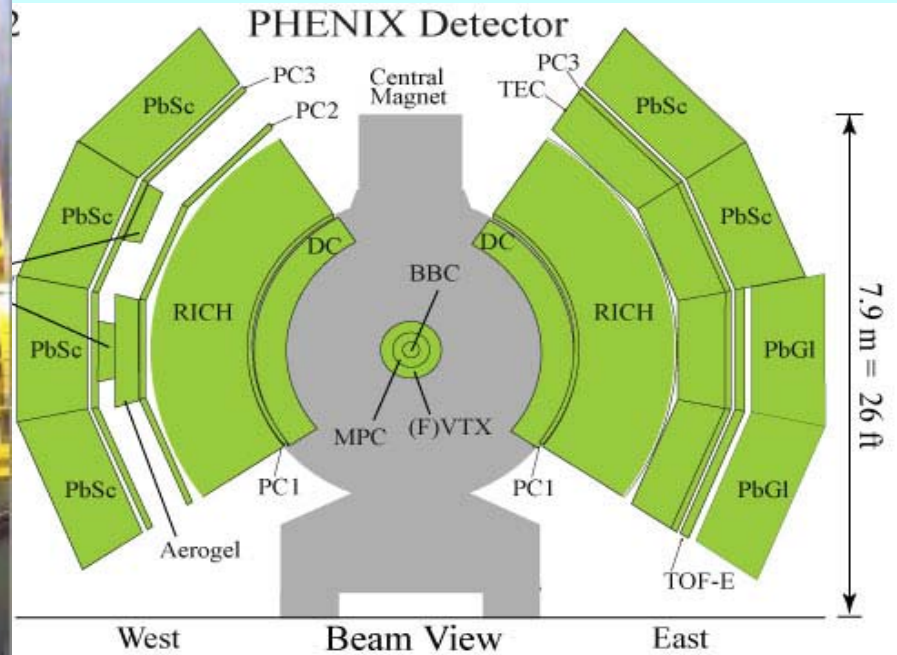
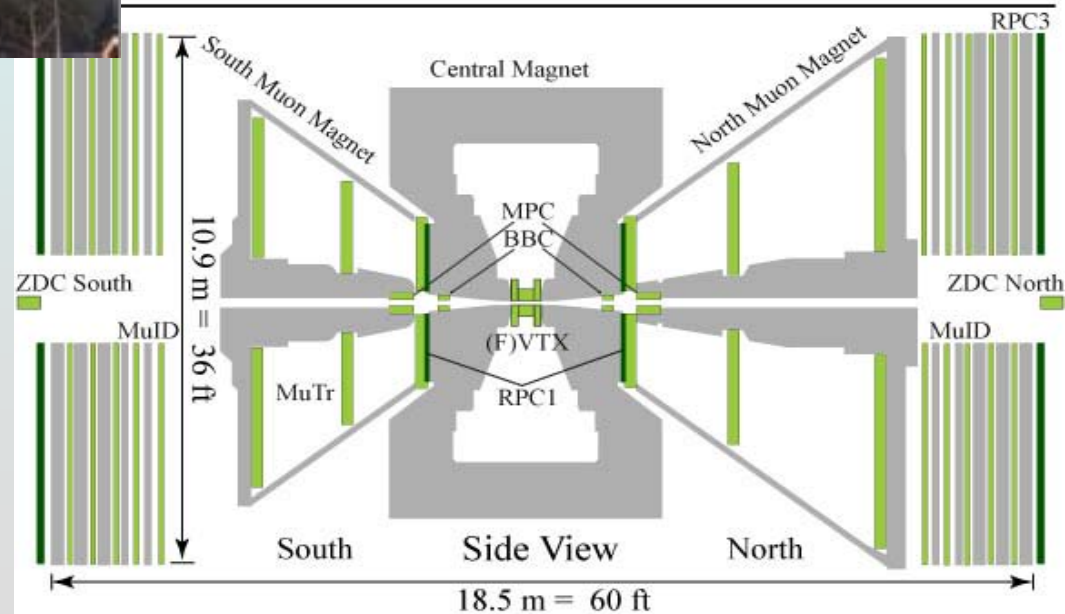


PHENIX status for Run-13



Barbara Jacak
For the PHENIX
Collaboration
Nov. 13, 2012



Key subsystems for Run-13
(no new ones this year)

W Trigger

RPC1 was installed already for 2012

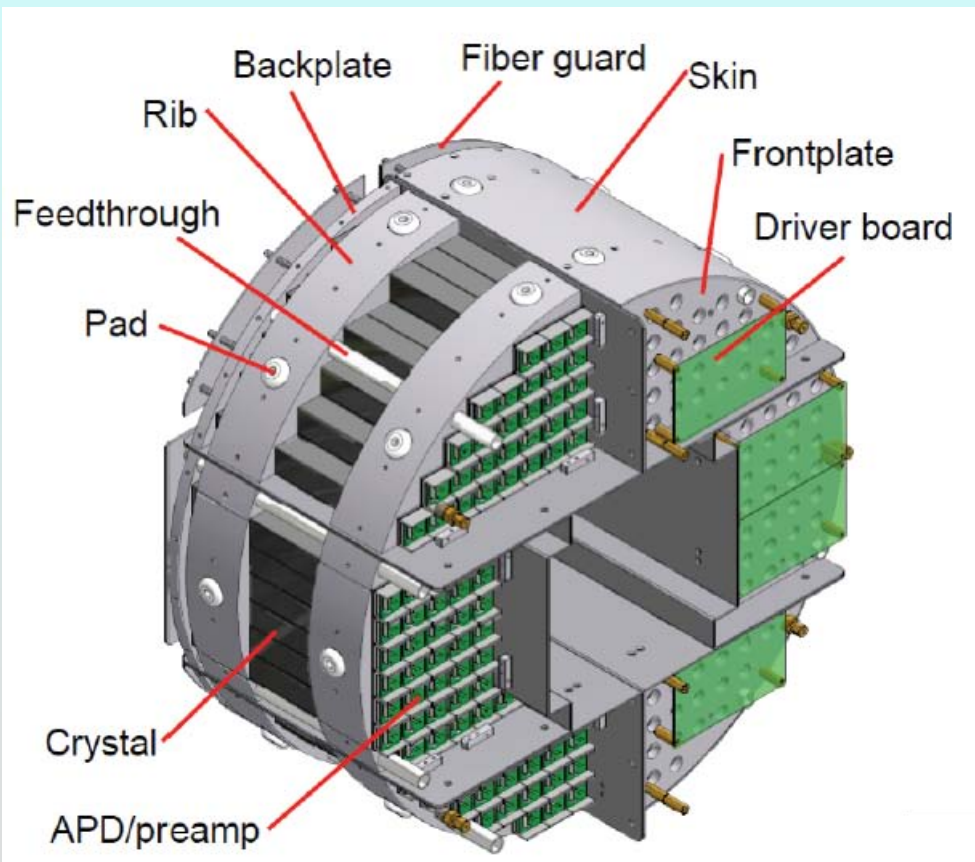
both RPC stations implemented in the trigger

Key component of Run-13 W program

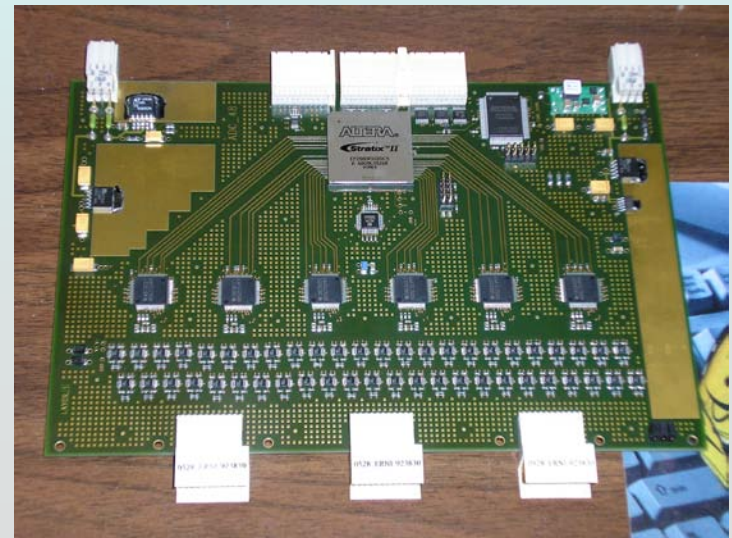


Muon Piston Calorimeter

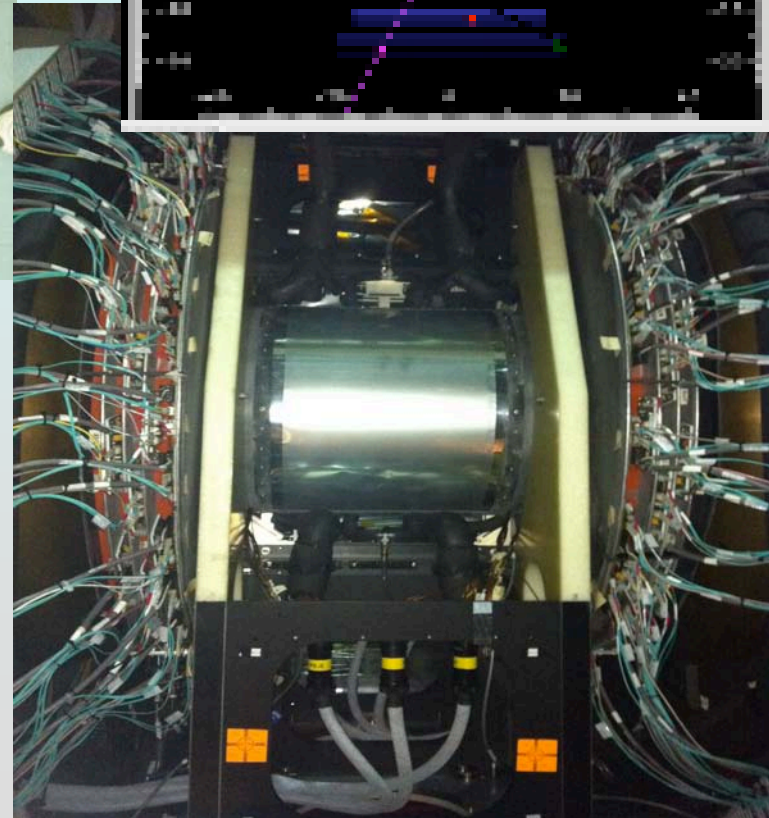
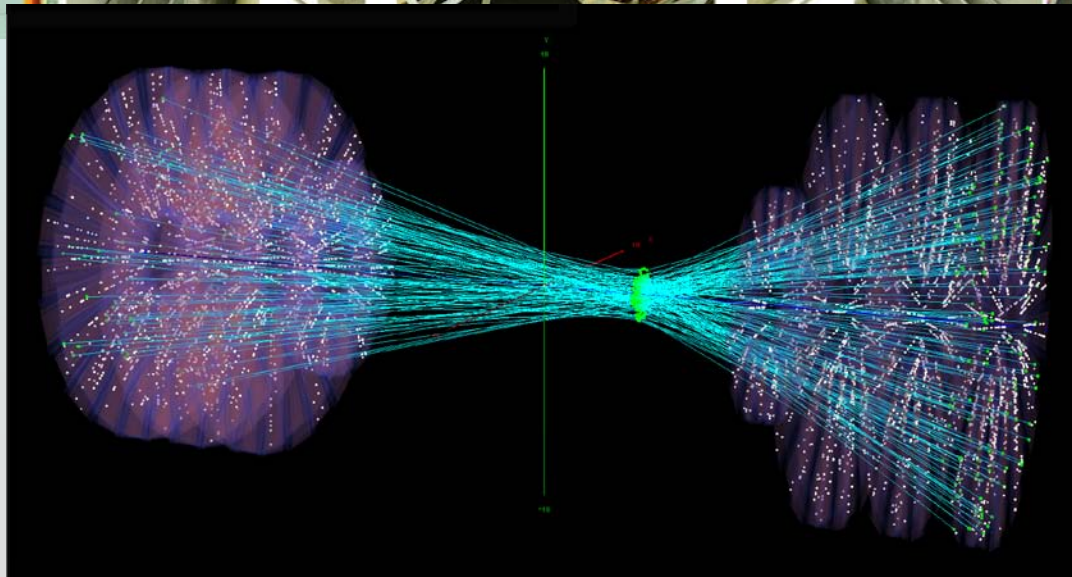
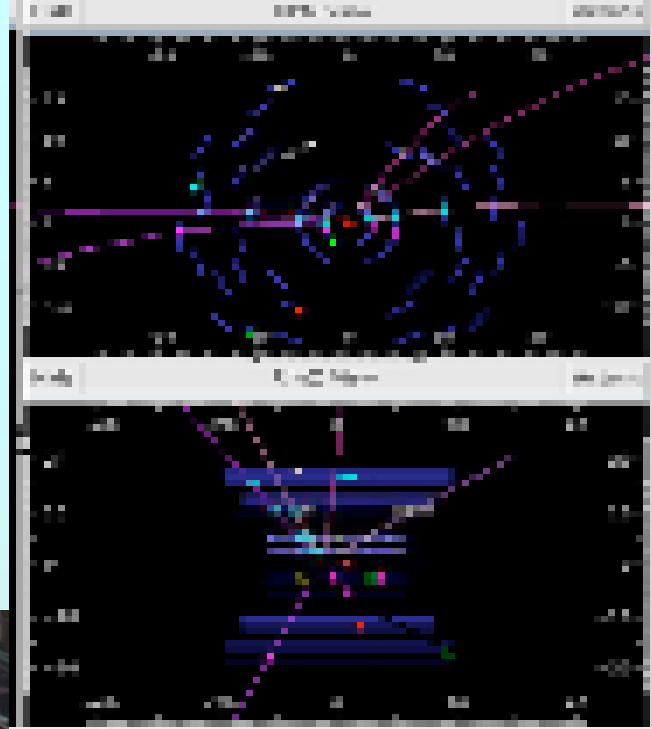
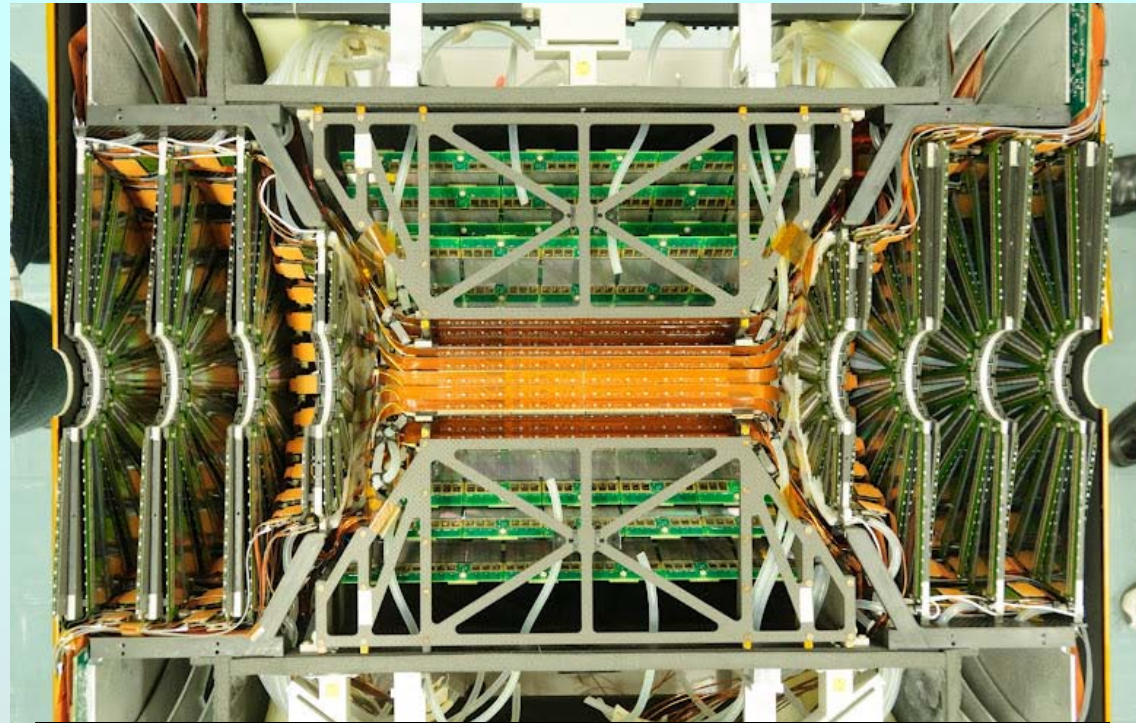
- Measure forward π^0
- HBD waveform digitizers improve resolution & trigger



**New SMPC electronics
rack installation**



VTX & FVTX



During the shutdown

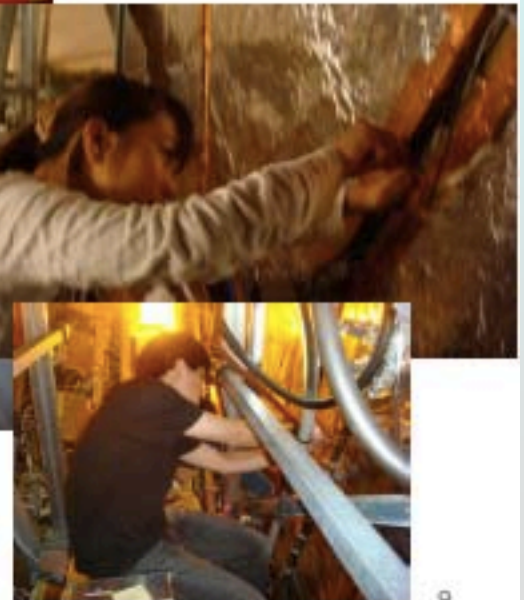
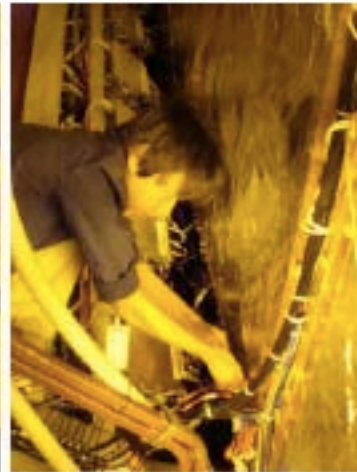
- VTX removal, repair and reinstallation **Nearly complete**
- FVTX maintenance **Nearly complete**
- VTX/FVTX cooling system maintenance and upgrades **Nearly complete**
- RPC1 Cooling Upgrade **Nearly complete**
- DC West maintenance ✓
- MuTr Station 1 South Upgrade ✓
- MuTr, MuTrigger Stations 2 & 3 Upgrades ✓
- MPC repairs ✓
- General subsystem maintenance **Ongoing**

● **will be ready to take cosmics in January!**

Lots of muon tracker maintenance (W trigger)

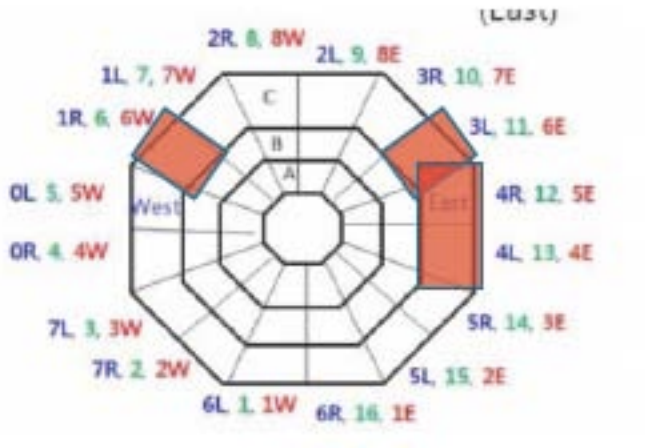
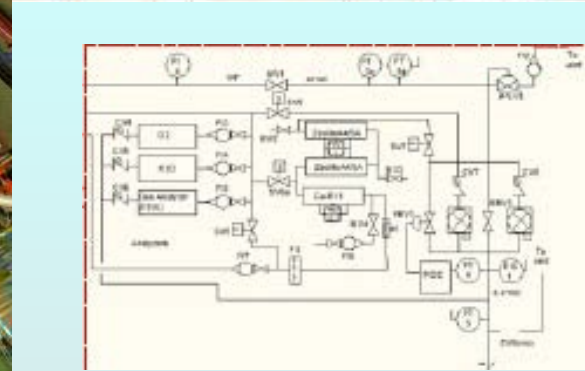


11/7/2017



*HV, FEE, dry air
ready to go*

W trigger RPC's



Added shielding

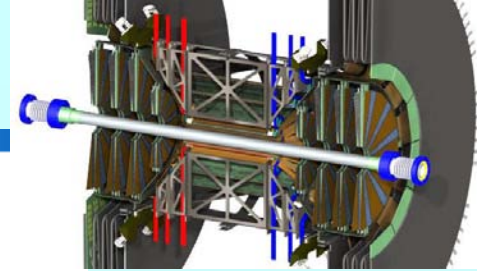


*Added
RPC1
cooling*

*Gas recirculation
in IR (in progress)*

ready for cosmics in January

VTX & FVTX status*



- Work on west ½ was successful- ~90% active
- VTX is ready for survey
- VTX Strips need one day for final testing before relocation to 1008
- Despite Sandy's best efforts the schedule was expedited by ~1 week

- ~25% of the FVTX ROC's required some form of maintenance this shutdown
(after its maiden voyage)
- All electronics issues successfully addressed.
- > 95% live FVTX channels for Run-13

* As of Nov. 7, 2012

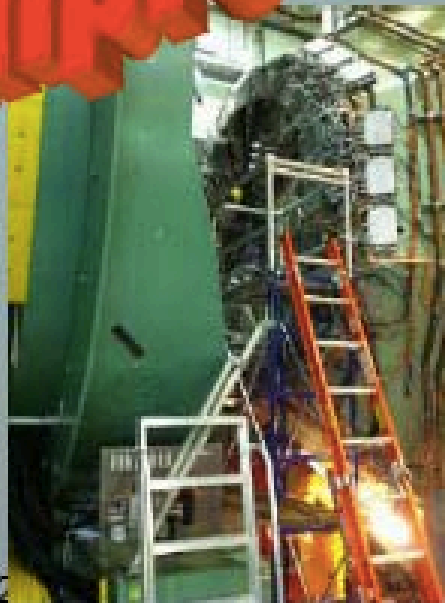
MPC Repairs -



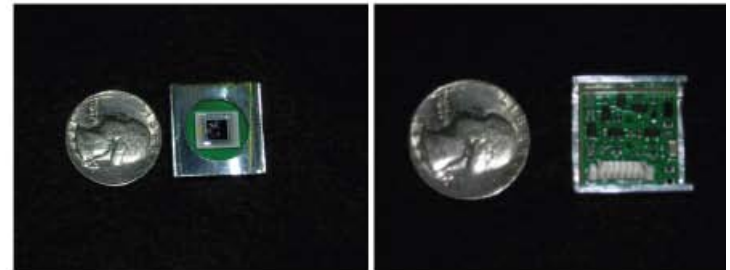
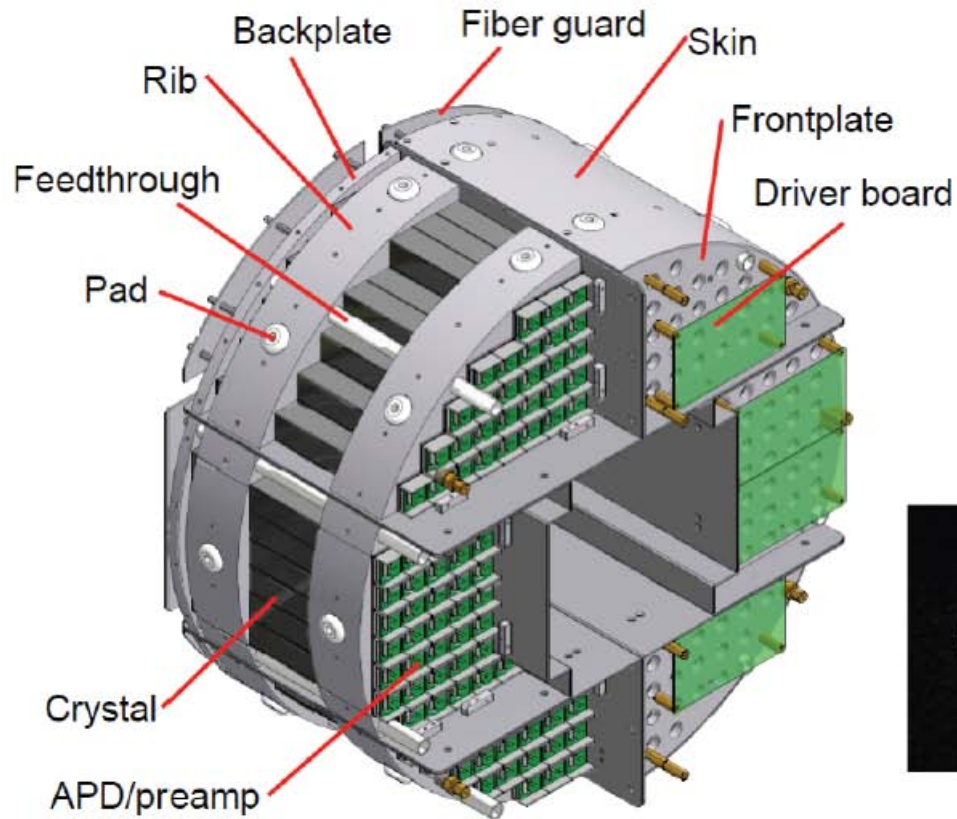
North MPC

South MPC

Completed

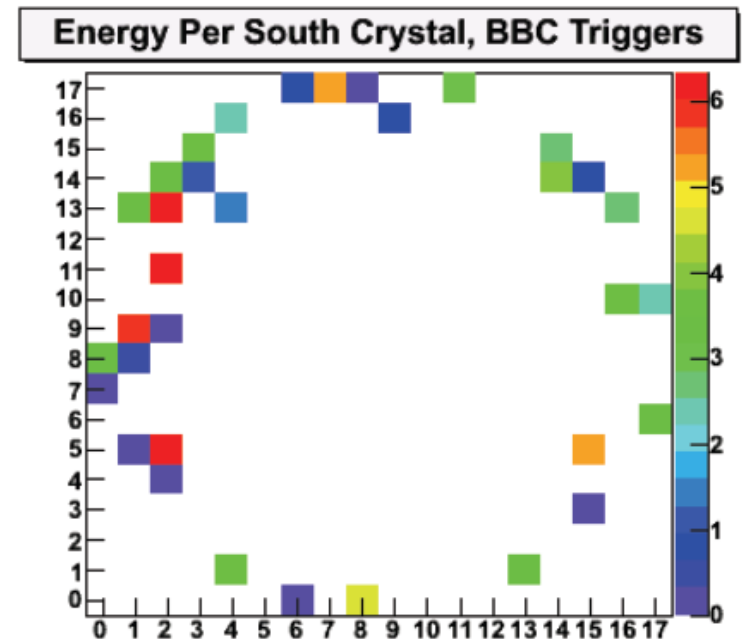
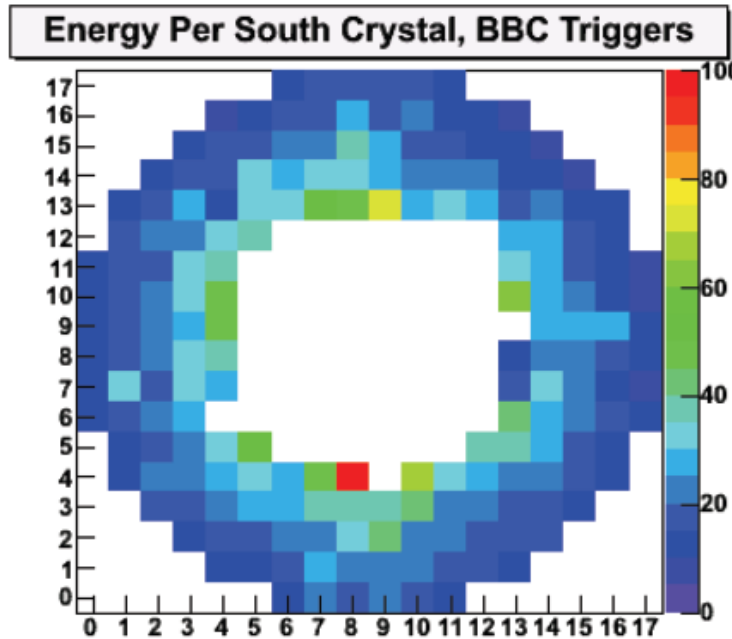


MPC Damage in Run-12



- **APD/Preamp had seen beam-loss damage in the past but not on such a large scale**

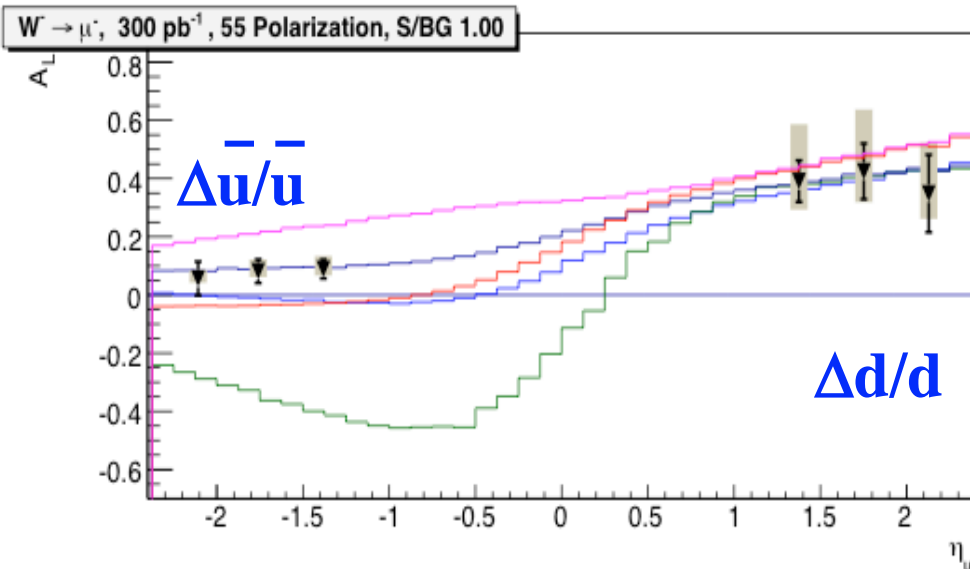
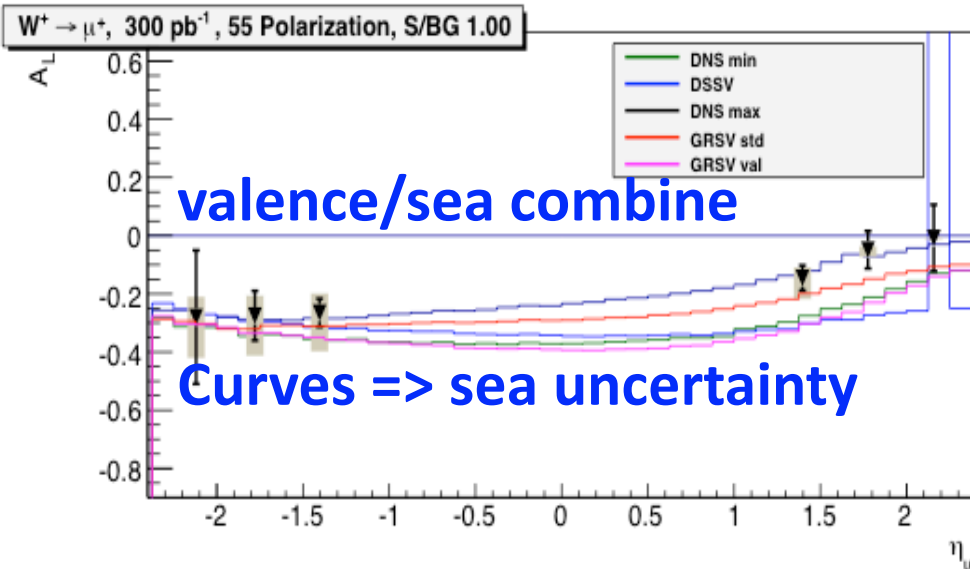
MPC South Damage Before and After Beam Dump



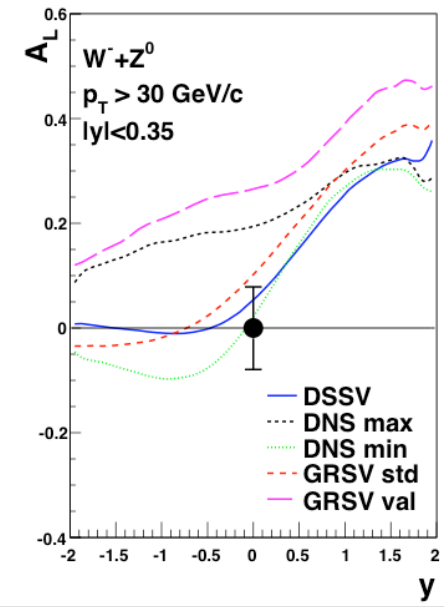
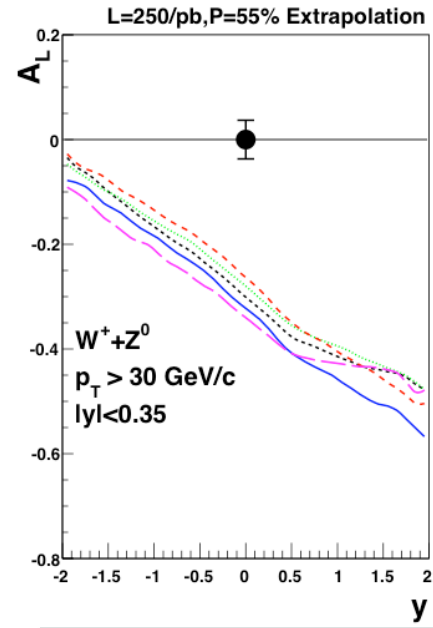
- We lost 300/416 readout channels total
- Repair had to wait until the summer shutdown
- C-AD agrees to add collimators between beam dump near 10 o'clock and the PHENIX IR
 - Did not happen (was not possible)
 - Leaves us vulnerable to damage in another beam dump
 - We are *very* worried, as this detector is key for ΔG physics

Needed for Run-13 Physics

Run-13 top priority: finish W measurement!



inclusive high p_T leptons
 $\int L dt = 300 pb^{-1}$ in 30cm, $P \geq 0.55$
 $250 pb^{-1}$ recorded in Run-13
 $\rightarrow \sim 750 pb^{-1}$ delivered

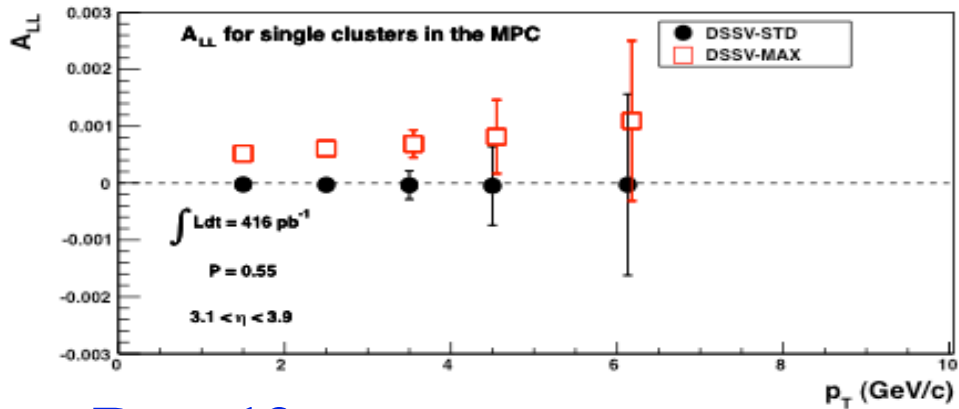
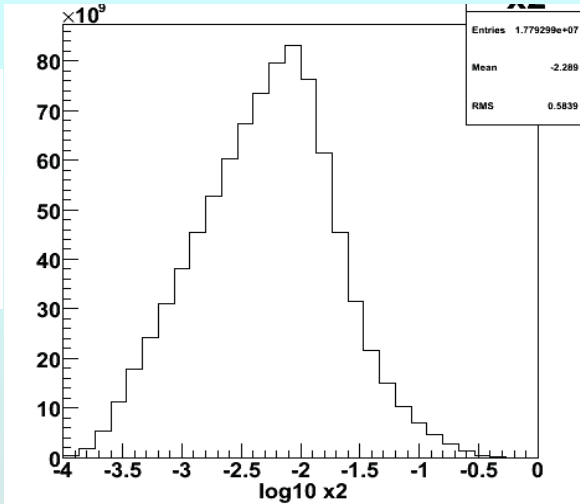


Requires $\int L dt = 900 pb^{-1}$
Combined Run-11,12,13

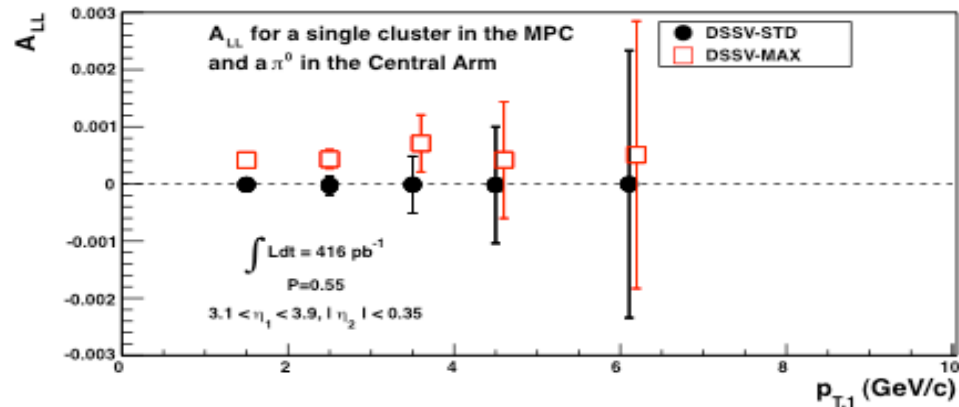
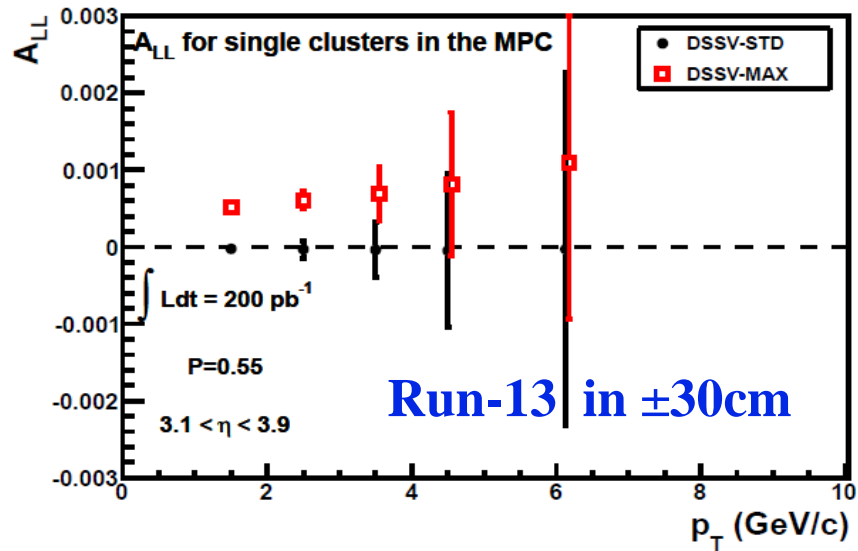
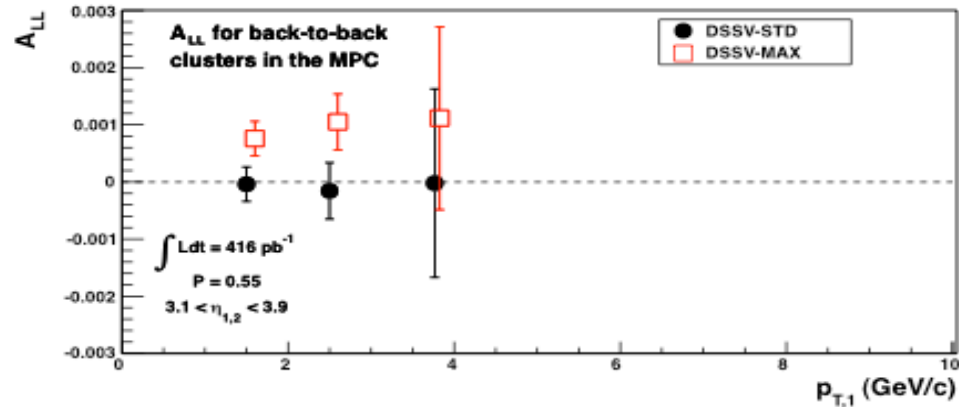
$$\Delta g : \pi^0 A_{LL}$$

Δg is small! 500 GeV offers lower x, higher luminosity

x gluon for π^0 in MPC

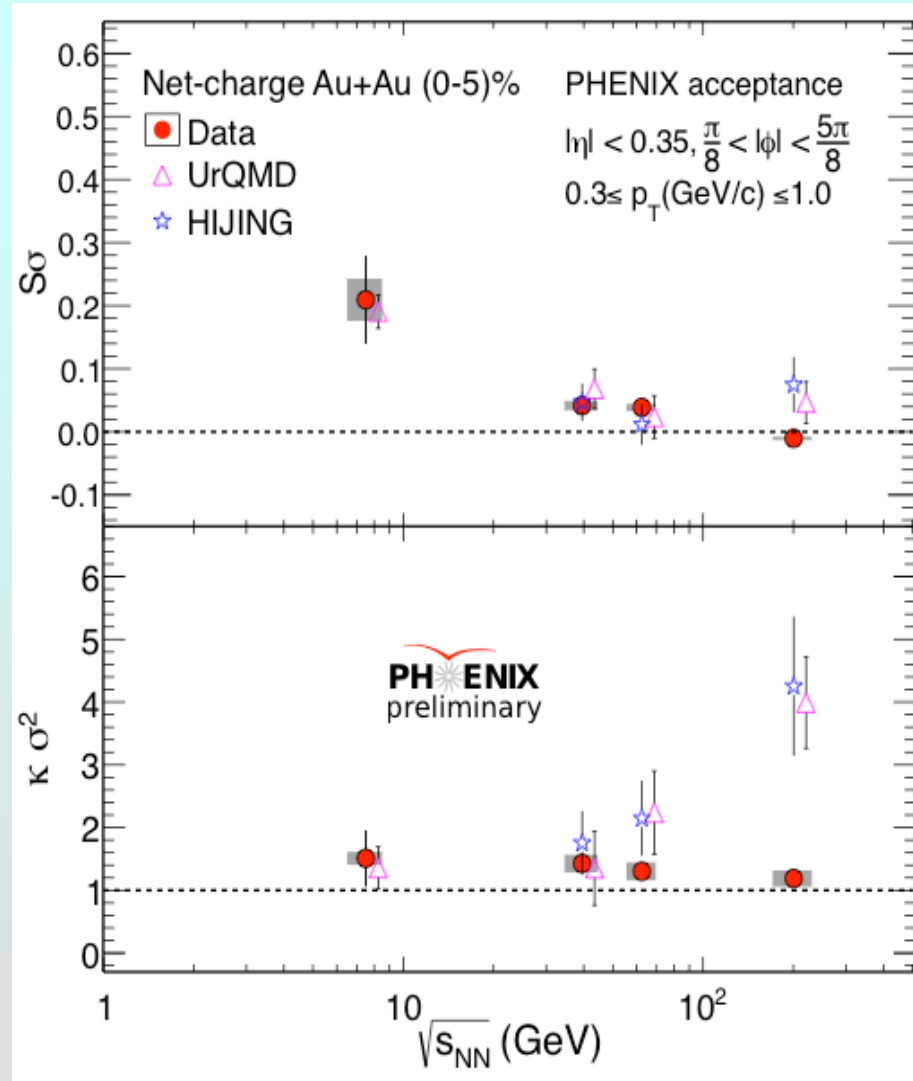


Run-13 no vertex cut



Energy scan for soft particle production

15 GeV will be very interesting

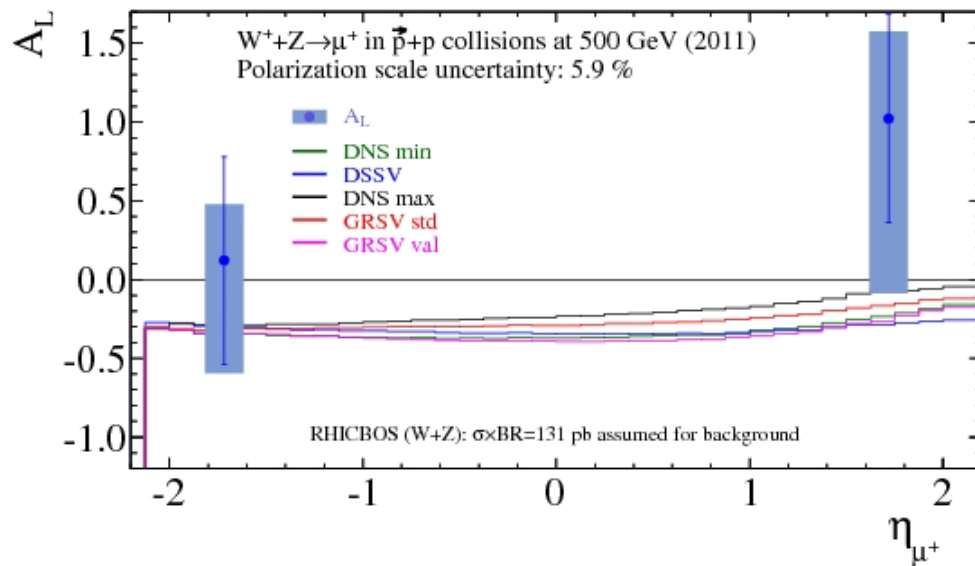


Run-13 Run Coordinator: Hubert van Hecke

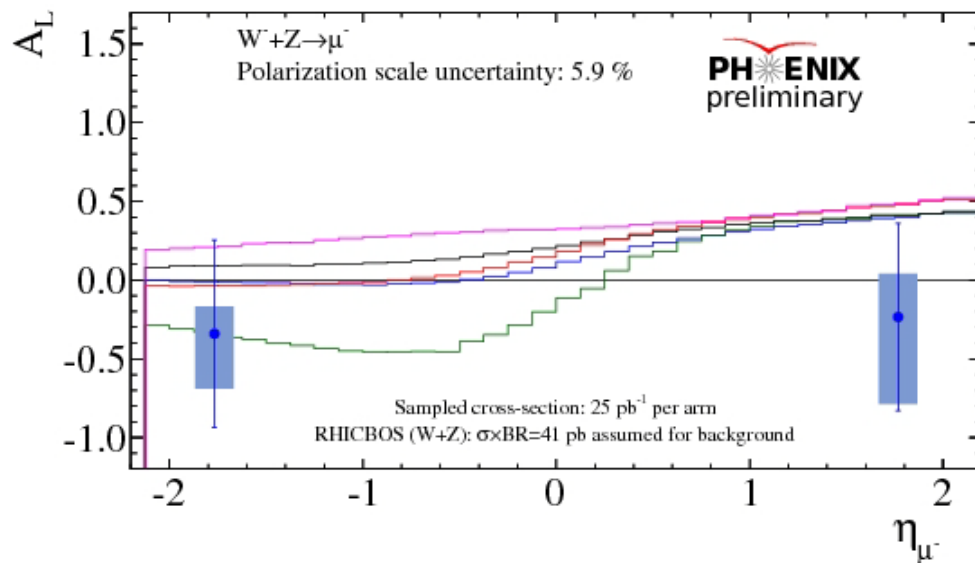


- **backup slides**

First $W \rightarrow \mu$ result



- **Run-11**
 - first use of RPC3
 - sampled 25 pb^{-1}
 - polarization $\sim 50\%$
- **Proof of principle**
 - Clearly needs more statistics
 - Statistics \uparrow also = systematics \downarrow



Compelling physics questions in Run-13 & 14

- What are the light antiquark polarizations inside a polarized proton?
Precision measurement of W^\pm in polarized 500 GeV p+p
- What is the gluon asymmetry at smaller x ?
Forward π^0 /cluster A_{LL} in polarized 500 GeV p+p
- How much are B mesons suppressed by QGP?
c/b separation in 200 GeV Au+Au and p+p w/VTX & FVTX
- What is $\pi^0 A_N$ at forward rapidity?
- What is the gluon shadowing at $x \sim 10^{-2} - 10^{-3}$ in a Au nucleus?
Install and commission MPC-EX
Measure forward direct photon yield in 200 GeV d+Au (or p+Au) and p+p reference
NB: if isospin effects require p+Au, need dedicated Run-15

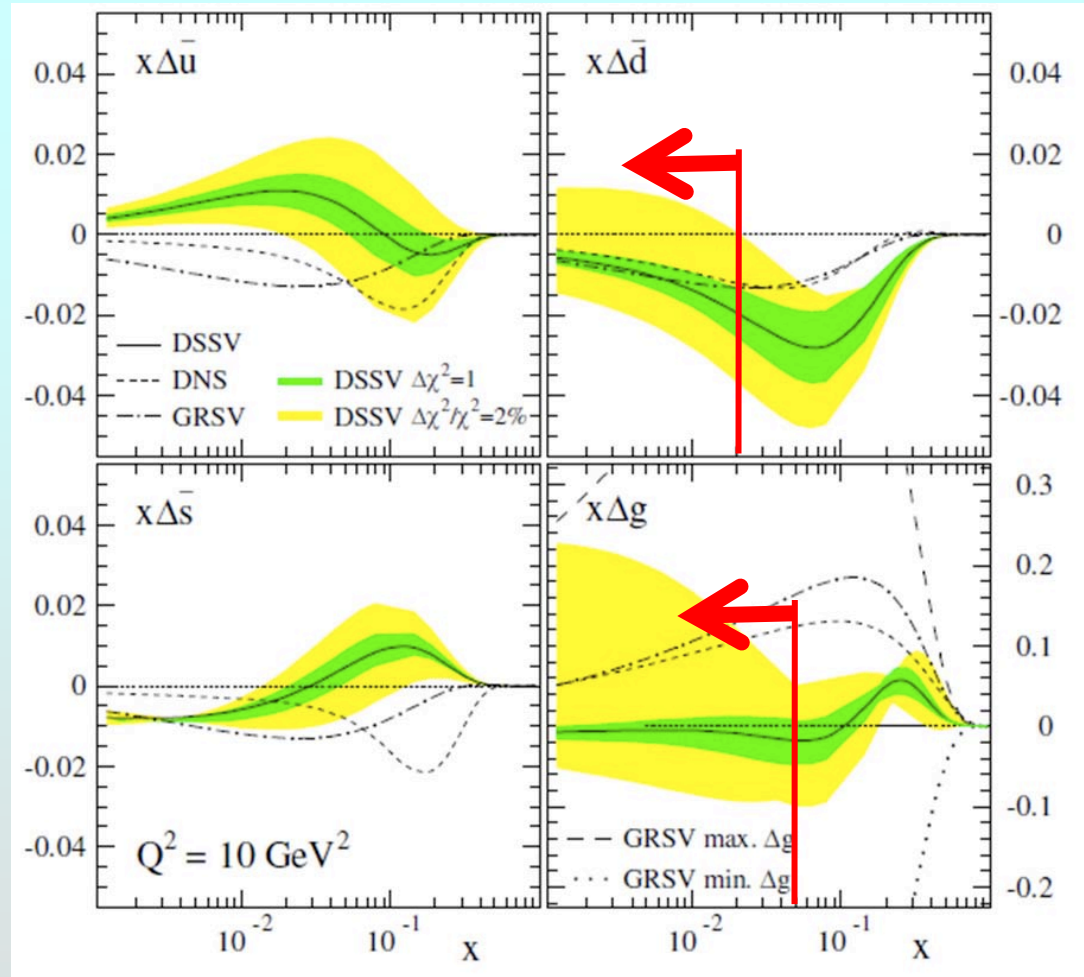
PHENIX beam use proposal

run	species	$\sqrt{s_{NN}}$	weeks	$\int L dt$	pol.	comments	
				$ z < 30 \text{ cm}$	$ z < 10 \text{ cm}$		
	<u>Species</u>	<u>$\sqrt{s_{NN}}$</u> <u>(GeV)</u>	<u>weeks</u>	<u>$z < 30 \text{ cm}$</u>	<u>$z < 10 \text{ cm}$</u>	<u>delivered</u>	<u>Polariz.</u>
1	Run13:						
	p+p	500	10-15	250 pb ⁻¹	97 pb ⁻¹	~750 pb ⁻¹	55%
	p+p	200	4	16 pb ⁻¹	> 5.5 pb ⁻¹	48 pb ⁻¹	60%
	<i>or p+p</i>	39	1	0.2-0.3 pb ⁻¹		0.9 pb ⁻¹	
	Run-14:						
	Au+Au	200	6-8	1.7 nb ⁻¹	1 nb ⁻¹	5 nb ⁻¹	
	d+Au	200	Rest of run				

gluon & sea quark polarization

Current best knowledge from global fits

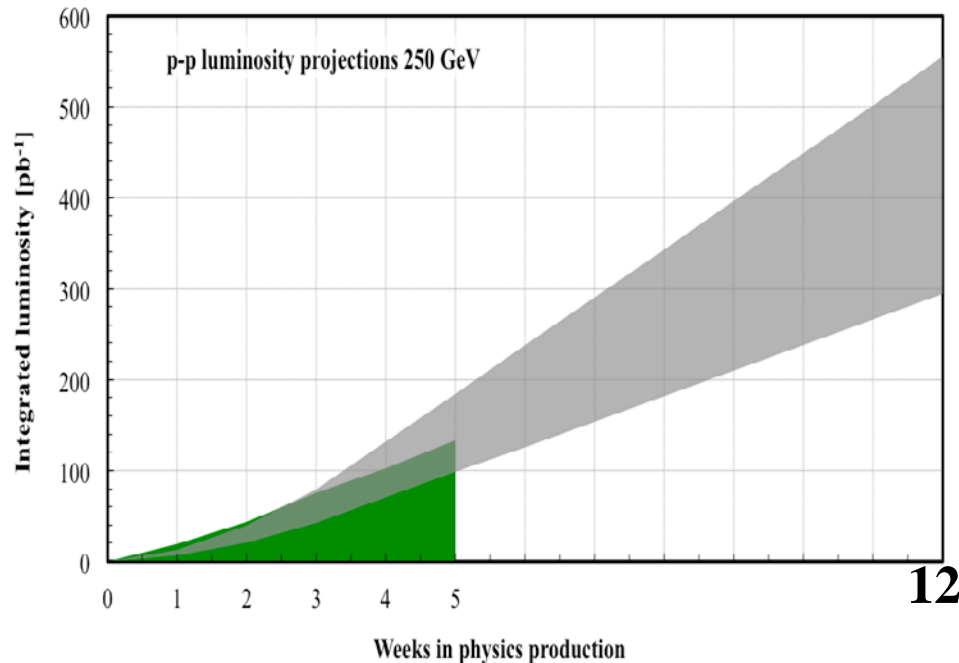
Δg small, but getting very interesting



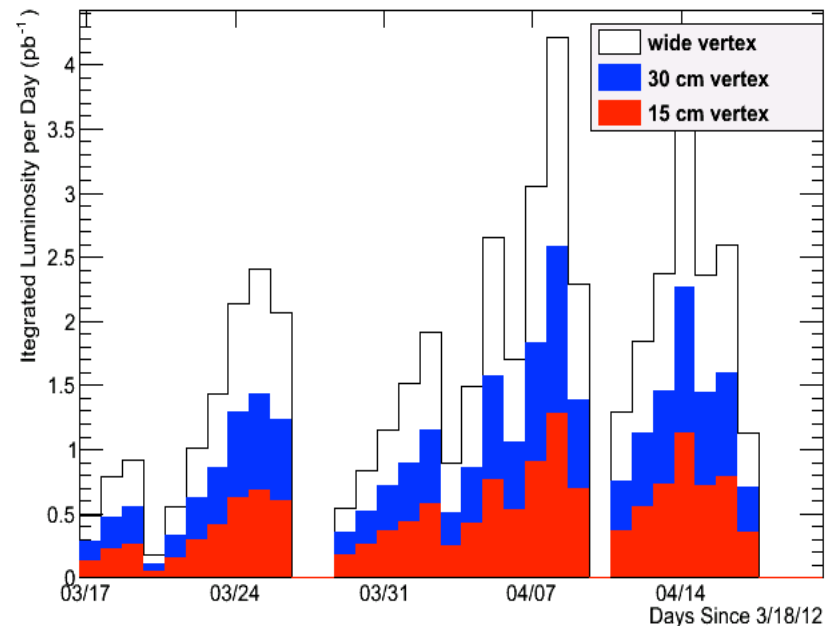
- 500 GeV p+p: π^0 A_{LL} to constrain Δg ($0.01 < x < 0.3$) NSAC milestone HP12
central/forward correlations tag kinematics NSAC milestone HP8
- W A_L at forward, backward, mid rapidity for $\Delta\bar{u}$, Δu , $\Delta\bar{d}$, Δd

A concern

- Can this program be completed in 2013?
NSAC milestone HP8 is set for 2013, RIKEN milestone in 2014
Curtailed running weeks also preclude stretch-out
- 300 pb⁻¹ in 30 cm is necessary for impactful measurement!
Plots are for 55% polarization, RHIC will match/exceed
The issue is integrated lumi – must optimize ops approach
PHENIX working to improve efficiency & vertex cut impact

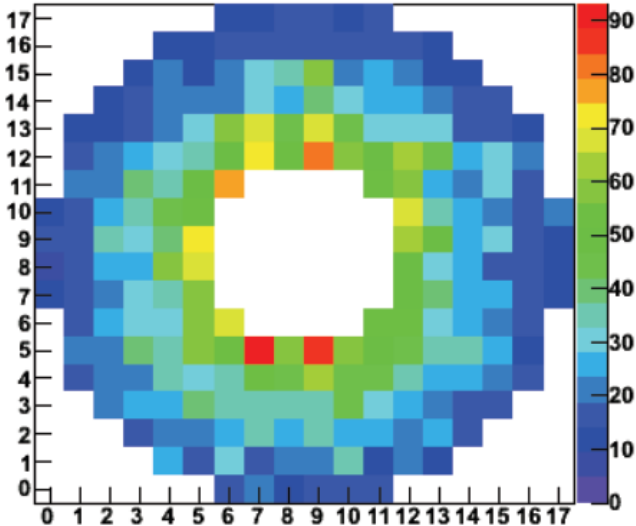


PHENIX Integr. Sampled Lumi/Day vs Day hu Apr 26 22:09:41 2012

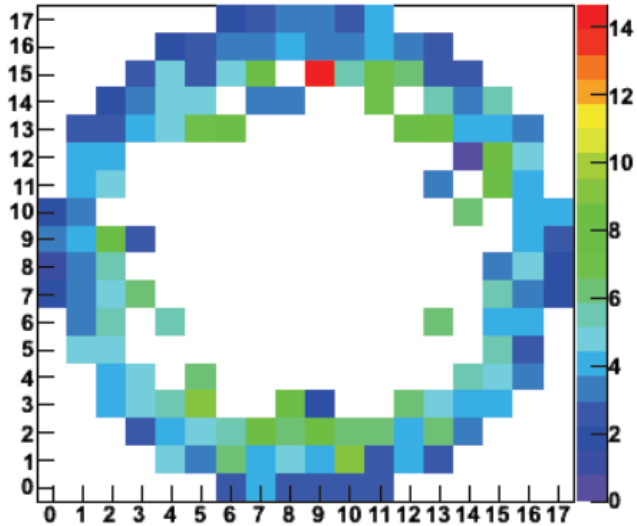


MPC North Damage Before and After Beam Dump

Energy Per North Crystal, BBC Triggers



Energy Per North Crystal, BBC Triggers



Damage by Au beam