d-Au Run Condensed Chronology

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March 27, 2008

1 Mon 22 Oct

Deuteron setup in Booster and AGS begins.

2 Fri 26 Nov

Cooldown of blue and yellow rings from 100K to 50K begins.

3 Wed 31 Oct

Deuterons transported to W dump.

4 Thur 1 Nov

Cooldown from 100K to 50K complete.

Cooldown (from 50K to 4K) of blue ring begins.

Gold setup in Booster and AGS begins.

5 Sat 3 Nov

Gold ions transported to W dump. Mode switching between deuterons and gold established. Cooldown of yellow ring begins.

6 Sun 4 Nov

Blue ring appears to be cold and the 4K wave is proceeding around the yellow ring.

7 Mon 5 Nov

Blue cooldown complete.

8 Tue 6 Nov

Yellow cooldown complete.

9 Wed 7 Nov

AGS to RHIC synchro setup for both deuterons and gold complete.

10 Thur 8 Nov

Circulating beam (deuterons) established in blue.

11 Sat 10 Nov

Blue beam survived most of a ramp to store.

12 Sun 11 Nov

Circulating beam (gold ions) established in yellow.

13 Tue 13 Nov

Blue ramp efficiency 69%. Ramp dAu82 established with yellow dipole field programmed to have correct values when yellow frequency is locked to

blue. (Without the correct values there were large radial excursions in yellow during the ramp.)

14 Wed 14 Nov

Back to ramp dAu80 but with yellow dipole field corrections. (Slowing down the beta squeeze made dAu82 unacceptable.) Blue ramp efficiency 81%. Yellow ramp efficiency 55%.

15 Thur 15 Nov

AGS develops vacuum leak at L05 around 10 pm.

16 Fri 16 Nov

Blue ramp efficiency 86%. Yellow ramp efficiency 87%. First collisions observed (800 Hz) at Star and Phenix. AGS vacuum leak develops again at L05 around 11 pm.

17 Sat 17 Nov

Successful tune feedback ramp in blue with 90% transmission efficiency.

18 Sun 18 Nov

Successful tune feedback and ramp replay in Blue. Successful 37x37 ramp with 92% and 86% transmission efficiencies in blue and yellow respectively. Initial ZDC rates were 18 kHz.

19 Mon 19 Nov

Experimental magnets brought on.

20 Tue 20 Nov

Work focussed on ramp development with the experimental magnets at full field and collimator setup. Initial rates at Phenix for 37x37 bunches were around 23 kHz. Worked on rebucketing setup.

Ramp 9214 (37 bunches per ring) started at 6:26 am.

1.080×10^{11} deuterons and 0.518×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.7%, Yellow ramp efficiency: 92.5%

21 Wed 21 Nov

Adjusted dAu80 ramp to reduce currents on the q89 shunts. Went to 68x68 bunches.

Ramp 9234 (68 bunches per ring) started at 22:59 pm.

1.153×10^{11} deuterons and 0.735×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 84.5%, Yellow ramp efficiency: 88.0%

22 Thur 22 Nov

Experimenter setup ran for 7.25 hours this shift with a single 68 bunch store (9234).

Ramp 9240 (56 bunches per ring) started at 3:31 pm.

1.157×10^{11} deuterons and 0.793×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 86.1%, Yellow ramp efficiency: 90.0%

Initial ZDC rates at Star and Phenix are 36 and 46 kHz respectively.

Rates scale with number of bunches.

23 Fri 23 Nov

Returned to 56x56 bunches.

Ramp 9247 (56 bunches per ring) started at 1:22 am.

1.058×10^{11} deuterons and 0.890×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 86.6%, Yellow ramp efficiency: 89.1%

Ramp 9252 (56 bunches per ring) started at 22:56 pm.

0.950×10^{11} deuterons and 0.684×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 86.4%, Yellow ramp efficiency: 90.3%

24 Sat 24 Nov

Blue Landau cavities were set up. No bunch dancing observed after that. Went back to 68x68 bunches late in the evening.

Ramp 9259 (56 bunches per ring) started at 23:06 pm.

0.728×10^{11} deuterons and 0.631×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.4%, Yellow ramp efficiency: 92.7%

25 Sun 25 Nov

Machine setup ran for 3.2 hours followed by 8.8 hours of Experimenter setup using a single 68x68 bunch store (9259).

26 Mon 26 Nov

Went back to 37x37 bunches early in the morning. Shortly after 3 pm a 54x54 store (9275) was put up for experimental use. The intensities at RHIC injection were 1.02×10^{11} deuterons and 0.667×10^{9} gold ions per bunch.

Ramp 9272 (37 bunches per ring) started at 2:04 am.

0.690×10^{11} deuterons and 0.588×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.6%, Yellow ramp efficiency: 95.2%

Fill 9272 (Mon morning) had excellent yellow beam decay, with store tunes about (0.2335,0.2218).

Ramp 9275 (54 bunches per ring) started at 3:03 pm.

1.021×10^{11} deuterons and 0.667×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 86.7%, Yellow ramp efficiency: 95.5%

Physics was declared (machines ready to deliver stores for Physics) at 4 pm. Now in a mode where the day shifts are to be used for machine development, and the evening and owl shifts are to be used for physics stores.

27 Tue 27 Nov

First successful back-to-back stores for Physics. Stochastic cooling kickers exercised.

Ramp 9282 (56 bunches per ring) started at 5:32 am.

0.891×10^{11} deuterons and 0.664×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.9%, Yellow ramp efficiency: 96.8%

Ramp 9287 (56 bunches per ring) started at 5:59 pm.

0.880×10^{11} deuterons and 0.892×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.2%, Yellow ramp efficiency: 85.4%

Initial ZDC rates of about 40 kHz at Phenix.

Looking at the BeamDecay.mon plots at injection for fill 9287, it is confirmed that with the new longitudinal alignment of blue and yellow bunches we no longer see blue beam affected by injection of beam into yellow (see Vadim's 19:23 entry in the Tue 27 Nov rhic-dau-2008 elog). This removes the urgency for doing tune measurements along the bunch train at injection (as proposed by Wolfram) to look for effects of electron cloud.

28 Wed 28 Nov

Ramp 9288 (56 bunches per ring) started at 1:02 am.

0.911×10^{11} deuterons and 0.930×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.5%, Yellow ramp efficiency: 93.1%

Prior to rebucketing, ZDC rates peaked around 50 kHz at Phenix.

Ramp 9293 (56 bunches per ring) started at 22:46 pm.

0.857×10^{11} deuterons and 1.076×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.0%, Yellow ramp efficiency: 91.1%

29 Thur 29 Nov

Ramp 9294 (56 bunches per ring) started at 5:44 am.

0.943×10^{11} deuterons and 0.942×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 96.3%, Yellow ramp efficiency: 95.0%

Went to 59x59 bunch ramps for Physics. Work on stochastic cooling is ongoing during stores.

Ramp 9297 (59 bunches per ring) started at 4:55 pm.

0.937×10^{11} deuterons and 0.906×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 90.4%, Yellow ramp efficiency: 93.3%

Stochastic cooling (in yellow) was brought on for part of this store.

For this ramp (as per Wolfram Fischer):

"From the last ramp, here are 3 Blue bunches with long-range beam-beam interactions (buckets 28, 148, and 268) and 3 bunches without long-range beam-beam interactions. The bunches with long-range beam-beam interactions have lower beam lifetime at injection. We need to increase the vertical separation at injection and/or change the tunes. The long-range beam-beam effect is also visible in the 3 selected Yellow bunches (buckets 28, 148, 268)."

Vadim then found that the yellow separation bump at IR6 was absent for this ramp (it had been removed during Todd's work). The bump was restored and it was later found that the bunches with long-range beam-beam interactions (buckets 28, 148, and 268) were no longer affected.

30 Fri 30 Nov

Ramp 9298 (59 bunches per ring) started at 12:27 am.

1.064×10^{11} deuterons and 0.999×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.9%, Yellow ramp efficiency: 92.6%

Longitudinal stochastic cooling fully operational in yellow. This started with ramp 9307.

Ramp 9307 (59 bunches per ring) started at 5:36 pm.

1.071×10^{11} deuterons and 0.986×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.0%, Yellow ramp efficiency: 91.5%

31 Sat 1 Dec

Ramp 9311 (59 bunches per ring) started at 1:25 am.

1.037×10^{11} deuterons and 0.965×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.1%, Yellow ramp efficiency: 92.6%

Ramp 9312 (59 bunches per ring) started at 8:22 am.

0.987×10^{11} deuterons and 1.036×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.0%, Yellow ramp efficiency: 90.5%

Ramp 9313 (59 bunches per ring) started at 8:14 pm.

0.961×10^{11} deuterons and 0.812×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.3%, Yellow ramp efficiency: 95.8%

32 Sun 2 Dec

Ramp 9314 (59 bunches per ring) started at 2:07 am 2 Dec.

0.897×10^{11} deuterons and 0.966×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.2%, Yellow ramp efficiency: 93.6%.

Poor beam lifetime in yellow.

Ramp 9315 (59 bunches per ring) started at 9:15 am.

1.027×10^{11} deuterons and 0.935×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 85.7%, Yellow ramp efficiency: 90.5%.

Ramp 9319 (59 bunches per ring) started at 6:57 pm.

0.997×10^{11} deuterons and 0.938×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 86.7%, Yellow ramp efficiency: 91.7%.

33 Mon 3 Dec

Ramp 9320 (59 bunches per ring) started at 1:33 am.

1.049×10^{11} deuterons and 0.978×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.5%, Yellow ramp efficiency: 90.9%.

Poor beam lifetime in yellow. Blue beam blowing up yellow beam? Try to match beam sizes to reduce beam-beam effect? Increase deuteron beam emittance or decrease gold beam emittance?

Continuous loss of yellow beam points to some continuous noise source?

Lowered the Deuteron intensity by 40% and increased the number of bunches to 78x78. Although this is the first attempt at this approach the results are very promising.

Ramp 9325 (78 bunches per ring) started at 7:00 pm.

0.609×10^{11} deuterons and 0.871×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.3%, Yellow ramp efficiency: 91.0%.

34 Tue 4 Dec

Ramp 9326 (87 bunches per ring) started at 1:36 am.

0.719×10^{11} deuterons and 0.881×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.4%, Yellow ramp efficiency: 93.6%.

Ramp 9327 (87 bunches per ring) started at 3:54 am.

0.609×10^{11} deuterons and 0.768×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.0%, Yellow ramp efficiency: 92.8%.

Ramp 9329 (78 bunches per ring) started at 12:24 pm.

0.581×10^{11} deuterons and 0.739×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.1%, Yellow ramp efficiency: 94.5%.

While setting up for 1.0×10^{9} gold ions per bunch, we find that we can get up to 1.4×10^{9} gold ions in RHIC at injection.

Ramp 9332 (59 bunches per ring) started at 6:31 pm.

0.991×10^{11} deuterons and 0.765×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 87.6%, Yellow ramp efficiency: 95.3%.

35 Thur 6 Dec

Ramp 9351 (78 bunches per ring) started at 5:44 am.

0.647×10^{11} deuterons and 0.986×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.6%, Yellow ramp efficiency: 93.0%.

Ramp 9354 (78 bunches per ring) started at 5:32 pm.

0.605×10^{11} deuterons and 1.02×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.9%, Yellow ramp efficiency: 94.2%.

Ramp 9355 (78 bunches per ring) started at 6:48 pm.

0.608×10^{11} deuterons and 1.02×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.8%, Yellow ramp efficiency: 88.2%.

36 Fri 7 Dec

Ramp 9356 (78 bunches per ring) started at 0:39 am Fri 7 Dec.

0.614×10^{11} deuterons and 0.993×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.6%, Yellow ramp efficiency: 94.1%.

Ramp 9357 (78 bunches per ring) started at 7:31 am.

0.601×10^{11} deuterons and 0.872×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.7%, Yellow ramp efficiency: 93.5%.

As of today the general consensus is that we should direct our efforts toward reducing the beta-star in yellow at IP6 and IP8. The current beta-star at these locations is 1.0 meter according to the model. Steve Tepikian is looking into reducing this to 0.8 or even 0.7 meters in the model. If this is possible, we will try to make it happen in the actual machine during the Wed 12 Dec APEX period.

During the day a vacuum leak developed in the AGS Ring between the J13 and K03 valves. As of the end of the shift, J. Barry and M. Candito are in to start leak checking the area.

Ramp 9358 (78 bunches per ring) started at 4:11 pm.

0.623×10^{11} deuterons and 0.995×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.3%, Yellow ramp efficiency: 89.0%.

37 Sat 8 Dec

While RHIC was at store work inside the AGS ring was done to repair the vacuum leak at the J-17 straight section. The beam pipe has been replaced.

Ramp 9362 (78 bunches per ring) started at 6:02 am Sun 9 Dec.

0.634×10^{11} deuterons and 0.966×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.8%, Yellow ramp efficiency: 87.2%.

38 Sun 9 Dec

Ramp 9363 (78 bunches per ring) started at 8:48 pm.

0.606×10^{11} deuterons and 1.03×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.7%, Yellow ramp efficiency: 87.3%.

Ramp 9364 (78 bunches per ring) started at 3:25 am Mon 10 Dec.

0.624×10^{11} deuterons and 0.999×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.3%, Yellow ramp efficiency: 88.3%.

39 Mon 10 Dec

After several days of trying to determine why the beam lifetime in yellow was poor, it was found (by Vadim) that the blue and yellow vertical tunes had been too close to each other.

Subsequently, we were able to increase deuteron intensity from 0.6×10^{11} to 1.0×10^{11} per bunch and increase the number of bunches from 78 to 87.

Increased deuteron bunch intensity.

Ramp 9365 (78 bunches per ring) started at 12:31 pm.

0.805×10^{11} deuterons and 0.995×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 90.4%, Yellow ramp efficiency: 90.9%.

Increased number of bunches.

Ramp 9366 (87 bunches per ring) started at 7:49 pm.

0.767×10^{11} deuterons and 1.043×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.0%, Yellow ramp efficiency: 85.5%.

40 Tue 11 Dec

Increased deuterons per bunch.

Ramp 9367 (87 bunches per ring) started at 3:25 am.

1.01×10^{11} deuterons and 1.03×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.3%, Yellow ramp efficiency: 88.2%.

With 87 bunches per ring the initial ZDC rates peaked at 90 kHz.

Ramp 9370 (87 bunches per ring) started at 3:55 pm.

1.03×10^{11} deuterons and 0.957×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.1%, Yellow ramp efficiency: 81.9%.

41 Wed 12 Dec

Instructions from Christoph to change yellow gamma-t setting:

For ramp 9371, please increase the yellow gamma-t delay by 1 millisecond: RampEditor – StepstoneEditor – Stepstones (pull-down menu) – gamma-t settings – yellow. I believe it's now set to -17 msec. Please increase by one millisecond, to -18 msec.

Ramp 9371 (87 bunches per ring) started at 12:20 am.

0.975×10^{11} deuterons and 0.988×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.0%, Yellow ramp efficiency: 95.1%.

APEX ran late for a total of 2.95 hours, promptly followed by physics for 4.85 hours. (APEX included work on new ramp dAu81 which has reduced beta-star in yellow. At conclusion of APEX we reverted back to ramp dAu80.)

Ramp 9383 (87 bunches per ring) started at 5:58 pm.

1.002×10^{11} deuterons and 0.990×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.7%, Yellow ramp efficiency: 90.6%.

42 Thur 13 Dec

Ramp 9385 (87 bunches per ring) started at 1:46 am.

1.035×10^{11} deuterons and 1.067×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 90.5%, Yellow ramp efficiency: 90.7%.

The day shift was largely dedicated to developing the low beta* ramp (dAu81). Fifty-six bunches per ring were ramped to top energy and preliminary work towards establishing operational store conditions was accomplished. Collisions were established in both rings and beam lifetime was significantly improved. As of the end of the shift we have reverted to dAu80 and ramped 87x87 bunches to top energy.

Machine development with reduced beta-star lattice in yellow (ramp dAu81). Attempted to do new feedback ramp in yellow using feedforward from yesterday's replay ramp. This failed, so we went back to replay. Then did ramp with 6 bunches per ring which survived to flattop. Vadim did orbit correction, tune adjustment, and coupling correction at store. Todd tried to do local decoupling in IR8. Chromaticity measurement was attempted.

Then did ramp with 56 bunches per ring which survived to flattop and had very good transmission in yellow (95.6%). Horizontal and vertical emittances (normalized) of 19.4 and 20.1 π mm milliradians were measured at store. Yellow lifetime initially was not particularly good (20% per hour decay rate), but this was improved by adjusting tune and chromaticity. Brought beams into collisions at IP6 and IP8 and collimated.

New ramp (dAu81) with reduced beta-star in yellow.

Ramp 9390 (56 bunches per ring) started at 3:12 pm.

0.894×10^{11} deuterons and 0.702×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.1%, Yellow ramp efficiency: 95.6%.

Reverted back to ramp dAu80 to put up Physics production stores.

Wolfram Fischer has done a careful analyis of the tunes in blue for all Physics stores so far this run (see 18:04 entry in the Thu-Dec-13-2007 rhic-dau-2008 elog). He suggests that vertical tune in blue should be raised by 0.005 at store stone. This was attempted for ramp 9392 after beam had been ramped to store. Moving the vertical tune in small steps only made the blue lifetime worse. For the next ramp (9393), the shift of 0.005 was put in the store stone before ramping with beam. This dramatically increased the blue lifetime at store, although yellow lifetime suffered somewhat.

(Back to ramp dAu80).

Ramp 9392 (87 bunches per ring) started at 6:36 pm.

1.107×10^{11} deuterons and 1.140×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.8%, Yellow ramp efficiency: 86.4%.

For this ramp (9392) Wolfram notes that "Blue lifetime at injection is again affected by Yellow beam".

Ramp 9393 (87 bunches per ring) started at 1:53 am Fri 14 Dec.

1.129×10^{11} deuterons and 1.071×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.2%, Yellow ramp efficiency: 91.8%.

43 Fri 14 Dec

Ramp 9398 (87 bunches per ring) started at 6:26 pm.

1.090×10^{11} deuterons and 1.037×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.8%, Yellow ramp efficiency: 90.6%.

Note that after fill 9393, the vertical store stone tune was increased by 0.005. This change was left in. An increase of 0.008 had been suggested by Wolfram.

44 Sat 15 Dec

Moved the Yellow vertical tune up the final .003 that Wolfram has suggested. Beam lifetime took a little hit. We will see how it looks when the next store (9399) starts. Note the even spacing of all four tunes as measured by HFtunes.mon (Blue QH = 0.237; QV = 0.228. Yellow QH = 0.223; QV = 0.233).

Ramp 9399 (87 bunches per ring) started at 1:12 am Sat 15 Dec.

1.112×10^{11} deuterons and 1.141×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.1%, Yellow ramp efficiency: 89.7%.

Phenix ZDC rates = 100 kHz.

Yellow tunes stayed pretty much were we left them at the end of last store (9398). Yellow lifetime did not improve, but it did not get any worse from the large vertical tune change.

As per Wolfram:

The last 4 high-intensity ramps (9396, 9297, 9398, 9399) all had a horizontal instability in Blue near transition. The instability set in at 210ms/220ms/188ms/122ms after the gamma-t event, with bunch intensities of 0.99/1.04/0.97/0.97e11 at these times.

There is no large emittance increase visible in the IPM with the Blue instability at transition. At this point we should probably do nothing.

In the current store (9399), the emittances measured by the IPM are 15mm.mrad in Yellow and 10mm.mrad in Blue, giving an average of 12.5mm.mrad. The emittances calculated from the PHENIX ZDC rates and beam intensities are 20mm.mrad (from STAR 30mm.mrad). If the n-pair production cross section for PHENIX were 0.39b (like in Run-3), not 0.52b, the emittances would agree. For STAR we would need about 0.3b. The ratio between the PHENIX and STAR ZDC rates is not constant throughout a store (for all three cases: uncorrected ZDC, corrected for all singles, and corrected for collision singles only). It would be good to have the latest vernier scans analyzed to confirm (or change) the cross sections for the ZDC rates. We could be underreporting the luminosity by as much as 30%.

Ramp 9400 (93 bunches per ring) started at 8:08 am.

1.100×10^{11} deuterons and 1.128×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 90.5%, Yellow ramp efficiency: 89.4%.

Beam Abort, 8b-ps1 dropped Loss Monitor 1. Losses due to both yellow and blue collimation. Also poor rebucketing.

Ramp 9401 (93 bunches per ring) started at 9:12 am.

1.182×10^{11} deuterons and 0.979×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 84.2%, Yellow ramp efficiency: 90.8%.

Appoximately 10% loss in blue around transition.

Beam Abort, 8b-ps1 dropped Loss Monitor 1. Losses due to collimation again?

Ramp 9402 (93 bunches per ring) started at 10:06 am.

1.188×10^{11} deuterons and 1.098×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 83.3%, Yellow ramp efficiency: 88.5%.

Again appoximately 10% loss in blue around transition.

Wolfram notes: "Again a coherence signal in Blue horizontal at transition,

and again no emittance growth seen by the IPM."

Vadim comments: "We might have reached those current levels when the survival of bunches on the ramp and at the store depends on the its position in the train. It seems that Blue transition instability affected mostly second part of the bunch train. Blue IPM, probably, looks only at the first part of the train and does not show the emittance blowup. Having many bunches blown up may make difficult Blue collimation too."

Calculation of the optimum store length (as per Wolfram). "Input parameters were determined from last and this week's physics stores (up to Friday morning). Luminosity was fitted as usual to a double exponential decay (a 3-parameter fit). Input parameters then are: fraction of fast luminosity decay 23%, time constant of fast luminosity decay 0.58h, time constant of slow luminosity decay 6.51h, average store-to-store time (cut at 12h) 2.5h. Assuming about half an hour from lumi-on until detectors fully operate, the optimum store length is 5.5h, fairly close to the current 6h."

A vacuum leak in the AGS occurred in another straight section of beam pipe. This time the location of the leak was at I17, fortunately this leak was able to be sealed with Glyptal vacuum sealant. At the time of the vacuum failure we were tuning Gold beam with AGS early turn off turned on. We had been tuning in this mode for about 10 minutes before the vacuum blew.

Ramp 9404 (87 bunches per ring) started at 6:16 pm.

1.125×10^{11} deuterons and 1.067×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.6%, Yellow ramp efficiency: 90.2%.

As per Wolfram: Although nice initial rates, we have again a Blue horizontal instability just after transition. As Vadim pointed out, this will affect only bunches at the end of the train. To counteract the Blue horizontal instability at transition we could either increase the Blue horizontal chromaticity at gammat3 from 6.7 to 7.7, or increase the Blue octupole trim strength in both gammat1 and gammat6 from -1 to -2. Without these instabilities, rates should be even higher. I would go with the octupoles.

45 Sun 16 Dec

Ramp 9407 (87 bunches per ring) started at 5:59 am Sun 16 Dec.

1.123×10^{11} deuterons and 1.104×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.9%, Yellow ramp efficiency: 90.2%.

Wolfram's comments on ramp 9407:

1. The Blue bunch pattern shows systematic variation along the train, the instability may have only affected the emittance. We could further increase the Blue octupole strength at transition (there are no beam losses after transition). To make a smaller change we can go from a trim strength of -2 to -3 in gammat6 only. We only need more stability 200ms after the gammat event.

2. Yellow has 2 problems. The first 6 bunches have less intensity than the average, probably caused by the gap cleaner. Please contact Angelika or Rob for changes in the gap cleaner. The second problem is beam-beam effect. Bunches in buckets 214 to 235 have better lifetime because they experience only 1 collision. The Yellow beam loss rate 2.5h into the store is 10%/h, twice as large as we had in good stores. Previously this could be remedied with tune changes.

3. This is the last tune measurement in Yellow (.224,.234), fairly close to what should be a good tune (.225.235). May be we raise both tunes by 0.001 for the next ramp.

As per Wolfram: "I suggest two changes for the next ramp:

1. the Blue octupole trim strength in gammat6 from -2 to -3;

2. both Yellow tunes in the store stone by $+0.001$, to set points of (31.2513, 32.3621).

Changes implemented by Selam."

Ramp 9408 (87 bunches per ring) started at 1:09 pm.

1.185×10^{11} deuterons and 1.006×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.2%, Yellow ramp efficiency: 92.0%.

Wolfram comments: No sign of Blue instability on this ramp. We would be ready for more beam. Rebucketing not as good as it used to be.

Ramp 9409 (87 bunches per ring) started at 2:41 pm.

1.222×10^{11} deuterons and 1.121×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 90.2%, Yellow ramp efficiency: 82.8%.

As per Wolfram: "With the Blue instability out of the way, we could try a few more bunches for the next store (93x93)."

Ramp 9410 (93 bunches per ring) started at 10:18 pm.

1.202×10^{11} deuterons and 1.010×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.3%, Yellow ramp efficiency: 93.2%.

Here we see losses in blue at transition; our instability has returned. Also poor rebucketing in blue. Wolfram suggests either increasing blue octupole strength in gammat6 further from -3 to -4, or going back to 87 bunches per ring.

Raising the Blue vertical tune at store by 0.003 improved lifetime in blue and yellow. It also helped backgrounds.

46 Mon 17 Dec

Ramp 9412 (87 bunches per ring) started at 4:59 am.

1.157×10^{11} deuterons and 0.933×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.7%, Yellow ramp efficiency: 90.2%.

Physics ran for about four hours in one store on. The early part of the shift was used to do beam scrubbing of the RHIC vacuum while sitting at injection.

Ramp 9414 (87 bunches per ring) started at 3:32 pm.

1.095×10^{11} deuterons and 1.017×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.1%, Yellow ramp efficiency: 93.8%.

Ramp 9416 (87 bunches per ring) started at 10:58 pm.

1.079×10^{11} deuterons and 1.021×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.7%, Yellow ramp efficiency: 90.6%.

47 Tue 18 Dec

Ramp 9417 (87 bunches per ring) started at 5:49 am.

1.152×10^{11} deuterons and 1.112×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 84.8%, Yellow ramp efficiency: 81.3%.

Switched to Ramp dAu81 with reduced beta-star in yellow.

Ramp 9421 dAu81 (87 bunches per ring) started at 2:27 pm.

1.161×10^{11} deuterons and 0.998×10^{9} gold ions per bunch at injection.

The beam was aborted by a loss monitor permit pull just after the beams were cogged.

Back to ramp dAu80 until APEX begins this evening.

Ramp 9427 dAu80 (87 bunches per ring) started at 7:09 pm.

1.170×10^{11} deuterons and 1.073×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 87.1%, Yellow ramp efficiency: 88.4%.

Ramp 9428 dAu81 (87 bunches per ring) started at 10:12 pm.

1.051×10^{11} deuterons and 0.905×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 85.7%, Yellow ramp efficiency: 93.0%.

For this ramp, the blue fill pattern was shifted by a bucket by mistake. As a result there were only 40 colliding bunches at PHENIX (instead of 87).

Ramp 9429 dAu81 (87 bunches per ring) started at 11:34 pm.

1.016×10^{11} deuterons and 0.964×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 87.8%, Yellow ramp efficiency: 91.1%.

48 Wed 19 Dec

Ramp 9430 dAu81 (87 bunches per ring) started at 3:17 am.

1.055×10^{11} deuterons and 0.964×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.3%, Yellow ramp efficiency: 92.3%.

As per Fulvia: This physics ramp with dAu81 yielded initial rates of approximately 85 kHz (extrapolating Phenix after optimization) with an average bunch intensity at store of approximately 0.85. Cogging, rebucketing, steering and collimation all worked. So this ramp can be used for physics if we decide to do that.

Ramp 9439 dAu81 (87 bunches per ring) started at 10:30 pm.

1.129×10^{11} deuterons and 1.093×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 83.5%, Yellow ramp efficiency: 92.3%.

49 Thur 20 Dec

Ramp 9440 dAu81 (87 bunches per ring) started at 6:05 pm.

1.107×10^{11} deuterons and 1.066×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 85.6%, Yellow ramp efficiency: 90.5%.

Physics ran in RHIC a very small amount of time this shift. Over the course of 5 attempted stores there was a maximum of 30 minutes of Physics. The last two ramp failures had identical signatures, with beam losses rising over the last 2 seconds before the blue link quenches. Many experts are currently investigating the possible cause of this beam loss.

Ramp 9449 dAu81 (87 bunches per ring) started at 7:55 pm.

1.046×10^{11} deuterons and 1.074×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 84.3%, Yellow ramp efficiency: 92.1%.

This store (9449) was brought down by a blue abort kicker blown fuse.

Ramp 9450 dAu81 (87 bunches per ring) started at 2:47 am Fri 21 Dec.

1.106×10^{11} deuterons and 1.080×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 83.9%, Yellow ramp efficiency: 92.6%.

This store (9450) was brought down by a PASS failure.

Ramp 9451 dAu81 (87 bunches per ring) started at 6:10 am Fri 21 Dec.

1.232×10^{11} deuterons and 1.016×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 82.3%, Yellow ramp efficiency: 94.0%.

50 Fri 21 Dec

Emittance blow-up in blue is huge for stores 9449 and 9451.

Roser: "What is blowing up the blue horizontal emittance? Whatever it is it stopped for a while between 7:40 and 9:20. Clearly BBQ is first in line as a possible culprit."

Al Dellapenna: "Thomas, although it does make sense that the BBQ will and could do this emittance growth, the amps were indeed OFF during that time frame....they have been off since 5:30pm yesterday."

Ramp 9452 dAu81 (87 bunches per ring) started at 5:02 pm.

1.341×10^{11} deuterons and 1.089×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.8%, Yellow ramp efficiency: 95.7%.

Good store. The blue emittance growth seen in stores 9449 and 9451 is not present in this store.

51 Sat 22 Dec

Ramp 9453 dAu81 (87 bunches per ring) started at 12:10 am Sat 22 Dec.

1.250×10^{11} deuterons and 1.064×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.3%, Yellow ramp efficiency: 92.0%.

The blue emittance growth seen in stores 9449 and 9451 is not present in stores 9452 and 9453. Yellow lifetime is poor for store 9453.

Ramp 9454 dAu81 (87 bunches per ring) started at 7:15 am.

1.182×10^{11} deuterons and 1.051×10^{9} gold ions per bunch at injection.

Yellow lifetime is poor for store 9454.

Blue ramp efficiency: 86.6%, Yellow ramp efficiency: 92.4%.

Ramp 9455 dAu81 (87 bunches per ring) started at 2:41 pm.

1.197×10^{11} deuterons and 1.068×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 82.2%, Yellow ramp efficiency: 94.7%.

Good store. Yellow lifetime for 9455 improved by lowering vertical chromaticity at store by one unit. This store ended in a yellow magnet quench "possibly due to efforts to restore voltage on the yellow abort kickers".

52 Sun 23 Dec

Ramp 9457 dAu81 (87 bunches per ring) started at 1:32 am Sun 23 Dec.

1.205×10^{11} deuterons and 1.055×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 85.4%, Yellow ramp efficiency: 93.8%.

Store 9457 was brought early Sunday morning down by a yellow QLI caused by the y-qmain supply.

Ramp 9459 dAu81 (87 bunches per ring) started at 7:33 am.

1.125×10^{11} deuterons and 1.099×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.9%, Yellow ramp efficiency: 93.3%.

Store 9459: vertical dipole corrector problem?

Ramp 9460 dAu81 (87 bunches per ring) started at 5:33 pm.

1.261×10^{11} deuterons and 1.097×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 86.1%, Yellow ramp efficiency: 92.1%.

Yellow sextupole trip (Sunday evening) during store 9460.

Ramp 9461 dAu81 (87 bunches per ring) started at 9:13 pm.

1.194×10^{11} deuterons and 1.045×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.0%, Yellow ramp efficiency: 87.7%.

Store 9461 aborted when BA1 tripped (early monday morning).

53 Mon 24 Dec

Ramp 9464 dAu81 (87 bunches per ring) started at 10:23 am.

1.233×10^{11} deuterons and 0.993×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.2%, Yellow ramp efficiency: 93.5%.

At store as per Wolfram Fischer: "Raised Yellow hor by 0.0015, lowered Yellow ver by 0.0005, resulting in small improvements in the Yellow beam lifetime. Changes in chromaticity tried but did not yield any improvement. Yellow decay rate settled at 6%/h".

Wolfram: "A proposal for the next ramp (9465) to explore the losses before transition (triggered by this morning's discussion on octupoles, initiated by Dejan). Blue gammat is 77.3 sec after accramp, the octupoles start ramping up at accramp. This morning we saw an improvement in the Blue beam lifetime by reducing the octupole strength. It would be sufficient to start ramping at t40 (then there are still more than 30 sec to gammat). For this we need to put +3 into the Blue t40 NONLINEAR trim pebble (currently -1.2251 from interpolation) to zero out the -3 design strength. A smaller change can be considered."

Ramp 9465 dAu81 (87 bunches per ring) started at 4:52 pm.

1.104×10^{11} deuterons and 0.931×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 90.1%, Yellow ramp efficiency: 91.1%.

Wolfram: "I'd say that (ramp 9465) looks better than before, the Blue

losses set in later than in the previous ramps. Still some further optimization possible."

"For the next ramp (9466) we could make further changes in the Blue octupole strength: in gammat1 change all trim settings from -2 to $+1$, in beta5 change all settings to -2 (explicitly, the current value is interpolated)."

"For the next ramp (9466) in Yellow we could change the trim octupole settings in t40 to $+3$ (currently interpolated, the same as we have done in Blue on this ramp)."

Ramp 9466 dAu81 (87 bunches per ring) started at 11:45 pm.

1.184×10^{11} deuterons and 1.042×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.7%, Yellow ramp efficiency: 93.7%.

54 Tue 25 Dec

Ramp 9467 dAu81 (87 bunches per ring) started at 6:37 am.

1.216×10^{11} deuterons and 0.972×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 90.8%, Yellow ramp efficiency: 95.8%.

Wolfram: "Another proposal for the Blue octupole settings, to restrict their effect to the time around transition, when we really need them to suppress instabilities. Above are the current settings ("old") and the proposed settings ("new"). The blue vertical line at 77.3 s marks the transition crossing. At this point the design values in the RampEditor become a burden, but it would not be a good idea to change this today. To create the new settings we have to put into the Blue octupole trim strengths:"

injection: $+0$

gammat1: $+5$

gammat2: -3

gammat3: -3

still5: $+5$

gammat6: $+5$

t140: $+0$

All other trim settings should be interpolated.

Ramp 9468 dAu81 (87 bunches per ring) started at 1:58 pm.

1.097×10^{11} deuterons and 1.017×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.8%, Yellow ramp efficiency: 91.9%.

Wolfram: "For the next ramp (9469) we could reduce the Blue trim octupole strength in gammat2 and gammat3 from -3 to -2. This will give the same total octupole strength at transition as we had yesterday (since we changed the wave form today), and should further increase the Blue ramp transmission."

"We can implement the same octupole waveform for the Yellow ramp that we have in Blue (shifted in time since the gammat-jump is 7.7 sec later). We are currently loosing about 8% of the Yellow intensity from accramp to transition. This should be less with the new octupole strengths. To make the new waveform shown above, we need to put in the following Yellow octupole trim strengths:"

injection: $+0$

gammat1: $+5$

beta5: $+5$

gammat4: -1

gammat5: -1

gammat6: $+5$

t140: $+0$

All other trim settings should be interpolated.

Ramp 9469 dAu81 (87 bunches per ring) started at 7:48 pm.

1.102×10^{11} deuterons and 1.048×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.6%, Yellow ramp efficiency: 97.6%.

55 Wed 26 Dec

Ramp 9472 dAu81 (87 bunches per ring) started at 4:07 am.

1.083×10^{11} deuterons and 0.946×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.7%, Yellow ramp efficiency: 96.4%.

Switched to Ramp dAu82 which has reduced beta-star in both yellow and blue.

Ramp 9479 dAu82 (87 bunches per ring) started at 2:39 pm.

1.193×10^{11} deuterons and 1.027×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 87.1%, Yellow ramp efficiency: 94.5%.

Ramp 9481 dAu82 (87 bunches per ring) started at 9:57 pm.

1.200×10^{11} deuterons and 1.107×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.1%, Yellow ramp efficiency: 95.3%.

56 Thur 27 Dec

Ramp 9482 dAu82 (87 bunches per ring) started at 3:02 am.

1.238×10^{11} deuterons and 1.080×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.1%, Yellow ramp efficiency: 95.4%.

Ramp 9483 dAu82 (87 bunches per ring) started at 10:01 am.

1.222×10^{11} deuterons and 1.078×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 86.8%, Yellow ramp efficiency: 96.1%.

Ramp 9484 dAu82 (87 bunches per ring) started at 6:29 pm.

1.116×10^{11} deuterons and 1.112×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 86.4%, Yellow ramp efficiency: 96.6%.

57 Fri 28 Dec

Ramp 9485 dAu82 (87 bunches per ring) started at 1:23 am Fri 28 Dec.

1.217×10^{11} deuterons and 1.215×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.0%, Yellow ramp efficiency: 93.4%.

Travis comments: "Just a note, the Fill intensity reported for blue is taken immediately after filling. We do not ramp with the reported blue intensity – this store (9485) we had quite a bit more yellow beam than blue. Also, the machine seems to be able to take 1.2/bunch Au okay – a little more transition loss than usual but otherwise it's fine."

Ramp 9486 dAu82 (87 bunches per ring) started at 8:14 am.

1.103×10^{11} deuterons and 1.125×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.6%, Yellow ramp efficiency: 96.4%.

Star magnet went off and yellow beam lifetime deteriorated (slowly) until loss monitor pulled the permit at 8:33 am.

Ramp 9487 dAu82 (87 bunches per ring) started at 9:38 am.

1.228×10^{11} deuterons and 1.024×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 86.9%, Yellow ramp efficiency: 96.5%.

BTF 9487 (9:48 am):

$Q_H = 0.2320$, $Q_V = 0.2248$ in blue;

$Q_H = 0.2231$, $Q_V = 0.2317$ in yellow.

BTF 9487 (1:58 pm):

$Q_H = 0.2337$, $Q_V = 0.2255$ in blue;

$Q_H = 0.2235$, $Q_V = 0.2350$ in yellow.

Elog (rhic-dau-2008) entries from Todd, Wolfram, and Brian van Kuik:

1:46 pm: Orbit statistics during this store (9487) for blue/yellow horizontal/vertical RMS. The red trace clearly shows the yellow vertical orbit corrections, and the green trace clearly shows vertical RMS orbit growth in blue with no correction. This indicates that we should routinely correct vertical orbits in both rings; this should have a net positive effect, as shown above already. We'll work to make this happen for the next store.

4:08 pm: I've added a "Start routine orbit correction for store" entry to the tape Up sequence. This will run an automatic vertical orbit correction in both rings at store every 60 minutes, similar to the automatic BTFs. To turn this off during a store, set the StoreOrbCorr parameter in pet RHIC/Magnets/Ramp to Off in EITHER ring. If this parameter is off in EITHER ring, no orbit corrections will run even if the tape step is executed. We'll see how this goes during the next store, and pull the plug if it looks like a problem.

For the next ramp (9490) Christoph Montag lowered blue horizontal tunes around transition by 0.003 in beta5 and 0.005 in gammat2 and gammat3 to get away from the 1/4 resonance. To avoid potential coupling problems he also lowered the vertical tunes in those stones by 0.003.

Ramp 9490 dAu82 (87 bunches per ring) started at 6:39 pm.

1.085×10^{11} deuterons and 1.053×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 82.6%, Yellow ramp efficiency: 95.4%.

As per Christoph (8:37 pm): "The blue transition loss got worse. Please revert my tune changes as of 9:50 this morning. The better way to fight this beam loss seems to be reducing the horizontal chromaticity before transition. Please add one unit in stones beta5 and gammat2."

BTF 9490 (7:50 pm):

$Q_H = 0.2318$, $Q_V = 0.2218$ in blue;

$Q_H = 0.2340$, $Q_V = 0.2327$ in yellow.

Lifetime in blue is poor; decay rate is 20% to 25% per hour.

Notes to operations: Vertical orbit corrections at store now happen automatically in both rings every thirty minutes (using the "best corrector" algorithm). The corrections are run by a script which is launched by the last step in the Up sequence, "Start routine orbti correction for store". The corrections can be stopped by changing the "StoreOrbCorr" parameter on the pet page RHIC/Magnets/Ramp to Off. Setting the parameter Off in either ring will stop the corrections from happening in both rings, even if the step in tape was run during the Up sequence.

Roser (10:46 pm) "The blue emittance is growing again and the blue vertical LF Schottky tune signal has low noise again as it did on December 21 (see entry on 12/21 13:34). We suspected a noise source on the blue vertical at the time but the effect went away after that store until now. Note that Pete made entry to IR2 before this store to connect the Blue LF Schottky to direct cables out of the tunnel."

Ramp 9491 dAu82 (87 bunches per ring) started at 11:17 pm.

1.223×10^{11} deuterons and 1.109×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 85.7%, Yellow ramp efficiency: 96.0%.

58 Sat 29 Dec

Ramp 9492 dAu82 (87 bunches per ring) started at 6:48 am.

1.224×10^{11} deuterons and 1.107×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 86.9%, Yellow ramp efficiency: 95.7%.

7:28 am. Thomas: "Whatever blows up the blue emittance stopped first at

3:00 am, came back and then stopped again at 3:20 am. Correlation of emittance growth with good vertical blue LF Schottky tune measurements holds."

For the next fill (9493) Christoph requests: "Please add another unit to blue horizontal chromaticity in stones beta5 and gammat2."

9:17 am. Thomas: "This is the same plot as I put in above but for the last four stores. It shows that the noise source started briefly Friday morning and then stayed on through the evening into the early morning and then again briefly at the beginning of this store. I checked all the stores since last Friday and there was no other sign of this noise since it stopped during the day of Dec. 21 until yesterday. Any ideas of what this could be?"

Ramp 9493 dAu82 (87 bunches per ring) started at 1:39 pm.

1.216×10^{11} deuterons and 1.093×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.5%, Yellow ramp efficiency: 95.3%.

Christoph: "Blue ramp efficiency has again improved a little. Please raise horizontal chromaticity around transition some more, +1 unit in stones beta5, gammat2 and gammat3."

Yellow lifetime is poor (10% to 20% decay rate).

Ramp 9494 dAu82 (87 bunches per ring) started at 9:11 pm.

1.211×10^{11} deuterons and 1.042×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 87.8%, Yellow ramp efficiency: 94.0%.

Christoph: "Please raise blue horizontal chromaticities in stones beta5, gammat2, and gammat3 by +1 unit."

Vincent: "Dropped both blue tunes by 0.002 to get pretty nice improvement (in lifetime). Not much luck in yellow, although small chrom increases seemed to help."

Thomas: "The bottom plot actually shows that the LF Schottky tune measurements are good and therefore the noise source seems to be present. This can also seen from the spectrum a fw entries lower. The emittance growth and beam decay are similar to store 9492. However, beam decay was stopped with tune change this time."

Thomas: "First plot is the blue beam decay and the quad current. Second plot is the betatron sideband of the blue vertical LF Schottky. Clearly a very small (.001) vertical blue tune change stopped the blue beam decay, followed by the disappearance of the Schottky betatron sidebands. This

could be explained if the noise source is ripple of a vertical dipole (corrector or injection kicker)."

Wolfram: "Around 23:10 the emittance growth accelerated again. Around 0:10 we first decreased the Blue vertical tune by 0.001 (small increase in loss rate), then increased the vertical tune by finally 0.0015 (from the original value), bringing the down the loss rate (the emittance growth also seem to level off, see below). Also tried a horizontal tune change of -0.001 but this did not change the trend in the loss rate already established. Since a small tune change can suppress the emittance growth, the excitation could be on all the time but is narrow band near the betatron tune."

59 Sun 30 Dec

Ramp 9495 dAu82 (87 bunches per ring) started at 4:24 am.

1.270×10^{11} deuterons and 1.081×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 88.1%, Yellow ramp efficiency: 94.1%.

Thomas: "Plots of beam decay, IPM and LF Schottky for last two stores. Correlation is pretty good except for early in store 9494, when a small tune change stopped the decay and then later during that store when tune changes were approximately related to stopping it. No activates are associated with turn-on of noise at 23:15 and with turn-off at 05:04."

Thomas:

"Just for reference these plots show the Lf Schottky, IPM and PHENIX ZDC. The problem of emittance growth has been with us on and off since Dec. 19 and possibly before. Often it happens at the beginning of the store and it is likely the main reason that blue emittance is larger than the 10 pi we have at injection. I don't think it is beam-beam since it turns off and sometimes turns on quite rapidly in the middle of a store and also, after it turned off, the larger blue beam emittance is then perfectly stable."

"Often the emittance growth happens at the beginning of the store and then rapidly turns off. This is reminiscent of the electron cloud problem we had in PHOBOS. I looked for correlations with vacuum excursions but could not find any. The biggest vacuum excursion is at 12 o'clock near Q3 but not correlated with emittance growth. There is some coincidence in that our problems started on Friday after there was an access for the polarimeter..."

"I also looked in the logs for any vertical corrector that is unstable. None show noise that is correlated with the emittance growth. I did find a noisy corrector PS (bi4-tv14) but the noise is not correlated."

Ramp 9496 dAu82 (87 bunches per ring) started at 1:08 pm.

1.156×10^{11} deuterons and 1.058×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.9%, Yellow ramp efficiency: 95.3%.

Jim Jamilkowski: "The initial Blue beam decay was around 180%, though it fairly quickly dropped to below 10% with no net tuning. Yellow beam decay on the other hand has slowly risen to around 14% even after attempting to tune."

Ramp 9497 dAu82 (87 bunches per ring) started at 10:13 pm.

1.174×10^{11} deuterons and 1.087×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.2%, Yellow ramp efficiency: 95.4%.

60 Mon 31 Dec

Ramp 9498 dAu82 (87 bunches per ring) started at 4:51 am Mon 31 Dec.

1.208×10^{11} deuterons and 1.085×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 89.1%, Yellow ramp efficiency: 95.6%.

Prior to Ramp 9499, Christoph Montag adjusted horizontal tune and chromaticities at gammat2 stone in blue. This improved ramp efficiency in blue. Yellow ramp efficiency also improved.

Ramp 9499 dAu82 (87 bunches per ring) started at 2:11 pm.

1.151×10^{11} deuterons and 1.097×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.2%, Yellow ramp efficiency: 96.0%.

Ramp 9500 dAu82 (87 bunches per ring) started at 9:10 pm.

1.197×10^{11} deuterons and 1.099×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.3%, Yellow ramp efficiency: 96.9%.

61 Tue 1 Jan

Ramp 9502 dAu82 (87 bunches per ring) started at 5:45 am.

1.236×10^{11} deuterons and 1.088×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.8%, Yellow ramp efficiency: 98.2%.

Ramp 9503 dAu82 (87 bunches per ring) started at 12:50 pm.

1.168×10^{11} deuterons and 1.175×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.3%, Yellow ramp efficiency: 97.4%.

Ramp 9504 dAu82 (87 bunches per ring) started at 5:19 pm.

1.212×10^{11} deuterons and 1.099×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.0%, Yellow ramp efficiency: 97.1%.

This store was dumped at 8:11 pm for the start of APEX.

62 Wed 2 Jan

During maintenance the polarity of Phenix magnets was reversed.

63 Thur 3 Jan

Ramp 9515 dAu82 (87 bunches per ring) started at 12:21 am.

1.200×10^{11} deuterons and 0.924×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.2%, Yellow ramp efficiency: 96.9%.

For this ramp yellow injection caused significant beam loss in blue.

Ramp 9516 dAu82 (87 bunches per ring) started at 8:48 am.

1.152×10^{11} deuterons and 0.869×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.9%, Yellow ramp efficiency: 97.1%.

For this ramp yellow injection again caused significant beam loss in blue.

Vadim found that the vertical separation bump in IR2 was screwed up. This is why yellow injection was causing beam loss in blue.

As per Vadim:

"In IR2 we do not have the vertical orbit data from 1 o'clock triplet, but the orbit corrector strengths at that location was very different from the fills before yesterday (those strengths were changed during SVD orbit correction yesterday). I have restored approximately the corector strengths in IR2 region to the previous settings, using local bumps. Also, I unloaded

the horizontal correctors around yi3-q13 location."

This fixed the problem of yellow injection causing beam loss in blue.

Ramp 9517 dAu82 (87 bunches per ring) started at 11:47 am.

1.179×10^{11} deuterons and 1.181×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.0%, Yellow ramp efficiency: 93.7%.

Blue rebucketing looks poor for this ramp.

Also, Vadium notes that:

"Yellow mean radial orbit was considerably affected by PHENIX magnet polarity change. Yellow bend trim at the transition can be readjusted by 1e-6 to 2e-6 to correct for this, if needed."

After Store 9517 is dumped (scheduled dump time is 6 pm), Mike Brennan and John Butler would like to setup up blue Landau cavity so that the damper is NOT inserted prior to rebucketing. If this helps blue rebucketing we will stay with this change; otherwise we will revert to the original setup.

Note (from Kip): John Butler setup up blue Landau cavity so that the damper is NOT inserted prior to rebucketing.

64 Fri 4 Jan

Ramp 9522 dAu82 (87 bunches per ring) started at 2:28 am Fri 4 Jan.

1.114×10^{11} deuterons and 1.101×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.5%, Yellow ramp efficiency: 93.1%.

Vadium (10:04 am): "Bend trim was increased by 1e-06 in gammat4, gammat5 stones. Yellow tunes in those two stones were adjusted to compensate for small tune change due to bend trim adjustment and to get the tunes to those on ramp 9504 with 97% ramp transmission."

Ramp 9523 dAu82 (87 bunches per ring) started at 12:54 pm.

1.102×10^{11} deuterons and 1.248×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.5%, Yellow ramp efficiency: 93.3%.

Ramp 9524 dAu82 (87 bunches per ring) started at 9:20 pm.

1.249×10^{11} deuterons and 1.232×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.1%, Yellow ramp efficiency: 93.2%.

Permit pulled by loss monitors as the blue collimators went into position.

Ramp 9525 dAu82 (93 bunches per ring) started at 9:55 pm.

1.244×10^{11} deuterons and 1.183×10^{9} gold ions per bunch at injection.

Lost when an RF glitch caused total debunching of the blue beam at flattop.

65 Sat 5 Jan

Ramp 9527 dAu82 (93 bunches per ring) started at 12:16 am Sat 5 Jan.

1.245×10^{11} deuterons and 1.179×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.0%, Yellow ramp efficiency: 93.7%.

2:05 am Sat 5 Jan. As per Travis: "Beam decay drop at 0151 corresponds with the sapVert Gpm showing no sidebands - up until this point the blue vert showed sidebands of 10 hamburgers (vertical units). I don't see a corresponding raise and then flattening out in the IPM data, so the schottky is picking up something else driving the beam but not blowing it up?"

2:06 am Sat 5 Jan. As per Travis: "Beam decay is back on the rise and the sidebands reappear."

Ramp 9528 dAu82 (93 bunches per ring) started at 7:08 am.

1.272×10^{11} deuterons and 1.097×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.4%, Yellow ramp efficiency: 94.0%.

Betatron tune sidebands are again present in the blue vertical low frequency Schottky spectrum. Thomas suggests small changes in blue vertical tune as this has helped with the noise in the past. This was tried but did not help.

10:26 am. As per Vincent: "The Blue decay drops suddenly, and the sidebands have disappeared without MCR doing anything."

This store (9528) was dumped at 1:22 pm.

Ramp 9529 dAu82 (93 bunches per ring) started at 5:06 pm.

1.284×10^{11} deuterons and 1.147×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.0%, Yellow ramp efficiency: 91.4%.

This store was dumped at 10:12 pm (one hour early because of low ZDC

rates).

66 Sun 6 Jan

Ramp 9530 dAu82 (93 bunches per ring) started at 1:50 am Sun 6 Jan.

1.256×10^{11} deuterons and 1.147×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.1%, Yellow ramp efficiency: 90.4%.

This store was dumped at 2:25 am (Sun 6 Jan) due to high loss rate.

3:01 am Sun 6 Jan. Power dip.

Ramp 9532 dAu82 (93 bunches per ring) started at 5:23 am Sun 6 Jan.

1.324×10^{11} deuterons and 1.192×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.9%, Yellow ramp efficiency: 94.7%.

5:36 am Sun 6 Jan. As per Travis: "Another spontaneous debunching in blue, this one wasn't total. High losses quickly pulled the permit link and the debunched beam cause a blue ring quench."

Ramp 9533 dAu82 (87 bunches per ring) started at 6:53 am.

1.319×10^{11} deuterons and 1.182×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.4%, Yellow ramp efficiency: 95.3%.

Ramp 9534 dAu82 (87 bunches per ring) started at 10:12 am.

1.400×10^{11} deuterons and 1.158×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.8%, Yellow ramp efficiency: 92.8%.

Ramp 9535 dAu82 (87 bunches per ring) started at 2:17 pm.

1.394×10^{11} deuterons and 1.144×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.2%, Yellow ramp efficiency: 94.8%.

Ramp 9536 dAu82 (93 bunches per ring) started at 9:14 pm.

1.329×10^{11} deuterons and 1.133×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.8%, Yellow ramp efficiency: 93.6%.

67 Mon 7 Jan

Ramp 9539 dAu82 (93 bunches per ring) started at 8:07 am.

1.128×10^{11} deuterons and 1.273×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.9%, Yellow ramp efficiency: 92.1%.

10:15 am. Wolfram: "Last ramp showed instability in Yellow at transition. Increased the Yellow octupole strength at transition from -6 to -7. This is the same as in Blue, and we had successfully ramped through transition with this during APEX (even with 111 bunches).

11:31 am. Todd: "Tune settings in yellow for dAu82 through the run. The waist scans from last week's APEX are clearly visible, as are other scans later in the run. Also visible is a lowering of the yellow vertical tune in fill 9523 to combat high beam decay. This weekend we reverted to a later store, so we should probably revert to tune settings of $Q_H = 31.2488$, $Q_V = 32.3700$ for the next ramp. These are the tune settings for good early ramps, such as fill 9506."

Chris Naylor: "Physics ran for 2.72hrs this shift with two stores, one that was inherited from the previous shift and one that continues as of the end of the shift. Four attempts at ramps failed as a result of a suspected instability at transition in the blue ring. For each attempt the per bunch intensity at injection was reduced. The fifth attempt finally succeeded when the per bunch intensity was reduced to a point where the beams survived throughout the ramp in both rings."

Ramp 9545 dAu82 (93 bunches per ring) started at 8:23 pm.

0.968×10^{11} deuterons and 0.841×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.6%, Yellow ramp efficiency: 96.3%.

68 Tue 8 Jan

Ramp 9546 dAu82 (93 bunches per ring) started at 3:55 am.

1.127×10^{11} deuterons and 0.924×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.2%, Yellow ramp efficiency: 97.3%.

This ramp used a modified "fancy gap" bunch pattern.

The initial ZDC rates were nearly 160 kHz, possibly the highest seen so far this run.

Ramp 9547 dAu82 (93 bunches per ring) started at 11:40 am.

1.126×10^{11} deuterons and 1.035×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.4%, Yellow ramp efficiency: 95.1%.

This ramp used a modified "fancy gap" bunch pattern.

Thomas notes: "Large emittance growth at transition in this store."

Todd notes: "No clear loss pattern along the bunch train for this ramp, though yellow bunch losses through transition varied a bit more than blue."

Todd again: "There is a real −10mm vertical bump at s=3558m in blue that should be taken out at the end of the store. The correctors here are stressed, and moving the BPM at this location to a reading of zero would change those correctors to near zero strengths. The automatic vertical correction uses BestCorrectors and therefore cannot remove local bumps like this. Removing this local bump will likely necessitate modest tune and coupling adjustments."

"There is also a 5mm bump at s=483m in horizontal blue that could be taken out to reduce large local corrector strengths. A horizontal bump removal will change the tune a small bit but should not change coupling."

Ramp 9548 dAu82 (93 bunches per ring) started at 6:09 pm.

1.063×10^{11} deuterons and 1.008×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.1%, Yellow ramp efficiency: 96.6%.

This ramp used a modified "fancy gap" bunch pattern.

11:37 pm. Wolfram: "Increased the Yellow octupole strength by a small amount (from −7 to −7.5 m^{-3}) in an attempt to suppress the transition instability completely on the next ramp."

69 Wed 9 Jan

Ramp 9549 dAu82 (93 bunches per ring) started at 1:10 am.

1.130×10^{11} deuterons and 1.025×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.7%, Yellow ramp efficiency: 95.0%.

This ramp used a modified "fancy gap" bunch pattern.

1:13 am. Wolfram: "Yellow still unstable (after octupole change) at transition, this time in both planes."

Ramp 9553 dAu82 (93 bunches per ring) started at 8:31 pm.

1.105×10^{11} deuterons and 0.892×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.8%, Yellow ramp efficiency: 97.9%.

This ramp used a modified "fancy gap" bunch pattern.

10:48 pm. Wolfram: "Both Blue and Yellow had again instabilities at transition on the last ramp. Less intensity, fewer bunches, or more octupole strength could lead to higher luminosity."

11:10 pm. Wolfram: "Since ramp transition is still very good, increased octupole strength in both rings by another 0.5 m^{-3} (to -7.5 m^{-3} in Blue, and -8 m^{-3} in Yellow)."

70 Thur 10 Jan

Ramp 9554 dAu82 (93 bunches per ring) started at 4:09 am.

1.273×10^{11} deuterons and 0.944×10^{9} gold ions per bunch at injection.

This ramp used a modified "fancy gap" bunch pattern.

Ramp aborted due to what was later found (by John Butler) to be a problem with the blue Landau cavity.

Ramp 9557 dAu82 (93 bunches per ring) started at 11:42 am.

1.078×10^{11} deuterons and 0.997×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 96.0%, Yellow ramp efficiency: 96.8%.

This ramp used a modified "fancy gap" bunch pattern.

Beam Abort at 12:35 pm. Loss monitor pulled permit. (Inadvertent insertion of yellow stochastic cooling pickup??)

1:00 pm. Wolfram: "Increased Yellow octupole strength by another 0.5 m^{-3} for next ramp (we still had an instability, but ramp transmission is good)."

1:03 pm. Horizontal and vertical yellow Chromaticities raised by 0.5 at store stone (as per Todd's suggestion).

Ramp 9558 dAu82 (93 bunches per ring) started at 2:00 pm.

1.017×10^{11} deuterons and 1.002×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.8%, Yellow ramp efficiency: 96.1%.

This ramp used a modified "fancy gap" bunch pattern.

4:16 pm. Vadim and Dejan find evidence of electron cloud.

5:27 pm. Wolfram: "Yellow still unstable at transition, and ramp transmission still good. Increased octupole strength by another 0.5 m^{-3} (to -9 m^{-3}) for the next ramp."

Ramp 9559 dAu82 (93 bunches per ring) started at 8:57 pm.

1.108×10^{11} deuterons and 0.998×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.4%, Yellow ramp efficiency: 96.0%.

This ramp used a modified "fancy gap" bunch pattern.

10:56 pm. Wolfram: "One more step increase of the Yellow octupoles, by -1 m^{-3} to -10 m^{-3}."

71 Fri 11 Jan

Ramp 9560 dAu82 (93 bunches per ring) started at 3:46 am Fri 11 Jan.

1.055×10^{11} deuterons and 1.012×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.8%, Yellow ramp efficiency: 95.8%.

This ramp used a modified "fancy gap" bunch pattern.

Although the yellow ramp transmission efficiency is very good, beam instability near transition persists. This increases gold beam emittance and reduces luminosity. Wolfram has been incrementally increasing the octupole strength (at transition) to combat this.

11:09 am. Brennan, Blaskiewicz and Marr experiment before dumping store 9560: "We reduced the storage voltage to 1/2. The bunch length got longer, which implies that the momentum spread decreased but there was no change to the Yellow decay rate. One cavity tripped off when we tried to go to 100 kV."

We return to the original bunch pattern.

Yellow store-stone setpoints put back to $Q_H = 31.2488$ and $Q_V = 32.3700$. (Recent history has shown that these are good tune setpoints. See Todd's elog entry 11:31 am Mon 7 Jan.)

Ramp 9561 dAu82 (93 bunches per ring) started at 11:45 am.

1.067×10^{11} deuterons and 0.980×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 96.1%, Yellow ramp efficiency: 97.2%.

Possibly one of the best stores so far, but it was brought down by a blue

abort kicker pre-fire at 12:09 pm.

Ramp 9562 dAu82 (93 bunches per ring) started at 1:16 pm.

1.066×10^{11} deuterons and 1.007×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.1%, Yellow ramp efficiency: 96.9%.

1:18 pm Wolfram: "Yellow still unstable."

1:35 pm. Wolfram: For the next ramp one more step with the Yellow octupoles (step of -1 m^{-3} to setting -11 m^{-3}).

7:36 pm. Artus tune measurment done at end of store 9562.

Ramp 9563 dAu82 (93 bunches per ring) started at 8:29 pm.

1.082×10^{11} deuterons and 1.013×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 96.0%, Yellow ramp efficiency: 96.7%.

9:07 pm. Wolfram: "For the next ramp, one more step with the Yellow octupoles (by -1 to -12 m^{-3})."

10:22 pm. Ian notices a "kink" in the yellow decay rate. This was later found to be due to stochastic cooling going off.

Ramp 9564 dAu82 (93 bunches per ring) started at 3:19 am Sat 12 Jan.

1.138×10^{11} deuterons and 1.048×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.5%, Yellow ramp efficiency: 95.4%.

5:20 am Sat 12 Jan. Ian:

"Yellow beam decay will not come down. Is there an SC problem? We have no alarms, but things don't look quite right." (No satellite bunches seen on yellow WCM.)

72 Sat 12 Jan

Ramp 9566 dAu82 (93 bunches per ring) started at 10:47 am.

1.130×10^{11} deuterons and 1.067×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 96.1%, Yellow ramp efficiency: 95.2%.

Phenix ZDC at 170 kHz after rebucketing. But stochastic cooling not yet back on.

11:47 am. Peggy: "CAS replaced a blown fuse, Freddy resolved issues logging into the network analyzer and Mike reset things up from home.

Stochastic cooling should be back in business."

11:53 am. Brennan: "The blown fuse was the AC line fuse in the power supply that supplies DC to the 1 x 16 Fan-out and to the ZRON amps in the equalizers. The delays had to be manually tweaked because the tracking loop (by the Network Analyzer) was not operating while the fuse was blown."

Ramp 9567 dAu82 (93 bunches per ring) started at 5:23 pm.

1.213×10^{11} deuterons and 0.999×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.9%, Yellow ramp efficiency: 95.7%.

73 Sun 13 Jan

Email from Wolfram:

Christoph, Kip, Thomas, Mike, Vadim,

So far we were not able to accelerate the same amount of Au beam through transition that we did in Run-7:

1. Run-8: 93 bunches with 1e9, with instability
2. Run-7: 103 bunches with > 1.1e9, without instability (i.e. about 20% less).

The differences I am aware of are:

1. gammat=26 (Run-8) vs. gammat=23 (Run-7)
2. difference in chromaticity set points before and after transition is about 10 units for Run-8 vs. about 5 units in Run-7 (both planes)
3. the octupoles in Run-8 are now more than twice as strong as in Run-7 (12 vs. 5 m^{-3}), the latest increases did not show any improvement
4. the electron cloud contribution to the instability from the Blue beam is weaker in Run-8 than it was in Run-7 (transition in Blue is 8sec earlier)

The instability is now always after transition (within 500ms), presumably at the point where we cross zero chromaticity. The growth time is about 100ms (from Pete's pictures).

In the past, crossing zero chromaticity before transition was better, although we don't know why.

Should we try to move the point where we cross zero chromaticity to before transition? Any other idea?

Ramp 9569 dAu82 (93 bunches per ring) started at 1:06 am Sun 13 Jan.

1.087×10^{11} deuterons and 0.973×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.4%, Yellow ramp efficiency: 94.3%.

1:22 am Sun 13 Jan. Paul Menga: "Yellow beam decay shot up when things where inserted...see next entry."

1:32 am Sun 13 Jan. Brain van Kuik: "There was a large vertical angle in Phenix yellow. The yellow beam entering was coming in at −6mm and leaving at +6mm vertically. Blue was coming in around +2mm and leaving around −2mm. Straightening them out a bit helped to decrease beam decay and increase Phenix ZDCs.

6:18 am Sun 13 Jan. Wolfram: "The orbit correction at the beginning of the store was supposed to deal with this. Did something go wrong?"

5:47 pm Sat 12 Jan. Wolfram: "For the next ramp, increased both Yellow chromaticities in gammat5 by 0.5 to work on these annoying Yellow instabilities. This may be too small to see something, but the ramps now are generally good, too good to make large changes." According to Travis, these changes were put in between ramps 9569 and 9570.

Ramp 9570 dAu82 (93 bunches per ring) started at 7:33 am.

1.098×10^{11} deuterons and 1.047×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.9%, Yellow ramp efficiency: 93.7%.

10:09 am. Thomas: "Yes, the noise (in blue) is back for this store. A little late this weekend."

10:59 am. Vadim: "Store orbit corrections at the beginning of the store have not been done for last 3 days. Identified reason is that the tape script 'autoCorrectRhicOrbit.pl' has to be modified in order to correctly call a new version of RhicLiveOrbitCorrector. Can not do it from home. Coming in to fix the problem."

11:00 am. Travis: "V. Ptitsyn found an error in a script for automatic orbit correction at flattop, possibly explaining the last few bad stores. He is coming in. We've informed the experimenters that we will be keeping the current store until the problem is fixed."

11:49 am. Vadim: "Updated both autoCorrectRhicOrbit.pl and autoCorrectRhicOrbitVert.pl scripts, which are responsible for the orbit corrections at the beginning and at the course of the store correspondingly. So, the correction should work now."

Ramp 9571 dAu82 (93 bunches per ring) started at 12:25 pm.

1.166×10^{11} deuterons and 0.991×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.1%, Yellow ramp efficiency: 95.5%.

4:37 pm. Thomas: "Coherence before (left) and after (right) the 0.5 chrom increase in gammat5 of yellow. This change should have moved the chrom zero crossing earlier, which might be true. Note that the following ramp with the same chrom setting didn't have an istability although it had a lower intensity. To move the zero crossing to before transition chrom need to be increased by several units."

5:02 pm. Christoph: "I'm not sure by how many units we can increase the chromaticity in gammat5 until the slope across transition becomes too large for the sextupoles. We should be able to raise chromaticities in gammat4 and gammat5 simultaneously without running into an instability before transition. This has typically twice (assuming that chromaticities are symmetric around zero across transition) the effect on the zero crossing time per unit chromaticity than raising it in gammat5 alone, plus we don't run into power supply (voltage) limits."

Ramp 9572 dAu82 (93 bunches per ring) started at 6:55 pm.

1.199×10^{11} deuterons and 0.982×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.4%, Yellow ramp efficiency: 95.7%.

7:12 pm. Wenge: "The SC kicker tank 3 left was not inserted, it didn't move and stay at 'Slip Detected' status even it is at home. I believe there is a hardware problem with the SC kicker 3 left. Please contact David Gassner to look into this if the SC system doesn't function right. All other SC pickups/kickers are fine."

10:13 pm. Naylor: "D. Gassner called back about the Stochastic Kicker Tank 3 Left. Informed Dave that Kicker Tank 3 Left did indeed go all the way in for the current store."

74 Mon 14 Jan

Ramp 9573 dAu82 (93 bunches per ring) started at 2:23 am Mon 14 Jan.

1.155×10^{11} deuterons and 0.989×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.2%, Yellow ramp efficiency: 94.8%.

Ramp 9574 dAu82 (93 bunches per ring) started at 10:06 am.

1.061×10^{11} deuterons and 1.114×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.9%, Yellow ramp efficiency: 93.5%.

10:21 am. Wenge: "The SC kicker tank 3 left didn't inserted. This has been happening since Sunday."

10:24 am. Wolfram: "Could you check orbit and steering? This store has unusually low rates with only a hint of a Yellow instability."

10:26 am. Wolfram: "A small signal of a horizontal instability, horizontally only. The BTM picture for this ramp would be interesting."

10:40 am. Vadim: "Dependence of the Yellow transition transmission on bunch position on last ramp has unusual positive slope."

11:10 am. Wolfram: "That could due to the e-cloud induced tune shift along the bunch train. Since the electron cloud is focusing, we should raise the Yellow tunes at transition by 0.0005 to get the tunes of the later bunches."

13:42 am. "After discussion with Vadim, increased Yellow tunes (horizontal and vertical) at transition (gammat4 and gammat5) by 0.0005 for the next ramp."

2:42 pm. Christoph: "IR8 10 Hz signals look nice and clean. I'll turn on the feedback to see whether it has any (hopefully positive!) effect on beam decay or backgrounds."

2:47 pm. Christoph: "Turning on IR feedback in IR8 suppresses 10 Hz very nicely, but results in a low-frequency (about 1.5Hz) offset."

4:32 pm. Thomas: "Turning the 10 Hz feedback on at 14:45 and back off at 14:51. 10 Hz signal gets reduced substantially but not a lower frequency. The lower frequency is probably a beat frequency. It seems to me that the feedback should work all the way to DC although there is too much drift in the DX BPMs for that. But much less than 1 Hz should be possible."

Ramp 9575 dAu82 (93 bunches per ring) started at 5:27 pm.

1.063×10^{11} deuterons and 0.971×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.5%, Yellow ramp efficiency: 94.9%.

5:47 pm. Wolfram: "No position dependent loss along the bunch train any more in Yellow, keep the tune changes."

5:50 pm. Wolfram: "Reverted Yellow chromaticity changes at transition from this morning since last two stores had larger emittance (statistics is low, admittedly)."

Ramp 9576 dAu82 (93 bunches per ring) started at 11:57 pm Mon 14 Jan.

1.120×10^{11} deuterons and 0.968×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.1%, Yellow ramp efficiency: 95.0%.

75 Tue 15 Jan

Ramp 9577 dAu82 (93 bunches per ring) started at 6:53 am.

1.128×10^{11} deuterons and 1.029×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.7%, Yellow ramp efficiency: 94.7%.

10:18 am. Wolfram: "Created a new pattern 95x95 with 4 more collisions for STAR (and 2 more for PHENIX). Please use for the next ramp."

11:28 am. Blaskiewicz: "I have modified the RF files at transition for yellow. The voltage on ya1 and ya2 steps from 75 kV to 95 kV over 1 millisecond when the rf jumps phase, 10 seconds after gammat-start."

Number of bunches increased from 93 to 95.

Ramp 9578 dAu82 (95 bunches per ring) started at 1:52 pm.

1.134×10^{11} deuterons and 1.030×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.8%, Yellow ramp efficiency: 93.8%.

2:22 pm. Mikes, Natalia, John, Mei: "The feedback loop for the bunch length oscillations has been inserted. We see no adverse effects. Also, the voltage jump at transition reduced the bunch length oscillations after transition. The multi-bunch average (available only in 1004) shows that the average amplitude of these oscillations is half what it was."

76 Wed 16 Jan

4:28 am. Natalia: "Next ramp I am going to try the quad damper in Yellow. I closed the loop and corrected the gain for the Yellow cavities. I

think the phase is right, hope it all goes fine!"

4:53 am. Natalia: "Damper is working!! The gain could be higher however it damps the signal very nicely! Comparison of the measured longitudinal oscillations with and without the longitudinal quadrupole damper."

Yellow longitudinal quadrupole damper active for this ramp.

Step up to 95 kV in blue at transition for this ramp.

Ramp 9591 dAu82 (95 bunches per ring) started at 8:40 pm.

1.162×10^{11} deuterons and 0.998×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.0%, Yellow ramp efficiency: 94.2%.

77 Thur 17 Jan

Ramp 9593 dAu82 (95 bunches per ring) started at 5:28 am.

1.234×10^{11} deuterons and 1.133×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.1%, Yellow ramp efficiency: 92.7%.

Ramp 9595 dAu82 (95 bunches per ring) started at 4:53 pm.

1.112×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.8%, Yellow ramp efficiency: 92.9%.

78 Fri 18 Jan

Ramp 9598 dAu82 (95 bunches per ring) started at 2:20 am Fri 18 Jan.

1.101×10^{11} deuterons and 1.217×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.4%, Yellow ramp efficiency: 94.4%.

Wolfram: "9598 has an instability, and low rates. We had reduced the octupole strength from -12 to -10 m^{-3} for this ramp."

Ramp 9599 dAu82 (95 bunches per ring) started at 6:06 am Fri 18 Jan.

1.082×10^{11} deuterons and 1.208×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.4%, Yellow ramp efficiency: 90.9%.

Wolfram: "Also instabiliy on 9599 and low rates. Octupoles are still at -10 m^{-3}."

6:58 am. Wolfram: "Put the Yellow octupoles back to -12 m^{-3} (from -10 m^{-3}), at transition."

2:35 pm. Greg Marr: "Ramp orbit correction prompt should work properly now. Please keep an eye on it for the next few refills."

Ramp 9601 dAu82 (95 bunches per ring) started at 2:30 pm.

1.214×10^{11} deuterons and 0.990×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.4%, Yellow ramp efficiency: 94.0%.

Debunching seen in blue at rebucketing. Beam abort at 2:40 pm.

Ramp 9603 dAu82 (95 bunches per ring) started at 4:28 pm.

1.144×10^{11} deuterons and 0.983×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.3%, Yellow ramp efficiency: 94.1%.

Beam abort at 4:36 pm. Jim Jamilkowski: "Blue debunching caused large losses and eventually a NM312 chipmunk interlock caused a beam abort."

Wolfram: "Blue beam losses increase after rebucketing while the collimator positions do not change."

Thomas: "This ramp also showed a hick-up in BS1 voltage although smaller than in the last ramp."

5:21 pm. John Butler has locked out BS1 and X2.

Ramp 9605 dAu82 (95 bunches per ring) started at 6:32 pm.

1.146×10^{11} deuterons and 1.000×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 91.4%, Yellow ramp efficiency: 95.4%.

Beam abort at 6:42 pm.

Ramp 9606 dAu82 (95 bunches per ring) started at 8:08 pm.

1.229×10^{11} deuterons and 0.996×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.5%, Yellow ramp efficiency: 95.4%.

Beam aborted at 6:18 pm.

9:02 pm Yellow Store Chroms: Hor from 1.4 to 3.4, Vert from 0.6 to 2.6, as per Thomas.

9:21 pm Greg Marr: Barring any other candidates, +2 units of chrom is the best bet to fight instability.

I see 3 choices:

1. 6 bunch ramp.
2. 95 bunch ramp with the chromaticity changes.
3. 95 bunch ramp with the chrom changes, but skip collimation, stochastic cooling and auto orbit correction, then add them in one at a time manually to rule them out for sure.

9:41 pm. Greg: "I would delay the store BTF step also, as this too has been executing right around the abort time (according to device set history)."

9:43 pm. Thomas: "I agree that we should try the third option. I suspect that the vertical chrom was too small - the artus spectrum shows an awfully narrow peak and the vertical coherence shows a hint of an increase just before the abort. The instability would be a coupled-bunch weak head-tail instability that would show up with small or negative chrom."

79 Sat 19 Jan

Ramp 9607 dAu82 (95 bunches per ring) started at 2:14 am Sat 19 Jan.

1.202×10^{11} deuterons and 0.906×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 97.0%, Yellow ramp efficiency: 96.4%.

Initial ZDC rates close to 160 kHz for Phenix.

2:32 am. Paul Menga: "Early evidence points to SC as the problem. When this started to spike, all the kickers were in and the pickups where about 90% of the way in. I had the application up, and as soon as I saw the yellow decay spike, I hit 'Stop' and then 'Home'. Don't think we'll put the kickers back in tonight.... We were following Greg's plan in the last elog. Nothing else (Coll, Orbit Correction, BTF) had been done yet."

6:10 am. Brennan: "Mia Culpa! I caused the problem with the stochcastic cooling pickup. During the Friday morning store I adjusted the pickup to improve the transverse signal output, but I forgot to take out the adjustment after the store. This must have caused the beam to hit one of plates when they were inserted after that. I had CAS go to 1012 and correct the problem so things should be back to normal for the next store, so cooling can be used. What can I say? I screwed up."

80 Sun 20 Jan

Ramp 9613 dAu82 (95 bunches per ring) started at 4:08 am Sun 20 Jan.

1.154×10^{11} deuterons and 1.025×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.4%, Yellow ramp efficiency: 94.8%.

Initial ZDC rates close to 145 kHz for Phenix.

Ramp 9614 dAu82 (95 bunches per ring) started at 2:47 pm.

1.134×10^{11} deuterons and 1.118×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.7%, Yellow ramp efficiency: 95.5%.

Initial ZDC rates close to 160 kHz for Phenix.

Ramp 9615 dAu82 (95 bunches per ring) started at 11:07 pm.

1.050×10^{11} deuterons and 0.786×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 90.1%, Yellow ramp efficiency: 95.5%.

Initial ZDC rates close to 110 kHz for Phenix.

81 Mon 21 Jan

Ramp 9616 dAu82 (95 bunches per ring) started at 5:40 am Mon 21 Jan.

1.125×10^{11} deuterons and 0.981×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.8%, Yellow ramp efficiency: 95.3%.

Initial ZDC rates close to 153 kHz for Phenix.

Ramp 9617 dAu82 (95 bunches per ring) started at 1:43 pm.

1.172×10^{11} deuterons and 1.059×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 96.0%, Yellow ramp efficiency: 78.5%.

Here the poor yellow efficiency was due poor longitudinal matching at RHIC injection (due to operator error).

Ramp 9620 dAu82 (95 bunches per ring) started at 10:35 pm.

Data not available. (Someone stopped BeamIons.logreq at 9:21 pm.)

82 Tue 22 Jan

Ramp 9621 dAu82 (95 bunches per ring) started at 4:23 am.

1.152×10^{11} deuterons and 0.978×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.2%, Yellow ramp efficiency: 94.5%.

Beam aborted due to losses at cogging.

Ramp 9622 dAu82 (95 bunches per ring) started at 5:14 am.

1.169×10^{11} deuterons and 0.896×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.1%, Yellow ramp efficiency: 95.3%.

Ramp 9626 dAu82 (95 bunches per ring) started at 5:49 pm.

1.210×10^{11} deuterons and 0.981×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.7%, Yellow ramp efficiency: 96.0%.

Initial ZDC rates close to 135 kHz for Phenix.

83 Wed 23 Jan

Ramp 9627 dAu82 (95 bunches per ring) started at 12:15 am.

1.170×10^{11} deuterons and 1.031×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.3%, Yellow ramp efficiency: 96.3%.

Initial ZDC rates close to 175 kHz for Phenix.

Ramp 9634 dAu82 (95 bunches per ring) started at 5:58 pm.

1.140×10^{11} deuterons and 1.040×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 92.8%, Yellow ramp efficiency: 94.7%.

Store lost at 6:07 pm. QLI in blue ring due to b4-q89 trip. As per Greg Marr: "B4-q89-ps caused the beam permit to trip which then caused the 4b-qd1 quench detector to trip the blue link."

Ramp 9636 dAu82 (95 bunches per ring) started at 8:34 pm.

1.099×10^{11} deuterons and 1.060×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.9%, Yellow ramp efficiency: 95.0%.

84 Thur 24 Jan

Ramp 9637 dAu82 (95 bunches per ring) started at 3:33 am.

1.142×10^{11} deuterons and 1.028×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 93.8%, Yellow ramp efficiency: 95.3%.

9:55 am to 10:35 am: Mei, Nikolay, and Vadim test IR waist moving knobs.

10:45 am. Beam dumped and RHIC ramped down. Carl Schultheiss begins work on yellow main dipole feedback.

Ramp 9640 dAu82 (95 bunches per ring) started at 3:33 pm.

1.081×10^{11} deuterons and 1.025×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.1%, Yellow ramp efficiency: 95.7%.

During this store, blue beam was moved out of collisions so that yellow decay rate could be measured under this condition. Vernier scans were then done at IP8 and IP6.

Ramp 9641 dAu82 (95 bunches per ring) started at 11:45 pm.

1.169×10^{11} deuterons and 1.046×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.2%, Yellow ramp efficiency: 95.0%.

Initial ZDC rates close to 175 kHz for Phenix.

85 Fri 25 Jan

Ramp 9642 dAu82 (95 bunches per ring) started at 6:38 am Fri 25 Jan.

1.150×10^{11} deuterons and 0.994×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.2%, Yellow ramp efficiency: 95.9%.

12:25 pm. The experiments are ready to dump. M. Bai and N. Malitsky are performing IR waist knob development.

1:40 pm. W. Fisher, J. Morris and A. Marusic are developing injection drift correction.

1:56 pm. Filling for physics.

2:11 pm. The power supply for yo5-tq4 has tripped during the ramp, resulting in a loss monitor permit pull. G. Heppner is swapping out the current regulator card.

3:15 pm. Greg is done. We will resume injection for physics. He replaced the regulator card and the fiber optic card.

Ramp 9644 dAu82 (95 bunches per ring) started at 3:28 pm.

1.143×10^{11} deuterons and 0.998×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.3%, Yellow ramp efficiency: 95.1%.

4:48 pm. Already very high yellow beam decay took a fast step up about an hour into the store and pulled the loss monitor permit. The reason for the step up is not clear. There were no ramp activations for minutes before the abort.

Ramp 9645 dAu82 (95 bunches per ring) started at 5:27 pm.

1.109×10^{11} deuterons and 1.057×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 94.1%, Yellow ramp efficiency: 95.8%.

5:32 Beam Abort, 5e-ps2.A dropped Loss Monitor 1.

5:48 pm. John Morris: "I've disabled the DriftCorrection steps in the BackToInjection sequence. We'll reenable them when we make it all work during APEX."

Ramp 9646 dAu82 (95 bunches per ring) started at 6:20 pm.

1.110×10^{11} deuterons and 1.011×10^{9} gold ions per bunch at injection.

6:26 pm. Beam Abort, 5e-ps2.A dropped Loss Monitor 1.

Ramp 9647 dAu82 (95 bunches per ring) started at 6:20 pm.

1.138×10^{11} deuterons and 1.001×10^{9} gold ions per bunch at injection.

7:30 pm. Beam Abort, 5e-ps2.A dropped Loss Monitor 1.

7:36 pm. Nick Kling: "I have reverted the machine to the Pre-Apex awesome store."

Ramp 9648 dAu82 (95 bunches per ring) started at 8:11 pm.

1.108×10^{11} deuterons and 1.038×10^{9} gold ions per bunch at injection.

8:21 Beam lost on ramp up. Dumping Beam and ramping down.

9:34 pm. Mei Bai: "Both 9646 and 9647 are aborted by b5-lm3.1. This seems to suggest that local orbit at IP6 in blue may not be optimized."

9:51 pm: Nick Kling: "I have reverted back to Wednesday morning's store. If it is orbit problem this should be taken care of. Did LISA possibly optimize incorrectly at the end of a store or when there was no beam?"

Ramp 9649 dAu82 (95 bunches per ring) started at 11:00 pm.

1.017×10^{11} deuterons and 0.997×10^{9} gold ions per bunch at injection.

Blue ramp efficiency: 95.2%, Yellow ramp efficiency: 95.7%.

86 Sat 26 Jan

Ramp 9650 dAu82 (95 bunches per ring) started at 5:31 am Sat 26 Jan.
1.053×10^{11} deuterons and 1.010×10^{9} gold ions per bunch at injection.
Blue ramp efficiency: 93.8%, Yellow ramp efficiency: 95.1%.
Ramp 9651 dAu82 (95 bunches per ring) started at 12:56 pm.
1.226×10^{11} deuterons and 1.015×10^{9} gold ions per bunch at injection.
Blue ramp efficiency: 94.8%, Yellow ramp efficiency: 95.1%.
Ramp 9652 dAu82 (95 bunches per ring) started at 9:14 pm.
1.215×10^{11} deuterons and 1.034×10^{9} gold ions per bunch at injection.
Blue ramp efficiency: 94.9%, Yellow ramp efficiency: 95.0%.
Initial ZDC rates close to 200 kHz for Phenix.

87 Sun 27 Jan

Ramp 9653 dAu82 (95 bunches per ring) started at 3:57 am Sun 27 Jan.
1.246×10^{11} deuterons and 1.061×10^{9} gold ions per bunch at injection.
Blue ramp efficiency: 93.2%, Yellow ramp efficiency: 95.2%.
Initial ZDC rates close to 180 kHz for Phenix.
Ramp 9654 dAu82 (95 bunches per ring) started at 10:37 am.
1.329×10^{11} deuterons and 0.995×10^{9} gold ions per bunch at injection.
Blue ramp efficiency: 93.6%, Yellow ramp efficiency: 95.4%.
10:44 am. Beam Abort, 5e-ps2.A dropped Loss Monitor 1.
Ramp 9655 dAu82 (95 bunches per ring) started at 11:26 am.
1.347×10^{11} deuterons and 1.092×10^{9} gold ions per bunch at injection.
Blue ramp efficiency: 91.9%, Yellow ramp efficiency: 94.5%.
Ramp 9656 dAu82 (95 bunches per ring) started at 3:58 pm.
1.223×10^{11} deuterons and 1.056×10^{9} gold ions per bunch at injection.
Blue ramp efficiency: 92.8%, Yellow ramp efficiency: 95.4%.
Initial ZDC rates close to 190 kHz for Phenix.
The 2008 d-Au run ended (at 8:15 pm Sun 27 Jan) after 1.15 hours of

physics, and was followed by 10.12 hours of accelerator physics experiments.