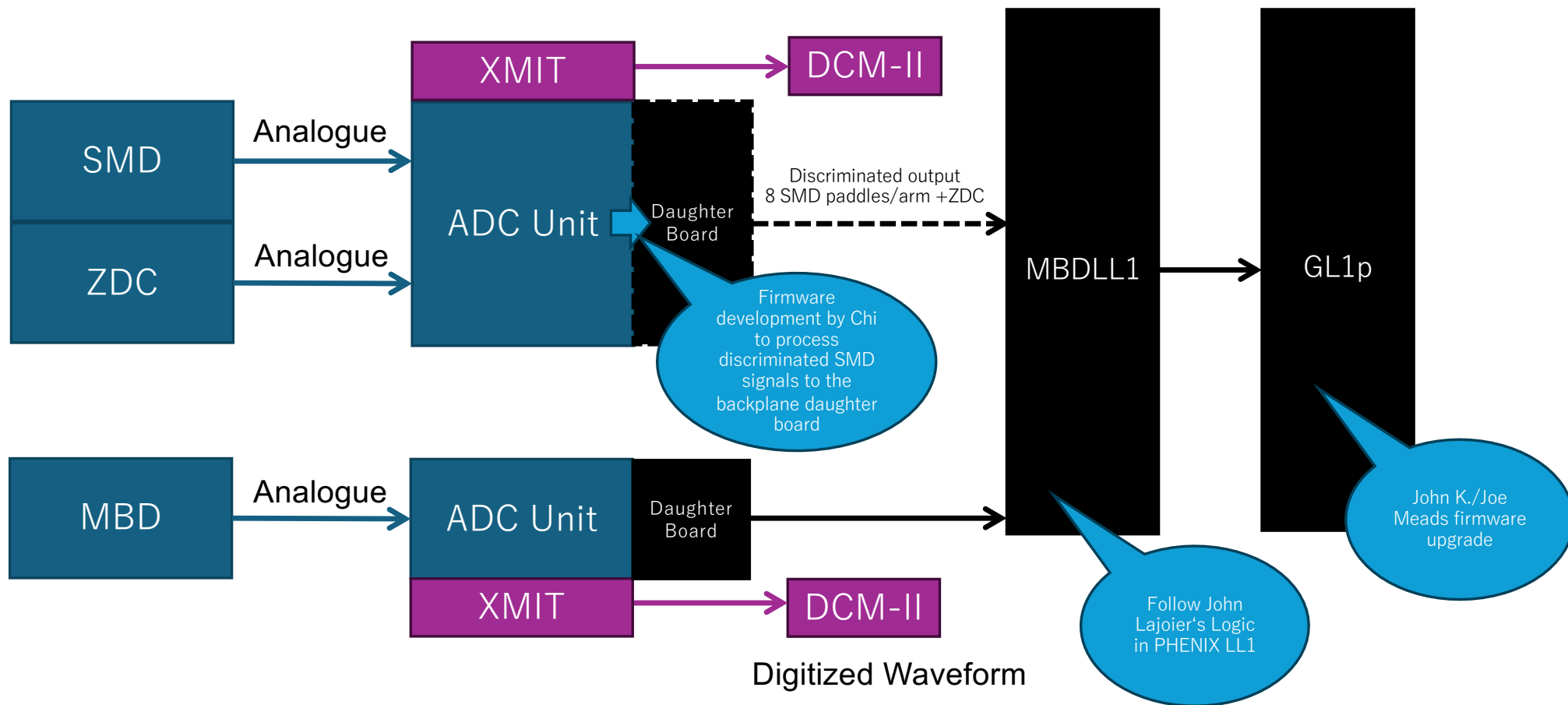
MBD/Calorimeter Readout Schematics



SMD Scaler Proposed Schematics

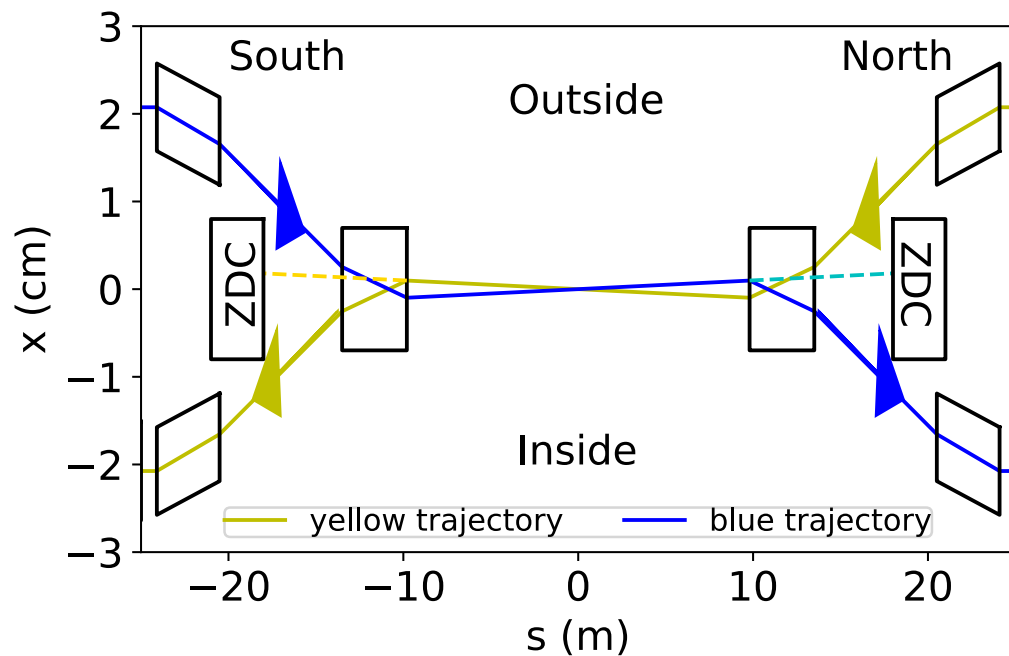
The concept is to use existing calorimeter/MBD LL1 trigger scheme for SMD scalers so that only firmware to be developed and no hardware.

Doesn't exist


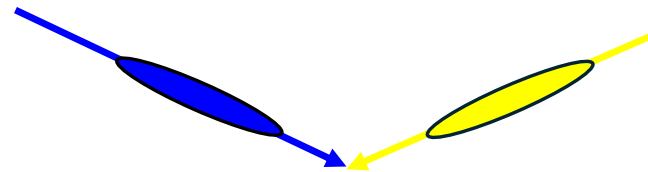


Beam Crossing Angle

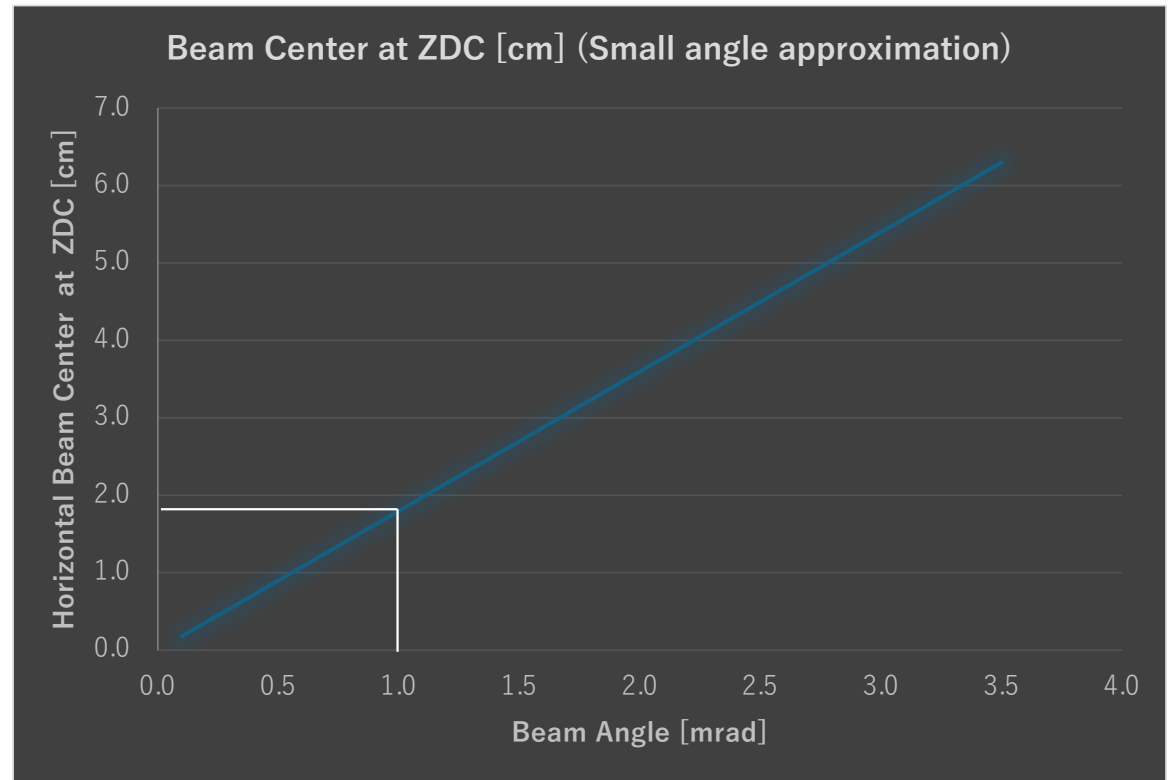
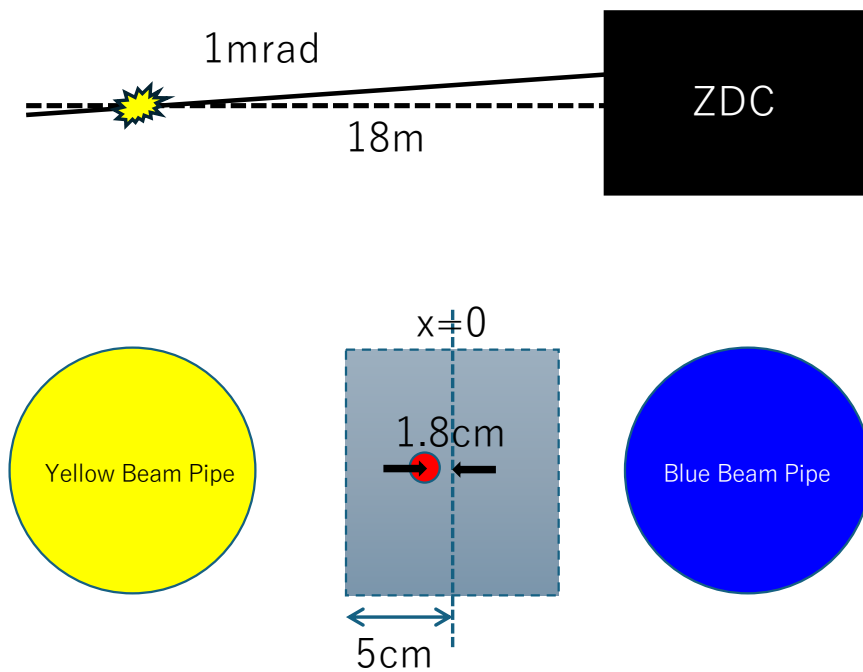
Crossing Angle Effect for Spin



- Following the strategy of Ru23, sPHENIX is requesting 1~2mrad crossing angles for Run24 as well in order to make the collision z-vertex compact.



Beam Angle Dependence of Horizontal Neutron Beam Center



Neutron beam will be off by 1.8cm at the ZDC location

Software Status

Online/Offline monitoring/calibration tasks

	Person responsible	Work needed, input needed, comments
SpinMonitor	Devon	Waiting for html input from CAD → Martin, waiting for gl1p scalers (already on gtm1)
ZDC/SMD monitor	Ejiro, Manuel	
Localpol offline monitor	Athira, Greg	Closely follow online analysis
Localpol online monitor	Vincent,	SMD scalers not available
Xingshift (Calibration)	Devon	Apart from new spin info (html) mostly possible to use old phenix version: (/online/calibration/onlcal/subsystems/xingshift)

ZDC/SMD/Veto Online Monitor

<https://www.phenix.bnl.gov/WWW/publish/csanad/zdc/note/zdc.pdf>

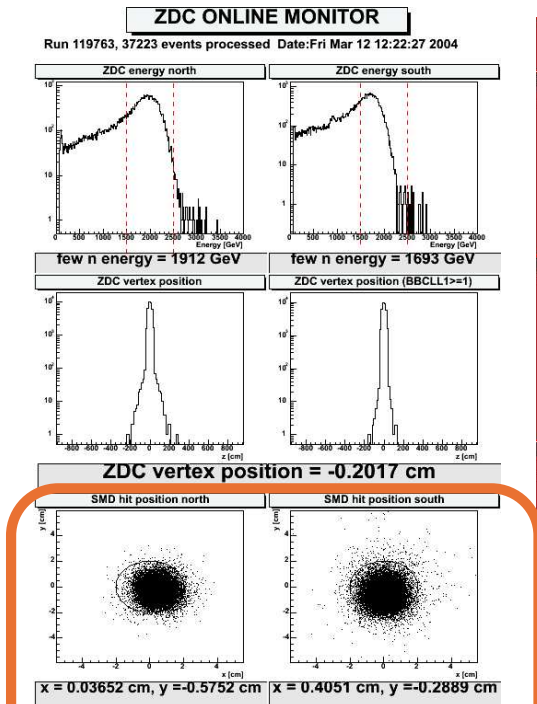


Figure 3: ZDC main online monitor in a Au+Au run

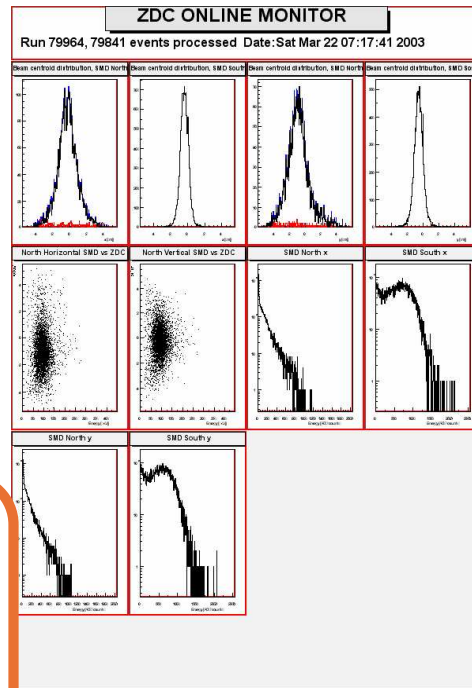


Figure 6: Expert plots in a d+Au run

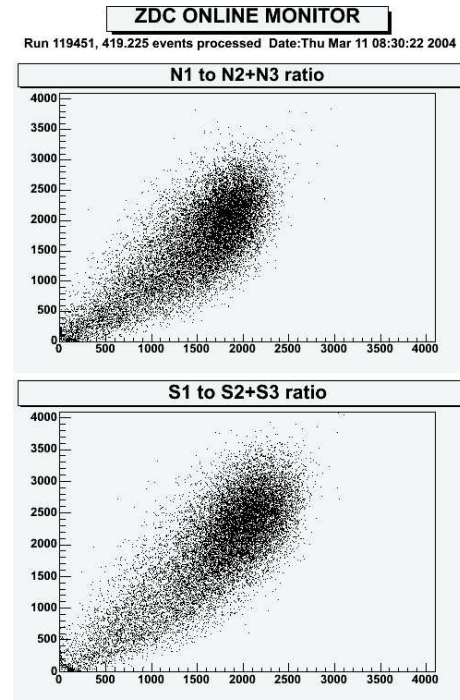


Figure 14: Expert plots in a Au+Au run

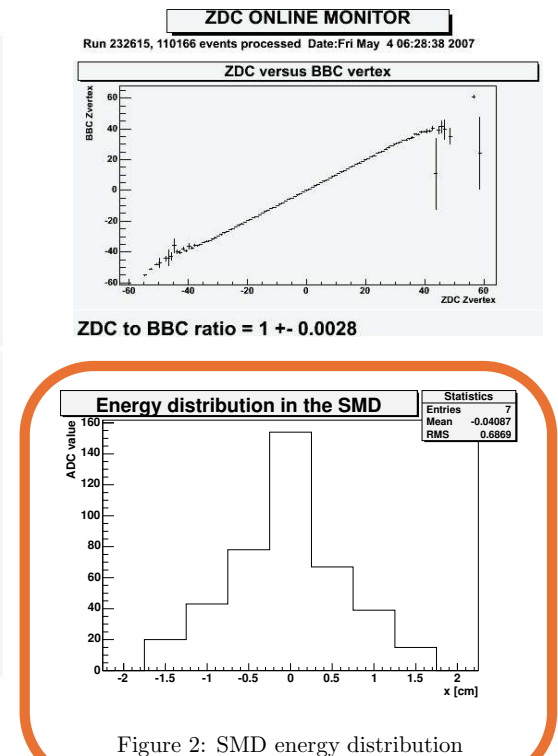
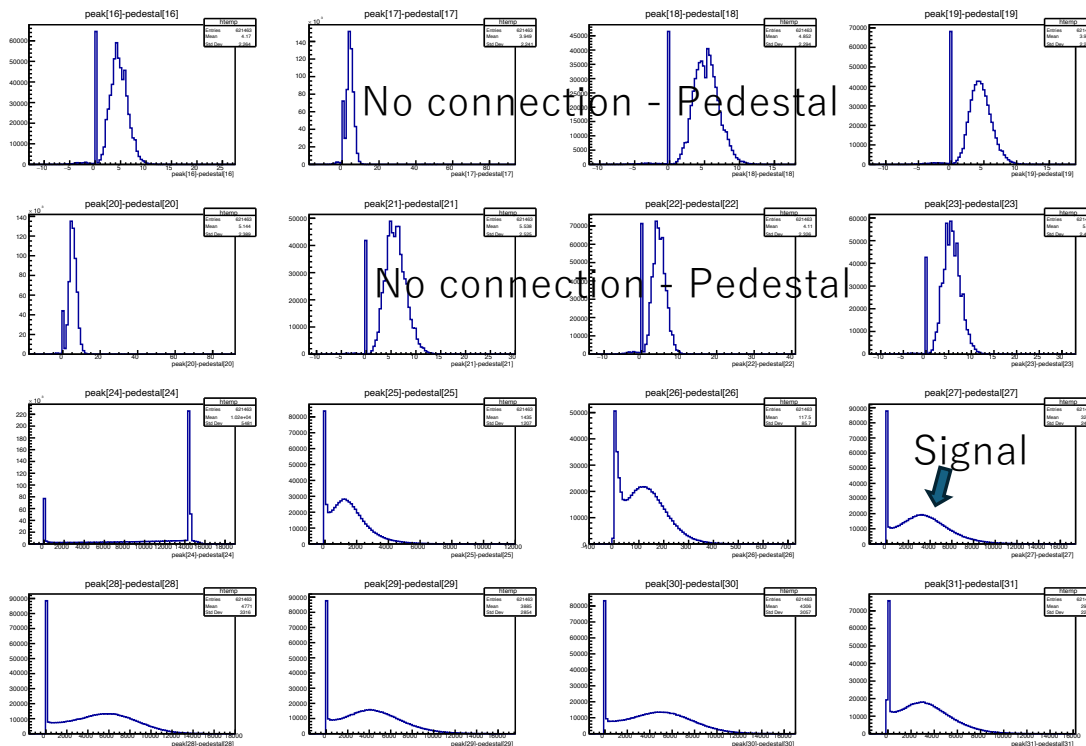


Figure 2: SMD energy distribution + hit multiplicity/event, etc..

SMD/(Veto) online monitors are to be developed by cold-QCD group. The strategy is to develop based on Ejiro's ZDC online monitor and mimic the PHENIX's online monitor.

SMD Test in Run23 with Beam

Run#24787



John's e-log entry in Aug.1st, 2023. I flipped the polarity of the SMD.N at the ADC (thus scrambling the channel map further), and now there is a pretty clean MIP in 7 of the 8 channels that are plugged in. There is quite a bit of variation in the MPV (~150 to ~6000), but that could arise from a variety of things.

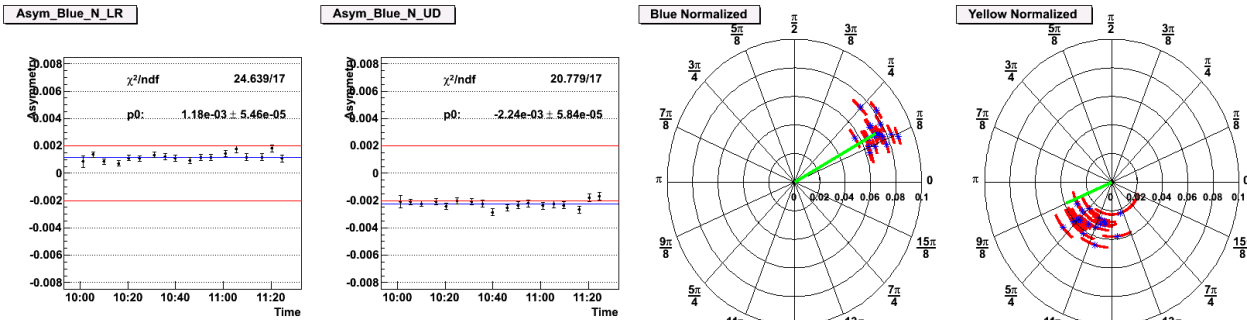


Was successful to readout the part of North SMD in rcdag. Some debugging is needed to make all channels working.

Data location: /sphenix/luster01/sphnxpro/commissioning/GL1/beam/*24787*
GL1 bunch information is available in data

Local Pol Online Monitor Development

LOCALPOLMON_0 Run 391871, Fill 17397, Time: Thu Apr 18 17:25:18 2013



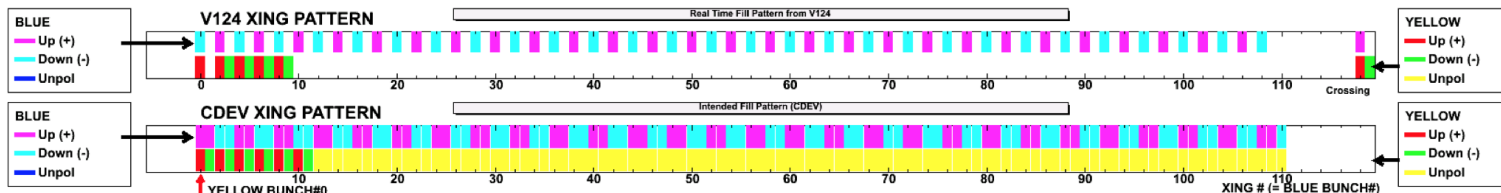
Error: Raw asymmetry out of range! Do not stop run!

Please call Local Polarimetry expert.

- We do need a data to develop the online monitor.
- Start developing the monitor using John's data took in Au+Au.
- Debugging may be limited due to incomplete channels.
- May consider generating simulation data if it is hard to develop the monitor with Au+Au data.
- Cosmic trigger data is another option before the beam, but also depending on the effort to set up the trigger.

Spin Monitor

Spin Monitor (run 435368, fill 19120) - for shift crew -



MONITOR START 2015/05/29 03:26:37
 MONITOR CURRENT 2015/05/29 03:33:04

CNI POL BLUE 0.555 ± 0.017 (stat)
 YELLOW 0.485 ± 0.024 (stat)

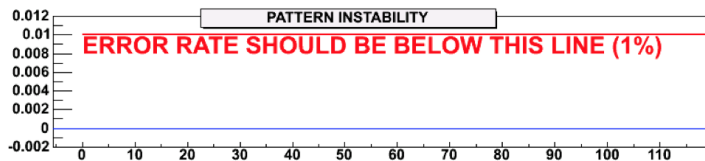
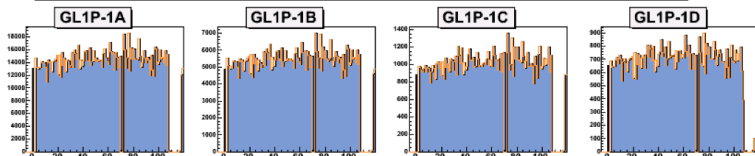
START 2015/05/29 01:02:43
 STOP 2015/05/29 01:03:11
 START 2015/04/27 06:40:29
 STOP 2015/04/27 06:40:41

Snake current : -0.15/ -0.29/ 324/ 100/ 324/ 99.6/ -0.71/ -0.27/

STAR rotator current : -0.15/ -0.22/ -0.42/ -0.05/ -0.29/ -0.22/ -0.35/ -0.05/

PHENIX rotator current : 0/ 0/ -0.37/ -0.37/ 0/ 0/ -1.03/ -1.9/

OF EVENTS MONITORED DATAEVENT SCALEREVENT 39911 7



PACKET LOSSES / PROBLEMS in DATAEVENTs
 GL1 0 (0.00 %)
 GL1P 0 (0.00 %)
 GL1-GL1P xing mismatch 39904 (99.98 %)

PACKET LOSSES / PROBLEMS in SCALEREVENTs
 CDEV 0 (0.00 %)

DEFAULT XING SHIFT 5

ERROR -- XING SHIFT DETECTED (SHIFTED TO RIGHT BY 118)
 Ask the DO to exit run control and reload the GL1 configuration from the daq level 1 trigger GUI.

ATTENTION! -- PATTERN NAME AUTO DETECT FAILED
REPORT THE ERROR AND RUN# TO ELOG
 Please check the spin pattern name in the RHIC Broadcast and verify visually that this is a known spin pattern.

ATTENTION! -- GL1 and GL1P mismatch --
 Please record the runnumber this issue in the ELOG

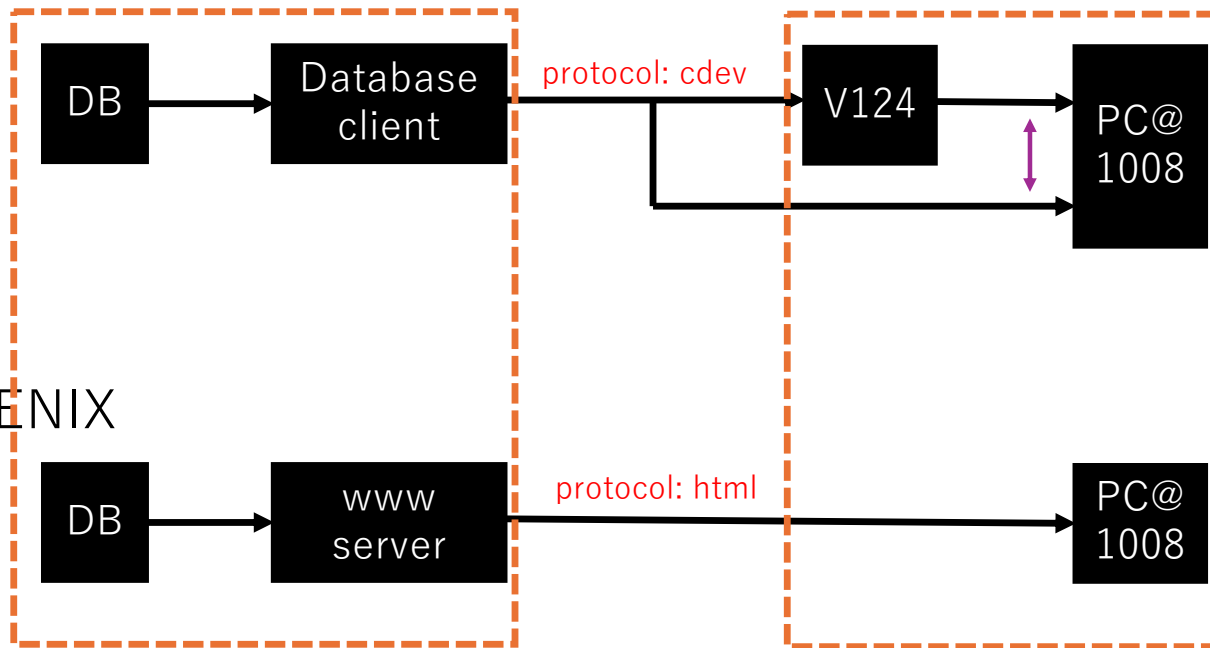
V124 SHIFTED TO RIGHT BY 118 bunches.(match method.)
 PATTERN INSTABILITY (THE WORST BUNCH)

BLUE	0%
YELLOW	0%
# of UNFILLED BUNCHES	
BLUE	55
YELLOW	100
PHENIX ROTATOR	OFF
PATTERN NAME	111x111_unknown
POL DIRECTION	unknown

- Unique and crucial information for spin
- Spin and filled bunch pattern, latest CNI polarization measurements.
- GL1p scalers
- Need to collect these information unique communication tools from multiple sources.

Transmission of spin patterns

PHENIX



Occasionally found discrepancy between two information (manually collected by cross checking with asymmetry pattern of pC polarimeter result)

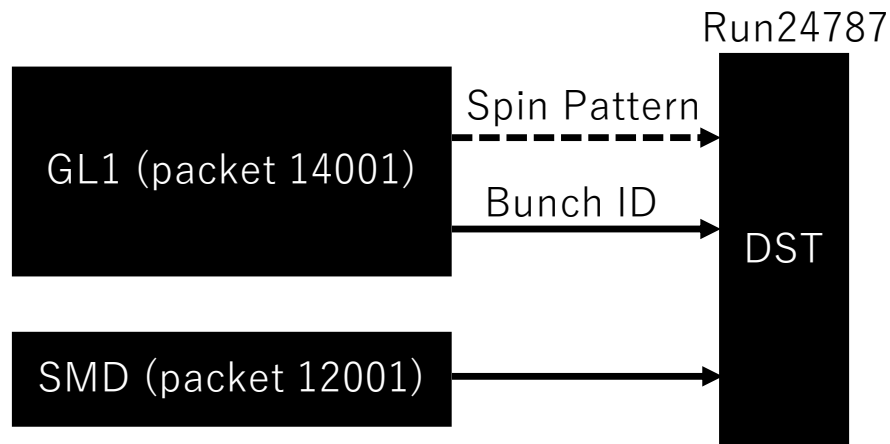
sPHENIX

We will not have any alternative record in sPHENIX. Keep only the information from the most reliable protocol.

CAD

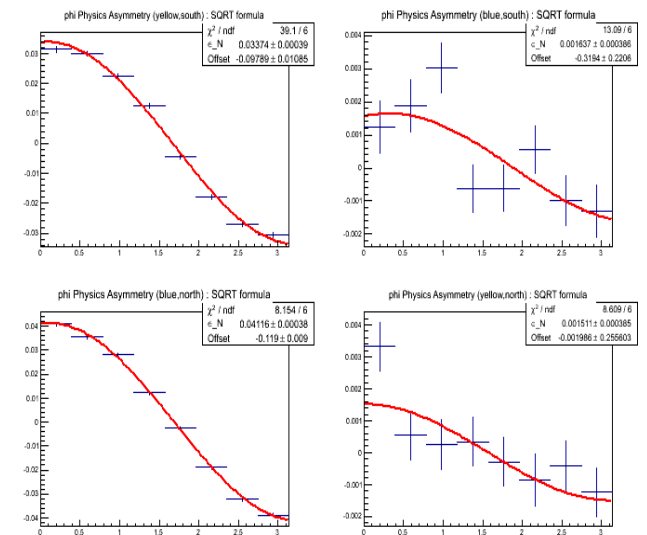
1008

Local Polarimeter Offline Analysis Software



The local polarimeter requires the bunch ID and spin patterns to every SMD hits. The SMD hits are tagged with the bunch ID already in the Run#24787 DST. Although spin patterns are not available, the software can be developed with a fake spin pattern assigned within the code for the time being.

PHENIX Local Polarimeter



Raw asymmetry for transverse fill

Data : /sphenix/luster01/sphnxpro/commissioning/GL1/beam/*24787*

Spin Tasks Present Status at a Glance

Item		Hardware/Firmware	Testing	Software
SMD	North	<ul style="list-style-type: none"> Module Installation ✓ Cabling ✓ Channel Mapping/Labeling ✓ 	<ul style="list-style-type: none"> Run23 beam data ✓ Half of SMD OK ✓ Scope Check ✓ Cosmic rdaq 	<ul style="list-style-type: none"> Online monitor Offline asymmetry analysis code
	South	<ul style="list-style-type: none"> Module Installation ✓ Cabling ✓ Channel Mapping/Labeling ✓ 	<ul style="list-style-type: none"> Scope Check ✓ Cosmic rdaq 	
	Scaler	<ul style="list-style-type: none"> ADC digitizer/LL1/GL1p Firmware 		LocalPol Online monitor to be developed using Run23 data
Veto		<ul style="list-style-type: none"> Power Supply Installation Cabling Differential Module Channel Mapping 	<ul style="list-style-type: none"> ²¹ Signal Check 	<ul style="list-style-type: none"> Online monitor Offline analysis code
Relative Luminosity		<ul style="list-style-type: none"> GL1p firmware (version 1.0 by Joe) 	<ul style="list-style-type: none"> Testing by Martin Testing by Cold-QCD group. Need to get familiar 	Spin online monitor to be developed with test data
Spin Pattern Recording				http-based delivery from CAD and saved in the spin database (Used to be broad casted via V124)
Vernier Scan (1 st attempt of ...)		<ul style="list-style-type: none"> GL1p firmware 		Analysis code development