



RHIC/Experiments Coordination Meeting

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Run 22 Operational Modes

- Physics program modes

Species	RHIC Top Energy [GeV/n]	Purpose
Pol. Protons	255	Colliding beam physics (16 wks)
Au	26.5	CeC X (2 wks)

→ PAC recommended finishing CeC time 'early' (first two months of operation)

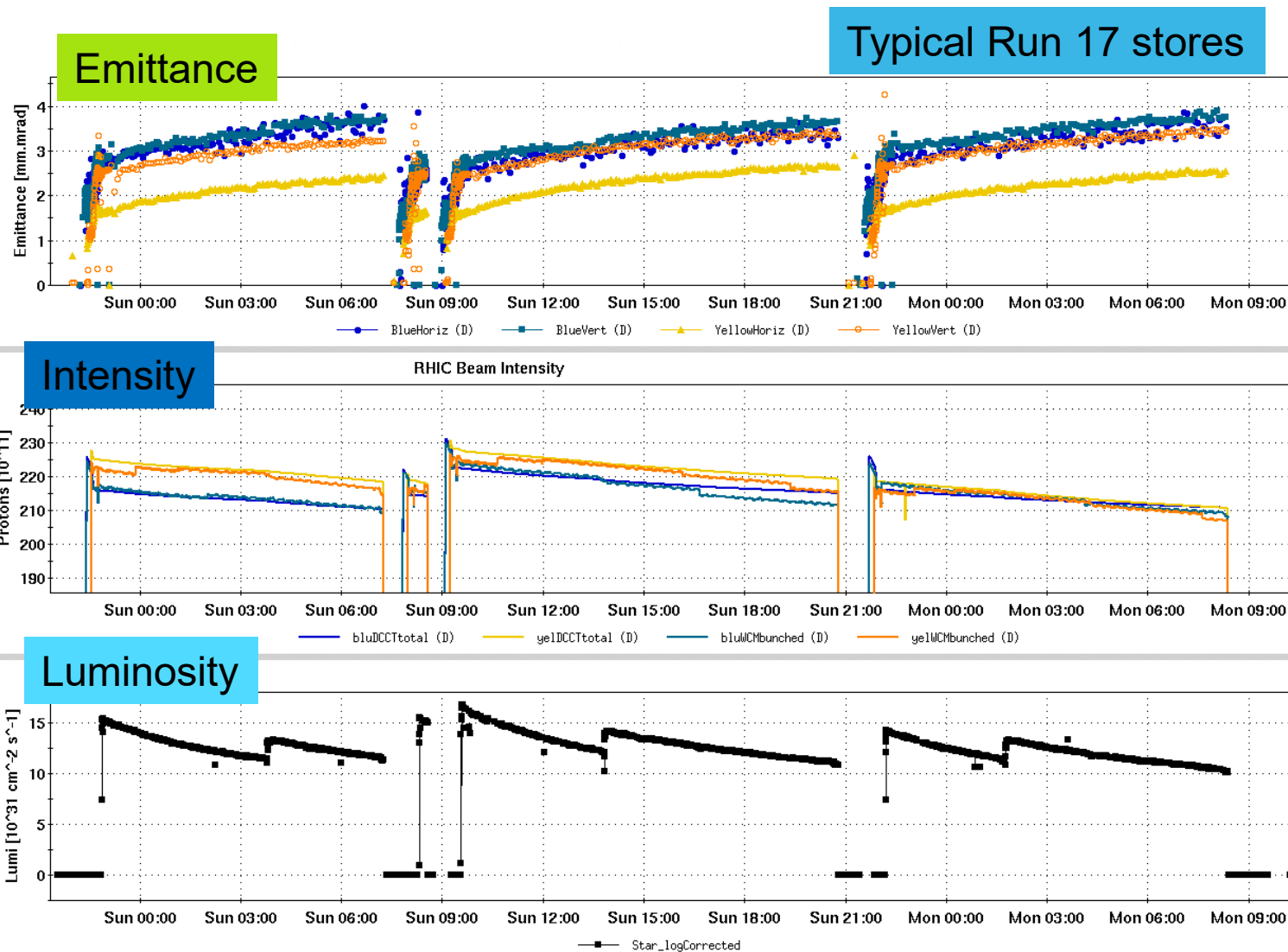
- APEX modes

Species	RHIC Top Energy [GeV/n]	Purpose
^3He (unpolarized)	100	Polarimetry development (blue only)
Au	3.85	LEReC experiments

No *new* lattice required for any planned operating mode.

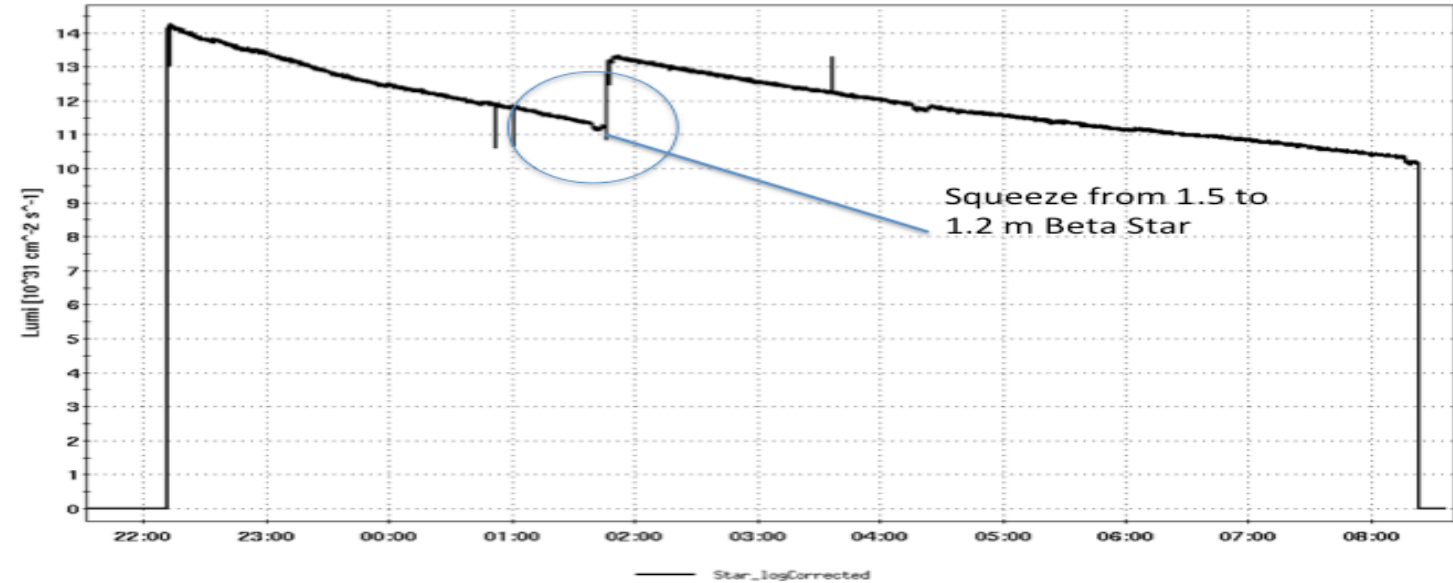
Polarized proton operation

- Polarized proton collisions at 255 GeV
 - 16 weeks
 - + 2 weeks of CeC
- Conditions similar to Run 17
 - Collisions at IP6 only
 - Cogging: abort gap collision at IP8-2
 - Luminosity capped at $14 \times 10^{31} \text{ cm}^{-2} \text{ s}^{-1}$
 - (limited) Leveling via second beta* squeeze
 - No crossing angle/misteering
 - *Transverse polarization only (no rotators)*
- Operational RF:
 - Inject/accelerate: 9 MHz+Landau
 - Rebucket: 28 MHz
 - Store: 28 MHz + 197 MHz



Typical Run 17 Store

	Start of store	
Intensity (/bunch)	2×10^{11}	
Emittance (trans,norm)	2.5	um,rms
Luminosity	14×10^{31}	$\text{cm}^{-2}\text{s}^{-1}$
Polarization (avg, Jet)	55%	
Bunch length (rms)	3	ns



Improvement plans

1. Booster split/AGS merge scheme: Reduce space charge at AGS injection
2. Imperfection resonance correction RHIC
3. Spin tilt at store in RHIC

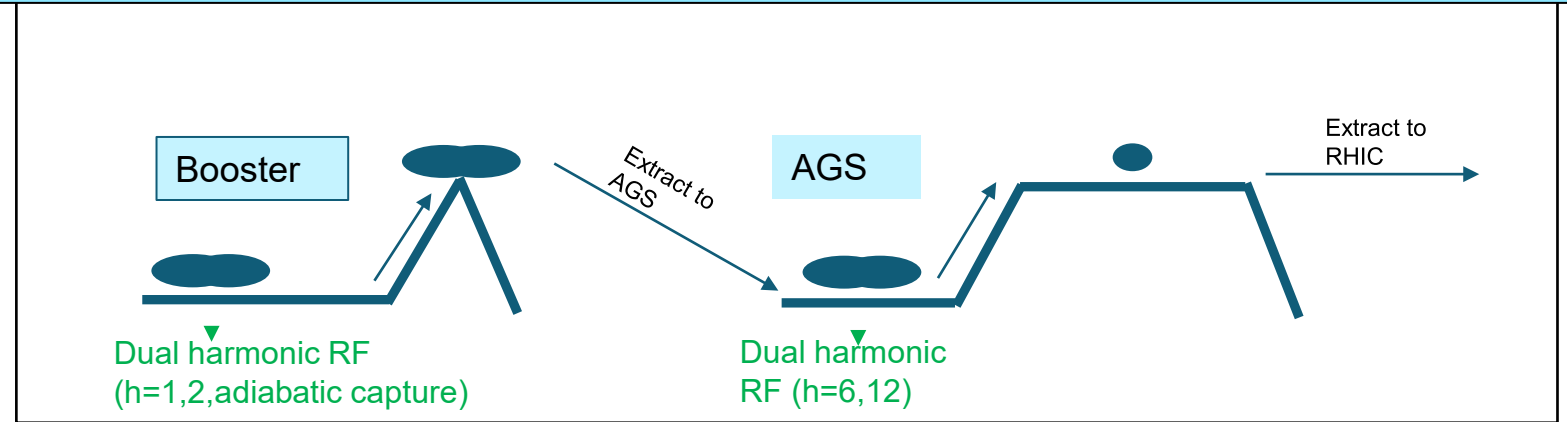
Injector Improvement: Bunch split and merge scheme

Present scheme: Single bunch from source to RHIC, dual harmonic RF at Booster and AGS injection

Present scheme:

A single pulse from the source remains a single bunch from source to collision

Booster and AGS injection both have defocusing RF harmonics

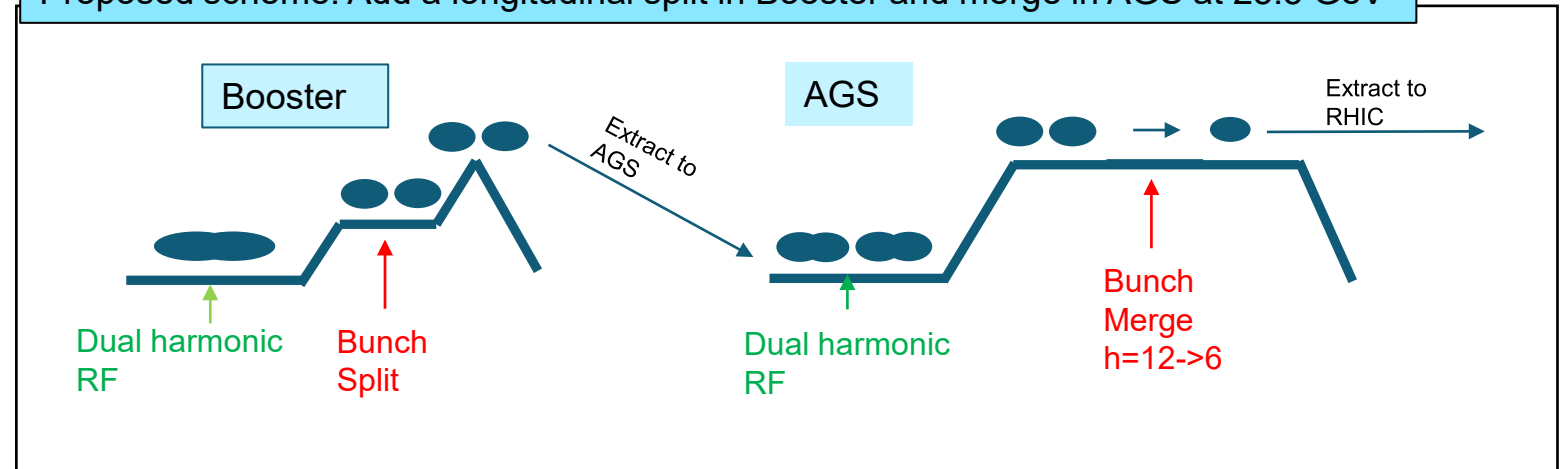


Proposal:

Add a 1->2 bunch split during acceleration in the Booster

Reduces peak current at AGS injection by $\sqrt{2}$ (optimally), merge at flattop

Proposed scheme: Add a longitudinal split in Booster and merge in AGS at 25.5 GeV



Expectation:

- 20% trans. emittance ('split' test in Run 13)
- +12% rel. AGS polarization ('split' test in Run 13)
- +20% long. emittance (merge test in Run 21)*

Does not affect spin pattern

*brief effort, few shifts

Orbit-based resonance correction in RHIC

Lessons from Run 17:

Polarization loss localized at major intrinsics (not obvious from previous full ramp speed measurements)

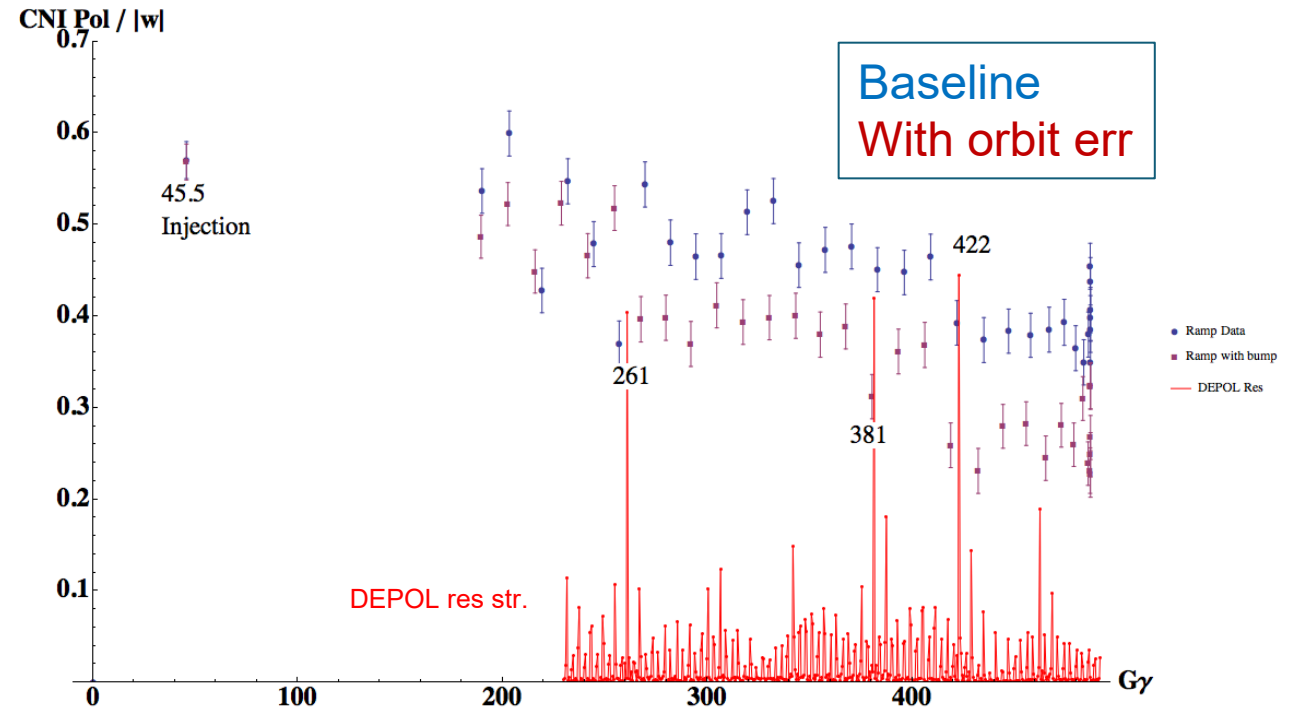
Worse with a strong overlapping imperfection

Proposal

Attempt a scan for each of the 3 resonances

~ 1 shift per resonance to scan in dedicated ramps. (First shift would provide a lot of info)

Goal: Investigate one possible source of the 8-10% relative polarization loss during RHIC acceleration



Plot from V. Ranjbar

Run 17 APEX

- Slow ramp (~45 min!)
- Mid-ramp pC measurements
- with and without applied orbit imperfections

Spin Tilt at 255 GeV

Spin away from vertical by 12-15° at pC location at 255 GeV ($G\gamma = 487$)

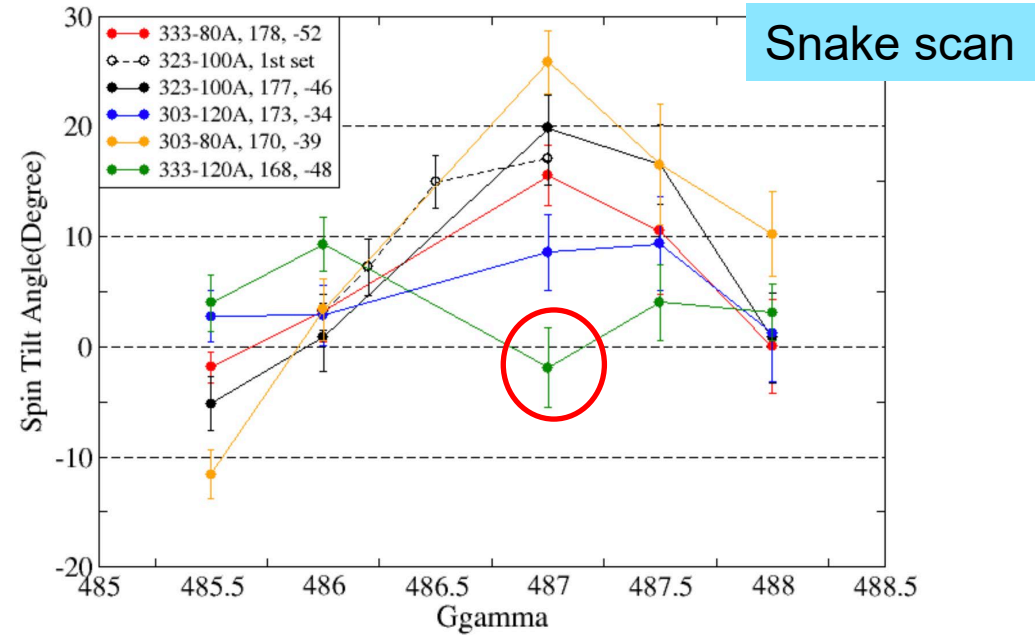
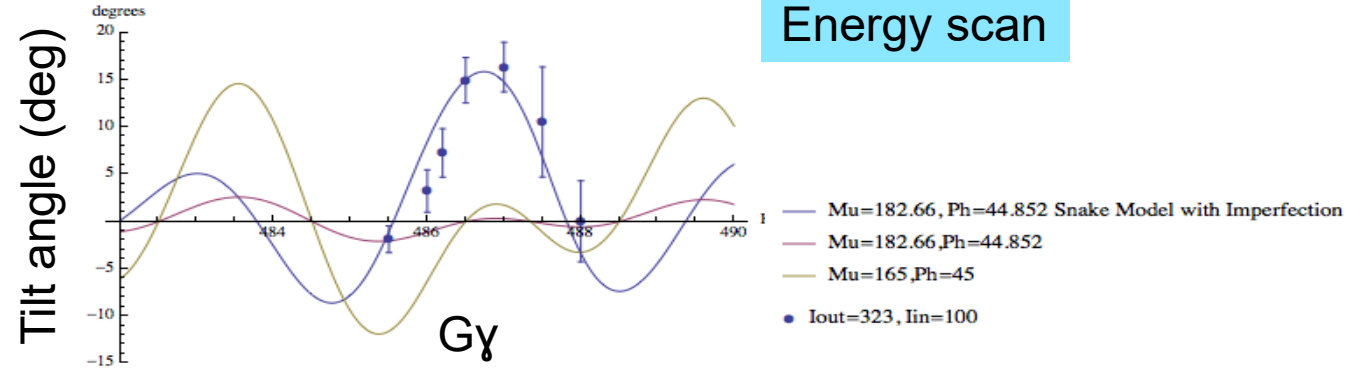
- Run 17 snake and energy scan
 - Snake detuning+large imperfection (0.2) mimics effect

There *are* snake settings that gave zero tilt at 255 GeV (locally)

Proposal

No further experimental proposal at present.

Goal: Determine source of non-vertical stable spin direction



Measurement by Huang, Marusic, Meot, Ranjbar

Scheduling and plans

AGS beam delayed to next week, pending resolution of L18 cable tray failure

Now through ~11/3 : Booster beam startup (all modes as available)
11/3 – 11/15 : AGS polarized beam commissioning
11/15 : RHIC 4K wave start
~11/19,20 : Blue beam in RHIC
11/20,21 : Yellow beam in RHIC
11/21 – 11/25 : Ramp, store, rebucketing setup
11/25,26 : Begin overnight stores

11/1- 11/5: RHIC DRY RUN
11/25 : Thanksgiving Day

Commissioning plan:

- Get to 8 hour \hat{p} physics stores in Run 17 configuration as soon as possible
 - (Re)Commissioning of \hat{p} equipment
- Commission other injector modes for behind stores
 - Mode switching CeC Au \leftrightarrow pp in the injectors is non-trivial (cold snake)
 - Commission and swap to split-merge scheme
 - Setup AGS Au for LEReC and ^3He setup as available and required

