AGS Commissioning Plans for Run03

L. Ahrens, BNL
September 16, 2002

for
RHIC Spin Collaboration Meeting XII
RIKEN BNL Research Center

Transparancies:

1: Schedule

2: Source/Linac

3: Booster

4: AGS

5: Observations Plans

6: Haixin's polarization plot

Schedule:	7 Oct 02	gold beam in Booster (Booster recommish)
	15 Oct 02	gold/ deuterium beam in AGS with Siemens Motor/Generator (how long AGS available – not clear, maybe not long – a week?) BAF (Booster Accelerator Facility) commissioning will compete making AGS beam harder to come by.
	4 Nov 02	Iron in AGS (NASA biology run)
	21Nov 02	Injectors setup for RHIC injection
	1 Dec 02	RHIC Blue cold, deuterium into Blue. fill, fill, fill or fill and ramp, fill and ramp. no resting spaces.(but deuterium always in the AGS, and most of that beam doesn't go into RHIC. Probably could be available as another User – if Operations has any space in their head. Yellow – gold into Yellow. probably no deuterium for a while. Then working on collisions.

comments: Injectors very busy just trying to deliver to RHIC (Au and d) – optimizing injector performance; little time for messing, but deuterium accelerating in AGS some fraction of the time - more if we have trouble d, less if deuterium a piece of cake relative to gold, in which case we will be working on gold behind RHIC.

mid Dec 02	Polarized protons in Linac, into HEBT to the 200 MeV polarimeter.
January 03	RHIC into physics runs (d,Au), injectors "mode switch" to polarized protons during stores. Plan for 3 (is there a constraint?) weeks of running in this pattern. This is the pre-run run.

Issues:

Linac:

200 MeV operation:

access into HEBT competes with Au/d operation (?)

measure 200 MeV polarization with 7Hz source pulse rate vs historic slow (1 Hz) pulsing.

(Anatoli Zelinsky +) Need the fast repetition rate if want to fill AGS with 6 bunches – for the internal polarimeter.

"commission" the 750 KeV chopper with beam from the polarized source. (Zelinski, Alessi, Brennan, Brisco, Zeno)

(issue: longitudinal emittance – last year ran Booster at h=2, two bunches accelerated, equally populated with beam and used only one of these, just to get a smaller beam in longitudinal phase space (.7 eVsec/n). The chopper which 'chops' the beam in time as it enters the Linac was ineffective for beam coming from the polarized source. This was (is) not understood. If the beam can be chopped, we have better control over the longitudinal phase space. Go back to h=1 operation. But also need smaller momentum spread out of Linac. Alessi has a program to attack this – at least gaining better understanding of the situation – diagnostics commissioning etc.

Booster:

Booster is the "easy" measurer of the longitudinal quality of the Linac beam. Can we inject into Booster before January?

Some serious orbit distortions possible due to the BAF construction. Reopens the possibility of losing polarization in Booster. (Equilibrium orbit measuring system being commissioned.)

The test will be polarization at AGS injection (1.5 GeV kinetic or slightly higher). Polarization should equal 200 MeV measurement. Old polarimeter.

Booster tune control, tune measurements all required for BAF commissioning so should already be there. Standard drill to optimize – or show degradation if move (4th 5th orbit harmonics, vertical betatron tune) away from optimal.

AGS:

changes:

1) back to the higher acceleration rate of the Siemens motor-generator set.
2) new magnet hardware for the (ac dipole/tune meter) both vertical and horizontal.
3) CNI Polarimeter

any immediate acceleration strategy changes?

nope. Set up as in last Siemens (higher acceleration rate) run (2000) – well nearly (betatron tune space).

comments:

unpolarized work:

satisfactory calibration of the (magnetic field measuring system / AGS average orbit measurement) last run. This cal should be redone during the RHIC setup period, and we should set the ac dipole intervals with the best confidence yet – not that we won't try to check with timing scans.

Equilibrium orbit correction – nothing new, but simplify if possible.

where should we live in tune space?

Two remotely-switchable frequencies now possible for the vertical ac dipole (~ betatron tune of 8.8) – choice fixes the vertical tune to be just above or just below the tune associated with this frequency, and horizontal tune on the other side. (Limited head room 8.5 – 9 or less)

Where can we go in tune space (without beam loss ... without emittance growth) (skew sextupole resonance line Qy+2Qx=26?) Understanding this is valuable prework for later polarization optimization.

observations and plans:

1) The presence of quality polarization (asymmetry) measurements will make a huge difference.

2) If in addition we can make these measurements while we are ramping (without having to introduce magnet porches) that will make another huge difference. It will remove the gnawing suspicion that something "else" has changes upstream in the acceleration process, and hence that the effect you see isn't really associated with the change you just made.

therefore : once we reestablish polarization in AGS (if not before) give commissioning of the CNI polarimeter highest priority.

Then get into systematic studies to tune polarization.

tune space locations (at each intrinsic resonance) – affects emittances and hence polarization loss at intrinsic resonances

intensity dependence of final polarization
? associated with emittance growth?

Snake strength during acceleration cycle– is there any optimization to be done?

Mei's explorations with quad pulsing and octupole pulsing on the plate – when we have good polarization measurements.

relevant experience from last run?

More convenient/automatic logging (hopefully) to help us keep track of what we have done.