

# STAR REPORT FOR FIRST TIME MEETING OF RUN 16

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*For the STAR Collaboration*

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## Outline

- Detector configuration for Run 16
- Data set Goals
- Desired luminosity profile for Run 16 AuAu
- STAR Schedule
- Summary



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**TOF**

**BBC**

**Heavy Flavor Tracker**

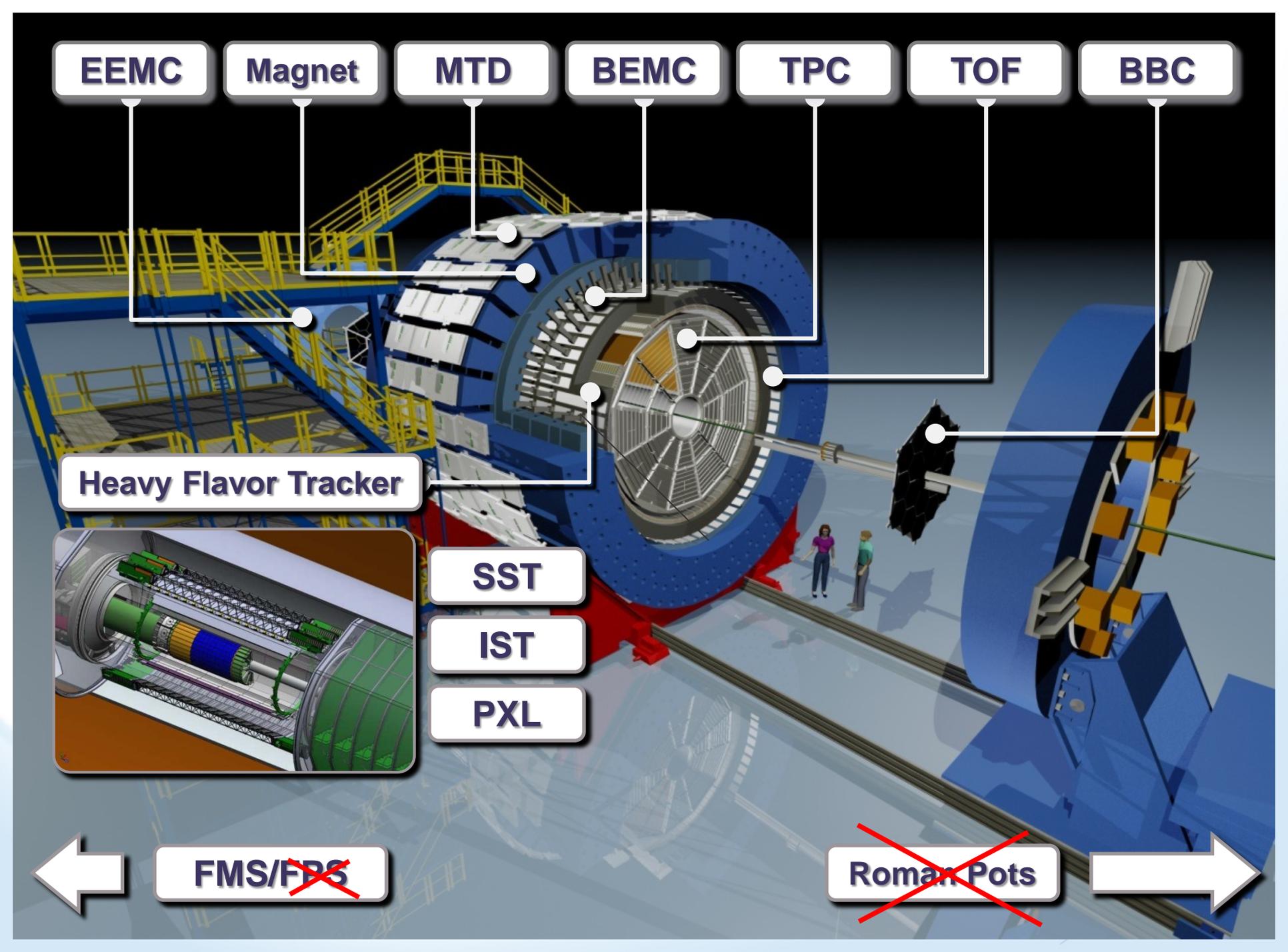
**SST**

**IST**

**PXL**

~~**FMS/FPS**~~

~~**Roman Pots**~~



# *TOP ENERGY AUAU DATA SET GOALS*



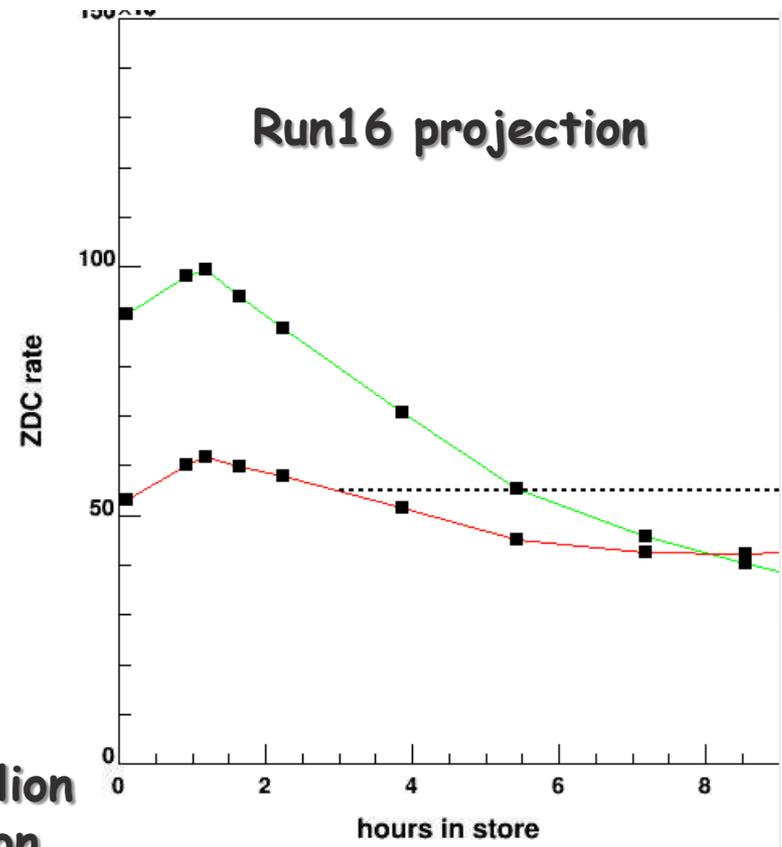
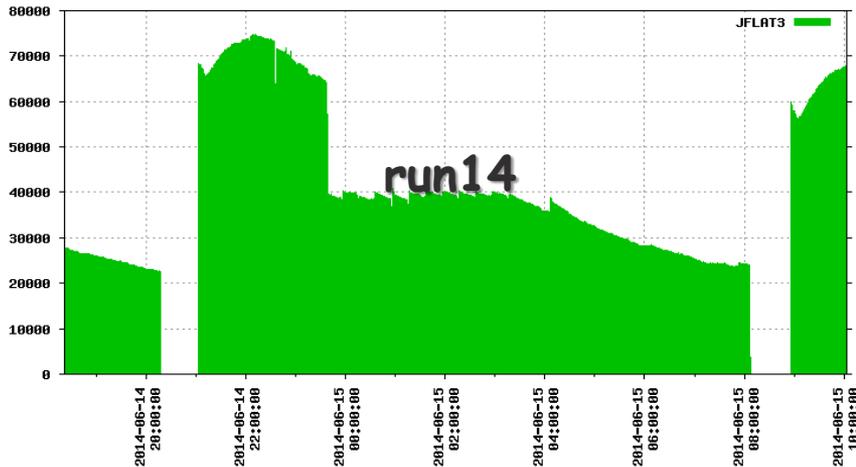
# RUN 16 BUR BY STAR

Run	Energy	Duration	System	Goals	priority	Sequence
16	$\sqrt{s_{NN}}=200$ GeV	13-wk	Au+Au	$\Lambda_C$ , $D v_2$ , $R_{AA}$ , $Y R_{AA}$ 10nb <sup>-1</sup> , 2 billion MB evts	1	1
	$\sqrt{s_{NN}}=62$ GeV	4-wk	Au+Au	1.5B MB (1B w/ HFT)	4	2
	$\sqrt{s_{NN}}=19.6$ GeV	1-wk	d+Au	100M MB	4	3

For Run 16 the PAC recommends the following (*in order of priority*):

1. 10 weeks Au+Au collisions at  $\sqrt{s_{NN}} = 200$  GeV
2. 5 weeks for a small system beam energy scan. This program can be realized with
  - a. Au+polarized proton collisions for a set of energies chosen among 200, 62, 39 and 20 GeV to optimize the physics output, or
  - b. d+Au collisions at 200, 62, 39, and 20 GeV
3. 2 weeks of polarized p+p collisions at  $\sqrt{s} = 62$  GeV
4. Up to 4 weeks of Au+Au collisions at  $\sqrt{s_{NN}} = 62$  GeV

# HFT OPERATION MODE IN RUN16

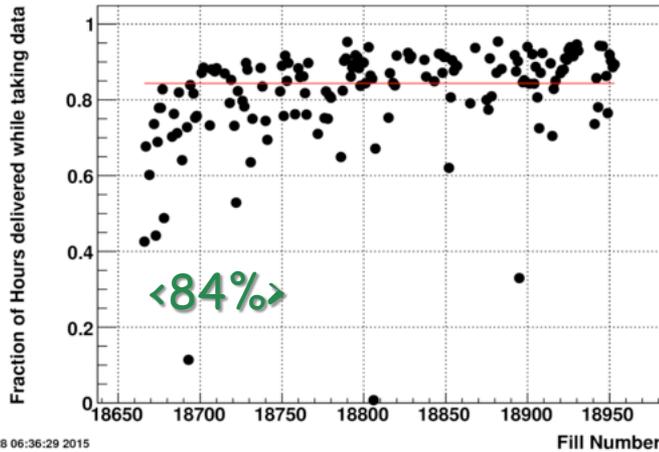


Limitation of options in operation mode  
<55KHz to reduce deadtime and LU rate  
Store length for optimized luminosity  
Perform dynamic beta\* squeeze  
Projection from this mode:  
1.8nb<sup>-1</sup>/week delivered for MTD and 2 billion  
MB for HFT requires **13 weeks** of operation

**RHIC Machine Efficiency not Luminosity,  
STAR Operation and Optimization  
Are keys to achieve these goals.**

# RUNNING EFFICIENCY DURING 200 GEV pp

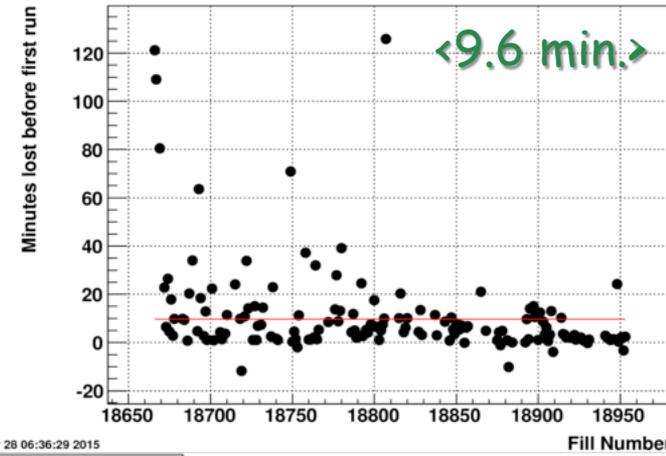
Fraction of Hours delivered while taking data



Tue Apr 28 06:36:29 2015

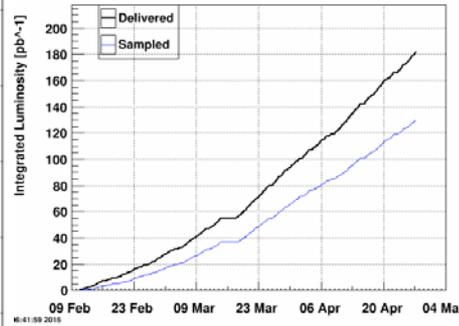
Fill Number

Minutes lost before first run



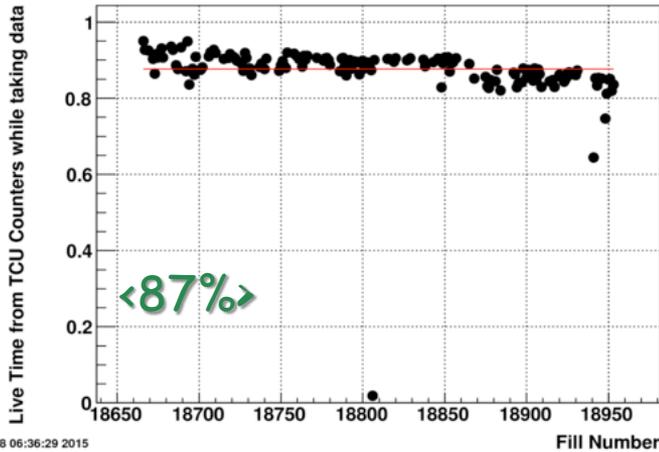
Tue Apr 28 06:36:29 2015

Fill Number



6:41:59 2015

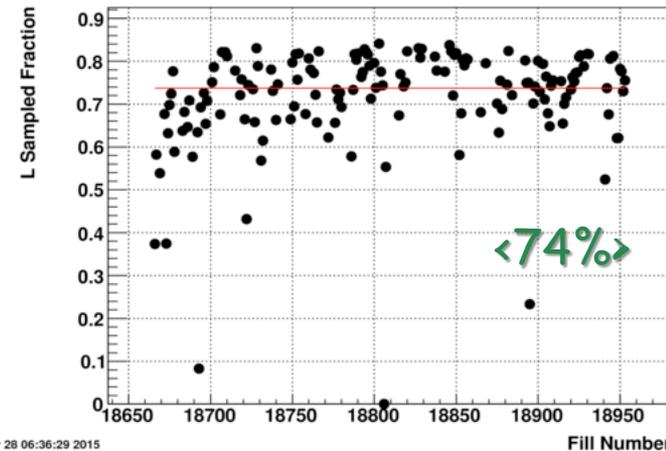
Live Time from TCU Counters while taking data



Tue Apr 28 06:36:29 2015

Fill Number

L Sampled Fraction



Tue Apr 28 06:36:29 2015

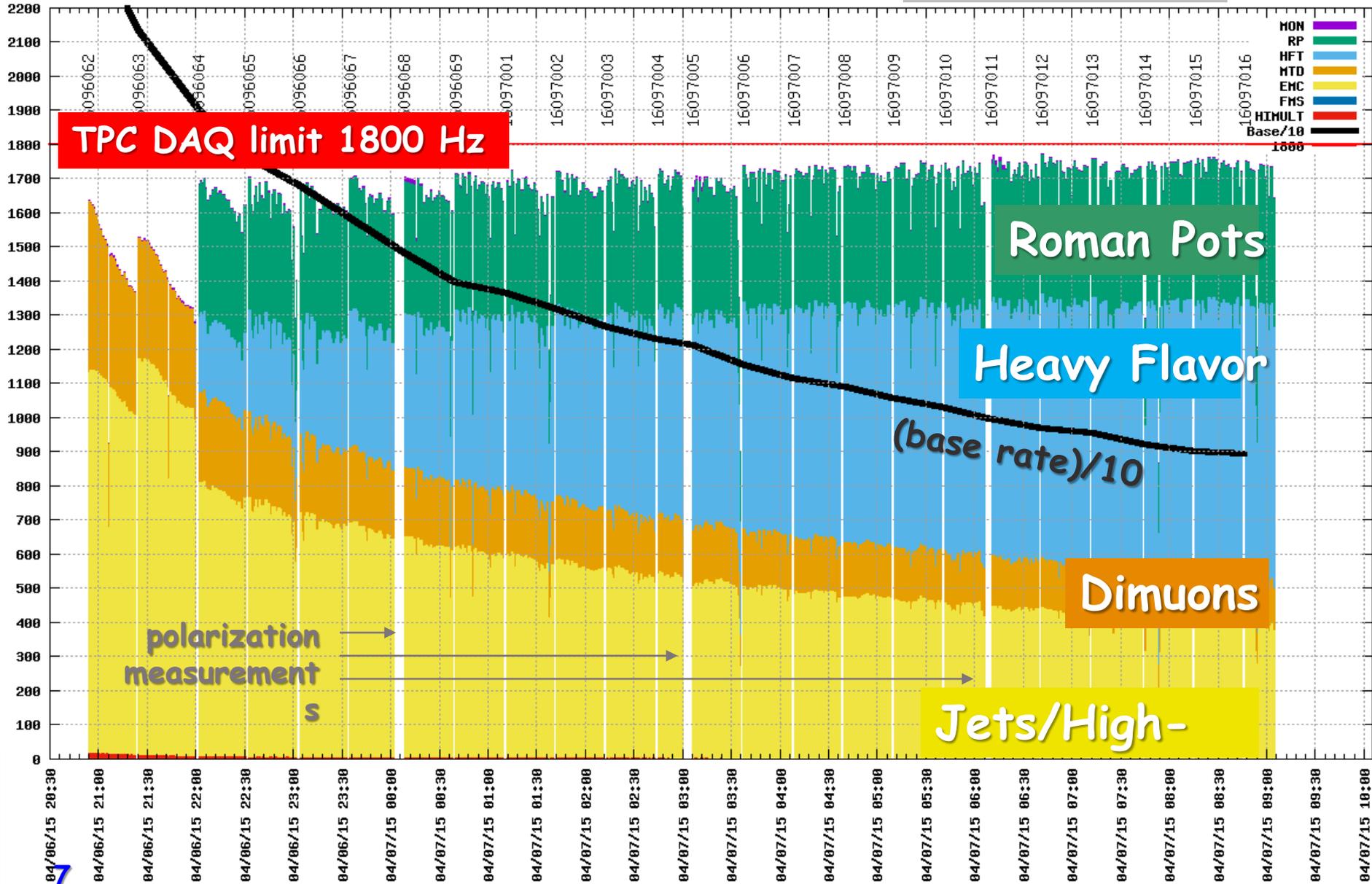
Fill Number

Very good overall running efficiency. Mantra "Every minute counts"

To first order:  $(0.84 \text{ uptime})(0.87 \text{ livetime}) = 0.73 \sim \text{Sampled L.}$

# TPC BANDWIDTH IN P+P

example fill 18882



## January 2016

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
	← Magnet checkout & Heat run, TPC HV check →				← Install & light check BBCs →	
10	11	12	13	14	15	16
	← Install & light check BBCs →		STAR ready for Cosmic Ray testing Start 2 person Shifts		← Detector commissioning and Cosmic Ray running →	
17	18	19	20	21	22	23
	← Detector commissioning and Cosmic Ray running →					
24	25	26	27	28	29	30
← Detector commissioning and Cosmic Ray running →						
31						

**Holidays and Observances:** 1: New Year's Day, 18: Martin Luther King Day

# **SUMMARY**

- **STAR is on schedule.**
- **STAR will be ready to start Commissioning and Cosmic Ray running next Tuesday, January 12<sup>th</sup>**
- **Two person Shifts will begin on Jan. 12<sup>th</sup>, and we plan to start the flow of flammable gases into the detector.**
- **We'll continue accumulating Cosmic Ray data until collider commissioning with beam begins.**
- **One of STAR's Run 16 top energy AuAu data set goals is to accumulate 2 billion minimum bias events. This will require a large "Physics ON" fraction per week of running from the Collider, as well as very efficient STAR operations.**

# LUMINOSITY PROFILE DESIRED FOR RUN 16 AUAU

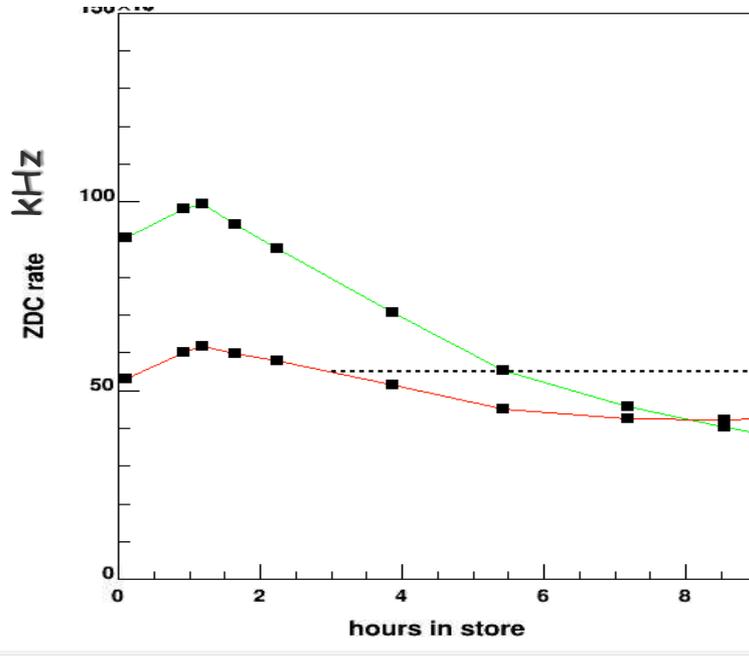
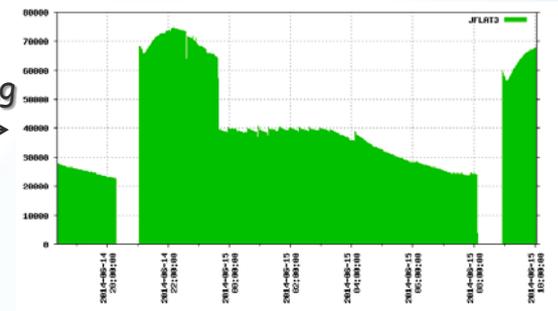


Figure 6-2 (From BUR):

ZDC rates for requested beam profile. The green curve shows the scaled ZDC rate (luminosity for 10b cross section) as the expected maximum luminosity, and the red a luminosity profile with a dynamic beta\*.

Red indicates what can be delivered if beta\* is changed from 1.2 early in the store to 0.5 late in store

Run 14 HFT Running  
40 kHz →



In the proposed scenario the delivered luminosity is  $\sim 0.17 \text{ nb}^{-1}$  per store.  
In the Run14 Au+Au at 200 GeV the average physics-on hours per day were 13.5 hours i.e. 94.5 per week.

Thus RHIC can deliver  $\sim 94.5/9 \times 0.17 \sim 1.8 \text{ nb}^{-1}/\text{week}$  in this running mode.

Even though the delivered luminosity is not the maximum that can be delivered, it still allows STAR to reach the proposed goals for both the minimum bias goals (2 Bevts) and the high luminosity goals ( $10 \text{ nb}^{-1}$ ) given sufficient weeks of running.