

# PHENIX dAu BES plan

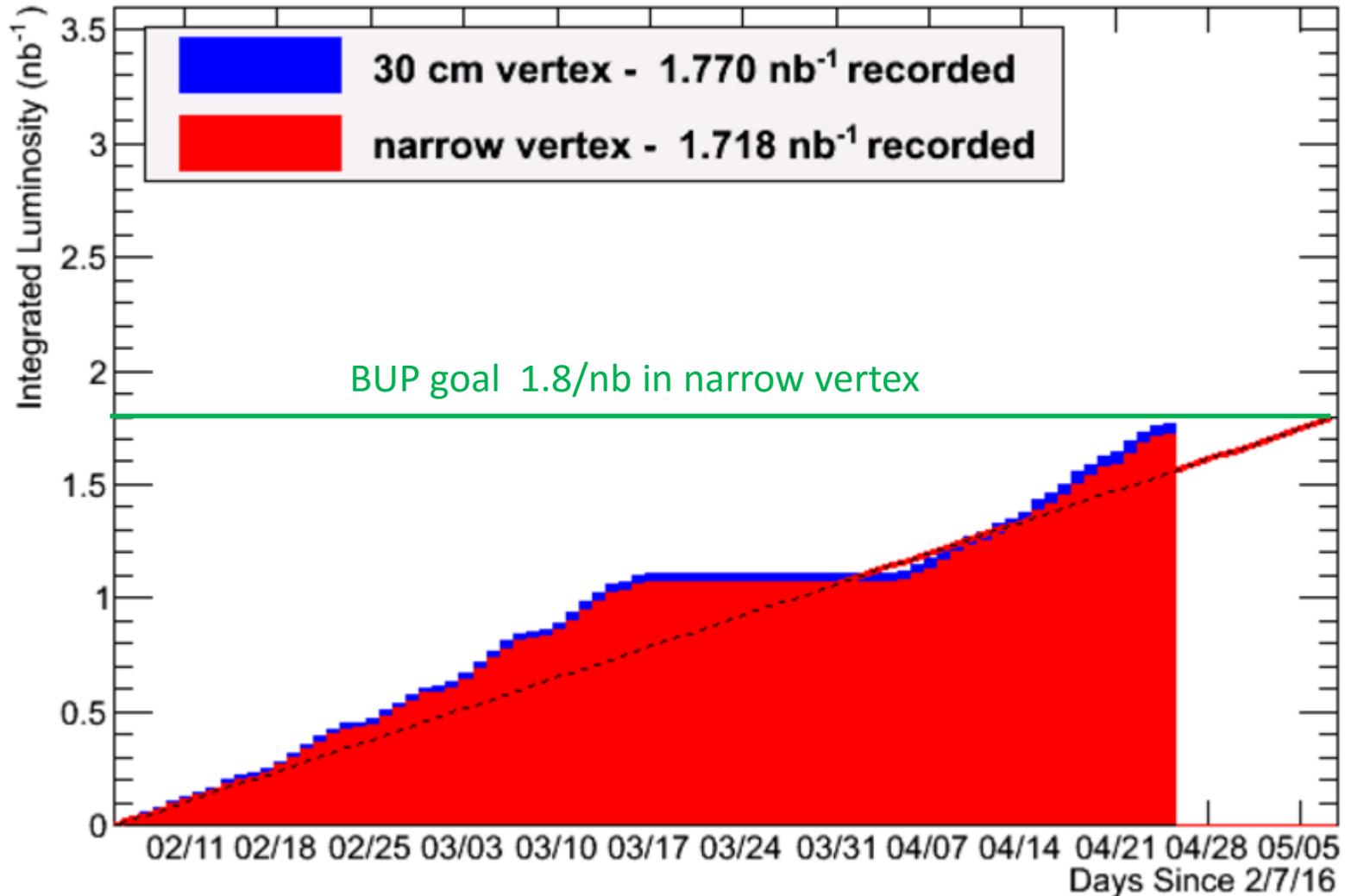
Y. Akiba

2016/04/26

# Au+Au recorded luminosity

PHENIX Integr. Sampled Lumi vs Day

Tue Apr 26 09:01:06 2016



# PHENIX plan of 5 and 6 weeks of dAu

E-mail to Berndt on 2016/4/19

## EXECUTIVE SUMMARY

**For 5 calendar weeks, our request is**

- 1 week of physics at 200 GeV (goals: 1B events for flow and 77/nb for MPC-EX)**
- 1 week of physics at 62 GeV (min. goal of 160M events. 320M events maximum)**
- 1.5 week of physics at 39 GeV**

**in this order.**

In this scenario we are forced to give up the 20 GeV energy point, since all of the 4 energy points cannot fit in 5 calendar weeks.

**For 6 calendar weeks, our request is**

- 1 week of physics at 200 GeV (goals: 1B events for flow and 77/nb for MPC-EX)**
- 1 week of physics at 62 GeV (min. goal of 160M events. 320M events maximum)**
- Minimum 1 week of physics at 39 GeV (min. goal of 110M events)**
- Minimum 1.5 week of physics at 20 GeV**

**in this order.**

In this plan, we have all 4 energy points. However, due to the missing 0.5 weeks, the v3 measurement at 39 is likely to be lost.

For each plan, if RHIC performance is exceptionally good, we would want to switch to lower energy earlier if our goals at the higher energy points has been achieved. We have a set of criteria for this, which is detailed in the detailed plan section below.

# More detailed plan

E-mail to Berndt on 2016/4/19

## MORE DETAILS of PHENIX d+Au BES plan

We have tried to define detailed criteria for when to best switch between the different beam energies on the fly. This is an attempt to optimize the use of beam time and restore as much physics as possible in the two scenarios. We give those details here. However, we note that it may be difficult to implement this detailed plan in practice due to the uncertainties involved in projecting performance in very short runs and the necessity to plan the switch time in advance. We would like to work with CAD to make the best use of the beam time in the most efficient manner.

### For 5 calendar weeks, our request is

**1 week of physics at 200 GeV (goals: 1B events for flow and 77/nb for MPC-EX)**  
**1 week of physics at 62 GeV (min. goal of 160M events. 320M events maximum)**  
**1.5 week of physics at 39 GeV**  
**in this order.**

In this scenario we are forced to give up the 20 GeV energy point, since all of the 4 energy points cannot fit in 5 calendar weeks.

We request that we start from 200 GeV and go to lower energy. The reasons of this request are:

- (1) We have two goals in 200 GeV run. One is the  $v_2$  and  $v_3$  measurements in central d+Au, and the other is direct photon measurement at forward rapidity with MPC-EX. By placing the 200 GeV run at the beginning of the d+Au BES, we have the smallest risk of not achieving both of two goals. If the 200 GeV run is placed at the end of the 5 weeks period, any unpredictable issues in early part of the run can reduce the beam time of the 200 GeV run.
- (2) By starting with 200 GeV, we can be more flexible in the beam time because the event sample at the higher energy is cleaner, and we will know right away how many good events we have recorded. We request for nominally 1 week of 200 GeV. However, if the run goes well and our goal is achieved earlier, we can move to the lower energy point earlier. We have two goals for the 200 GeV run:  
G-200-A: 1 Billion central d+Au events recorded in  $|z| < 10\text{cm}$  for  $v_2/v_3$  measurement  
G-200-B: 77/nb sampled with MPC trigger (no vertex cut) for direct photon measurement with MPC-EX.  
If both of these goals are met earlier than 1 week, we can switch the energy.  
If 75% of these goals are met, we will change the energy after 1 week of run

We request that the next energy point is 1 week of physics at 62 GeV. In this run, we also set two goals to ensure  $v_3$  measurement at this energy.

G-62-MAX: 320 M central d+Au events recorded in  $|z| < 10\text{cm}$   
G-62-MIN: 160 M central d+Au events recorded in  $|z| < 10\text{cm}$

Although we can do physics measurement with MPC-EX at this energy, we don't set a goal for MPC-EX.

G-62-MIN is our minimum goal at 62 GeV. We think we need 160M events for  $v_3$  measurement. If this goal is achieved less than 1 week, we continue to run at 62 GeV and switch to the lower energy (39 GeV) after 1 week of physics run. If the run goes very well and can achieve G-62-MAX in less than 1 week, we will move to the lower energy earlier. Please note that in the most recent RHIC projection, G-62-MAX can be achieved in 1 week. On the other hand, if G-62-MIN is not achieved in 1 week, we request to extend the 62 GeV run up to 0.5 week until G-62-MIN is achieved. In this case, as soon as G-62-MIN is achieved we will switch to 39 GeV.

39 GeV is the last energy point, and we run this energy to the end. In our plan, it is nominally 1.5 weeks of physics. However, if the earlier runs at 200 GeV and 62 GeV achieve their goals earlier than 1 week, the time saved in these runs are added to 39 GeV. On the other hand, in case it takes longer than 1 week to achieve the minimum goal of 62 GeV (G-62-MIN), the 39 GeV run can be reduced. But we will have at least 1 week of 39 GeV in this case. We can achieve  $v_2$  measurement at 39 GeV for 1 week. However, we don't think we can measure  $v_3$  at 39 GeV for just 1 week.

### For 6 calendar weeks, our request is

**1 week of physics at 200 GeV (goals: 1B events (recorded) for flow and 77/nb (sampled) for MPC-EX)**  
**1 week of physics at 62 GeV (min. goal of 160M events. 320M events maximum)**  
**Minimum 1 week of physics at 39 GeV (min. goal of 110M events)**  
**Minimum 1.5 week of physics at 20 GeV**  
**in this order.**

Please note that 6 calendar week corresponds to 4.5 physics weeks.

As in the 5 weeks plan, we request to start with 200 GeV, and go down to lower energy. The number of weeks at each energy is the nominal length of run. If the goals of these energy points are achieved earlier, we will switch energy to the next point earlier.

In this 6 weeks plan, if beam time is saved at 200 and/or 62 GeV, the saved time is first goes to 39 GeV. We will run at least 1 week at 39 GeV, or minimum goal of 110M events are recorded. If the remaining run time becomes less than 1.5 week, we will switch to 20 GeV. (The switch to 20 GeV takes 1 day).

In this plan, we have all 4 energy points. However, in this plan, the beam time at 39 GeV is likely to be squeezed to just 1 week, instead of 1.5 weeks that we planned. This means the  $v_3$  measurement at 39 GeV is likely to be lost. We made a plan above so that any beam time that can be saved in earlier part of the run can be used to restore the lost 0.5 week, but there is no guarantee we can save any time. Additional 0.5 week of d+Au BES, i.e. restoring the 6.5 weeks calendar time, can restore the nominal beam time of 39 GeV to 1.5 weeks. With 1.5 week, we may be able to measure  $v_3$  if the  $v_3$  is sufficiently large.

Sincerely yours,

Yasuyuki Akiba  
PHENIX Spokesperson