

Trigger Board Meeting

14-Sep-2020

Members:

Rosi Reed, Jiangyong Jia, Hongwei Ke, Gene Van Buren, Irakli Chakeberia, Bill Christie, Eleanor Judd, Hank Crawford, Jeff Landgraf, Akio Ogawa, Geary Eppley, Xaochen Ye, Grazyna Odyniec, JH Lee, Daniel Brandenburg, Daniel Cebra, Prasanth Shanmuganathan

Agenda:

- Run 20 Summary
- Round table discussion of lessons learned

Overall Run Status

Energy	Start	Finish	First Run	Last Run	HLTgood	Target
11.5 GeV	Dec 10 th	Feb 24 th	20056032	21055017	235 M	230 M
31.2 FXT	Jan 28 th	Jan 29 th	21028011	21029037	112.5 M	100 M
9.8 FXT	Jan 29 th	Feb 1 st	21029051	21032016	108 M	100 M
19.5 FXT	Feb 1 st	Feb 2 nd	21032049	21033017	118 M	100 M
13.5 FXT	Feb 2 nd	Feb 3 rd	21033026	21034013	103 M	100 M
7.3 FXT	Feb 4 th	Feb 5 th	21035003	21036013	117 M	100 M
5.75 FXT	Feb 13 th	Feb 14 th	21044023	21045011	115.6 M	100 M
9.2 GeV	Feb 24 th	Sep 1 st	21055032	21245010	161.8 M	160 M
7.2 FXT	July 29 th	Sep 14 th	21211028	21258004	317 M	(300 M)
7.7 GeV	Sep 2 nd	Sep 11 th	21246012	21255021	3.19 M	(2.5 M)

Overall FXT Runs with eTOF

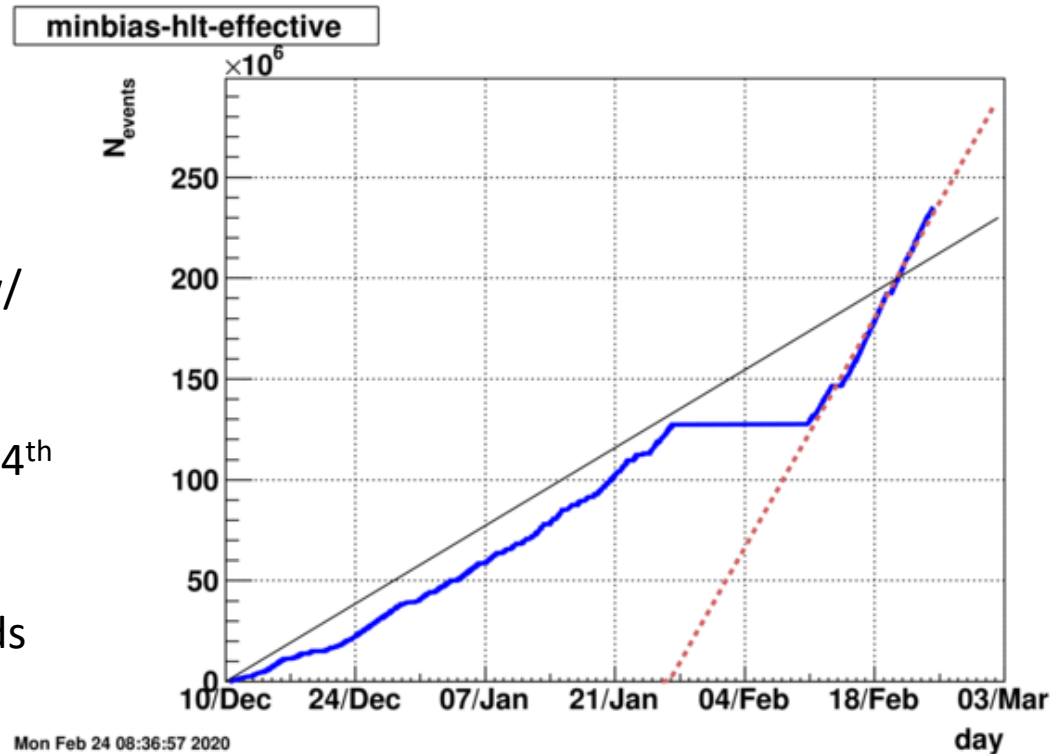
Beam Energy	CM Energy	HLTgood w/ eTOF	Minimum w/ eTOF
31.2 FXT	7.7 GeV	101.7 M	100 M
26.5 FXT	7.2 GeV	298.7 M	NA
19.5 FXT	6.2 GeV	80.4 M	80 M
13.5 FXT	5.2 GeV	88.9 M	70 M
9.8 FXT	4.5 GeV	72.7 M	65 M
7.3 FXT	3.9 GeV	106.4M	50 M
5.75 FXT	3.5 GeV	99.4 M	70 M

Collider Runs 2020

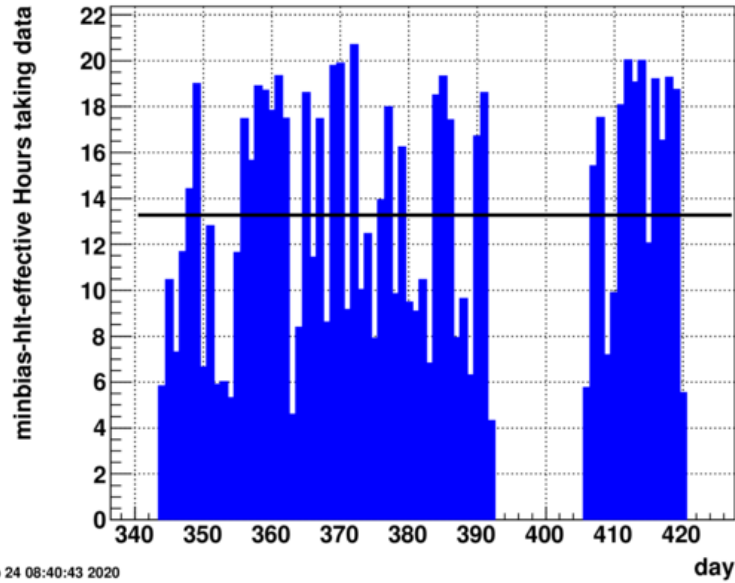
11.5 GeV Overview

	2010	predicted	achieved
Average HLTgood event rate (Hz)	30	60-80	80
Data taking (hours per day)	12	15	13
Fill Length (minutes)	20	40	25
DAQ Rate at start of fill (Hz)	140	250	550
Ratio of HLTgood/triggers (%)			40%

- First Stand from Dec 10th to Jan 27th
 - 37 days
 - Runs 20056032 to 21027019
 - Accumulated 127 M HLTgood w/ eTOF
- Second Stand from Feb 10th to Feb 24th
 - 14 days
 - Runs 21041021 to 21055017
 - Total 235 M between two stands

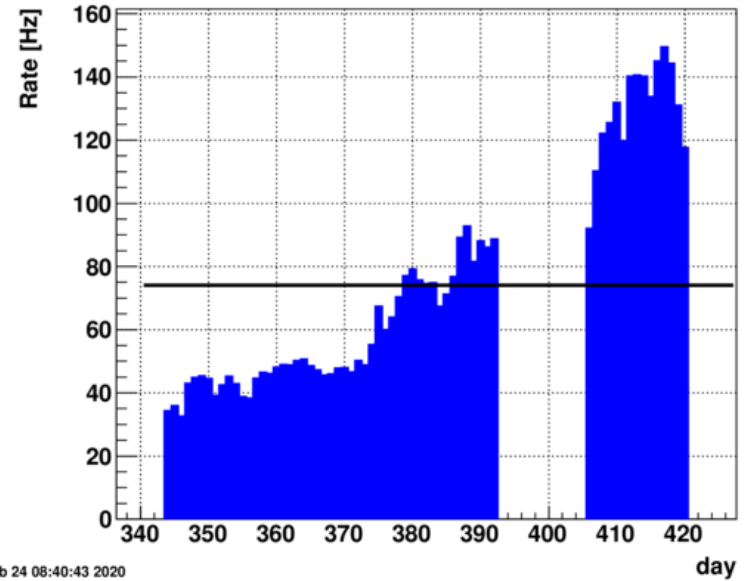


hours_perday_mb_hlt-effective.txt

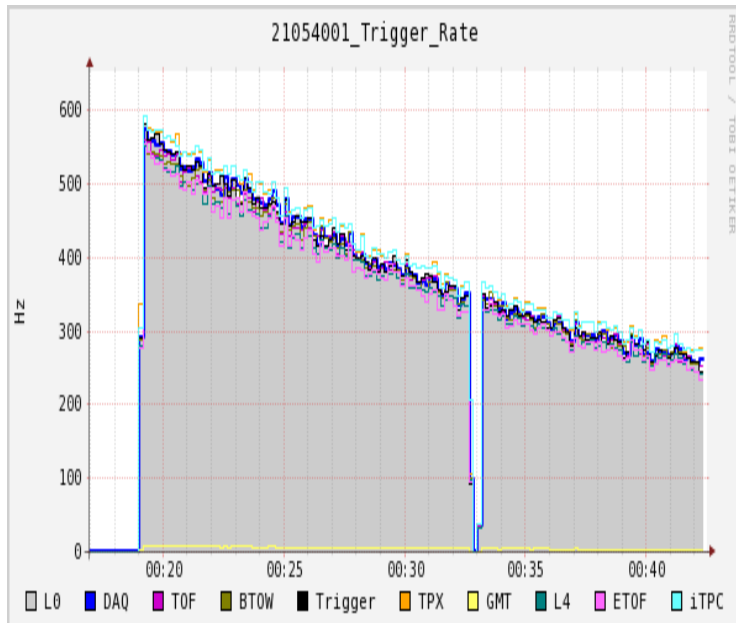


Mon Feb 24 08:40:43 2020

minbias-hlt-effective Average Rate [Hz]



Mon Feb 24 08:40:43 2020



STAR Event Display

*** SELECT GEOMETRY ***

Camera 1

*** 2D/3D MODE ***

Scene rotation: ON

Events: Live events

ZOOM IN
SAVE IMAGE
ZOOM OUT

DETECTOR GEOMETRY

BASICS

BOTTOM PLANE

BLUE BEAM

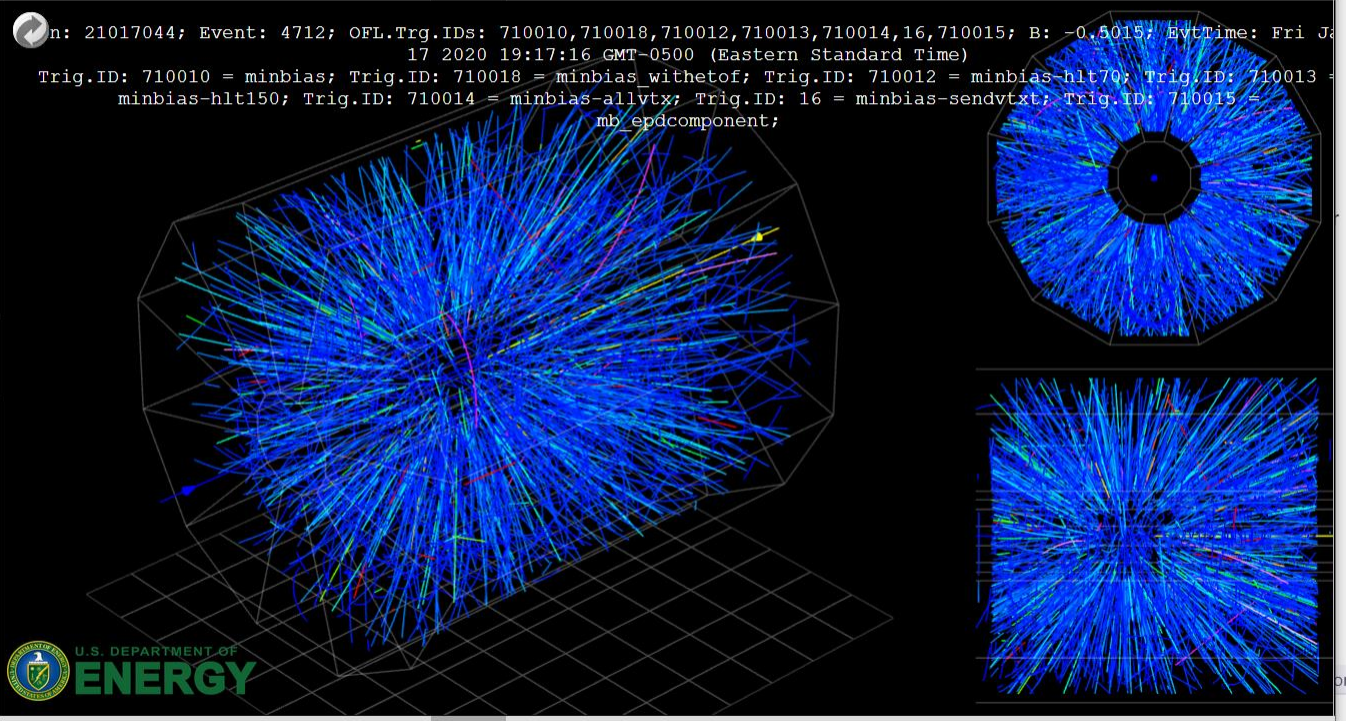
YELLOW BEAM

TIME PROJECTION CHAMBER

BARREL TPC

TRACKS

HITS



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9.2 GeV Overview

	2019	predicted	Achieved
Average HLTgood event rate (Hz)	6.2	33-53	33
Data taking (hours per day)	8	14	13
Fill Length (minutes)	45	30	45
DAQ Rate at start of fill (Hz)	60	160	200
Ratio of HLTgood/triggers (%)	10%	25%	18%

Initial Test :

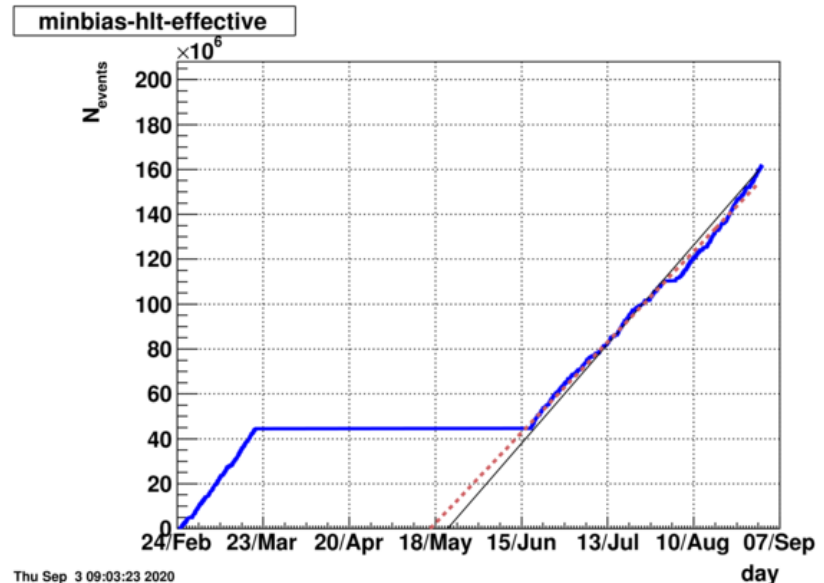
- January 30th 8:20 PM to 10:25 PM
- Runs 21030030 to 210330033
- Accumulated 35 k HLTgood70 events
- Good event rate = 8 Hz

Electron Cooling Commissioning :

- Feb 5th 6:30 PM to Feb 10th 8:00 AM
- Runs 21036022 to 21041013
- Accumulated 7.2 M HLTgood
- Good Event rate = 33 Hz

First Physics Production :

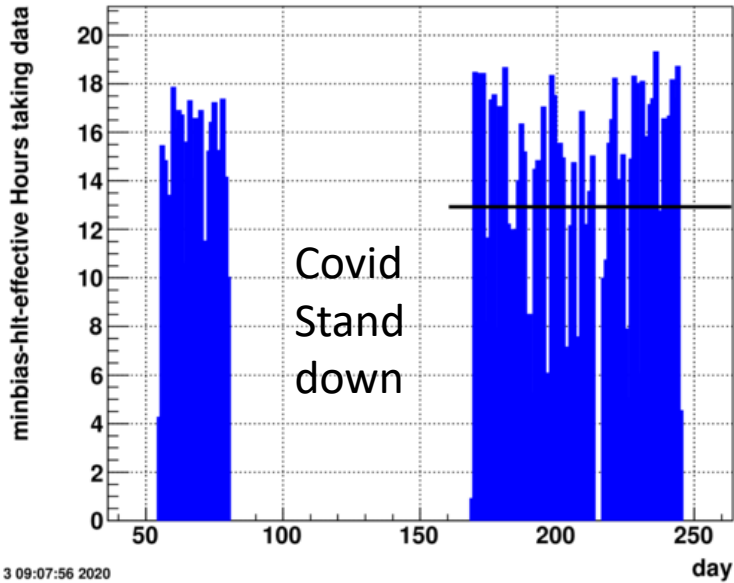
- Feb 24th to Mar 20th
- Runs: 21055032 to 21088027
- Accumulated: 44.5 M HLTgood



Second Physics Production :

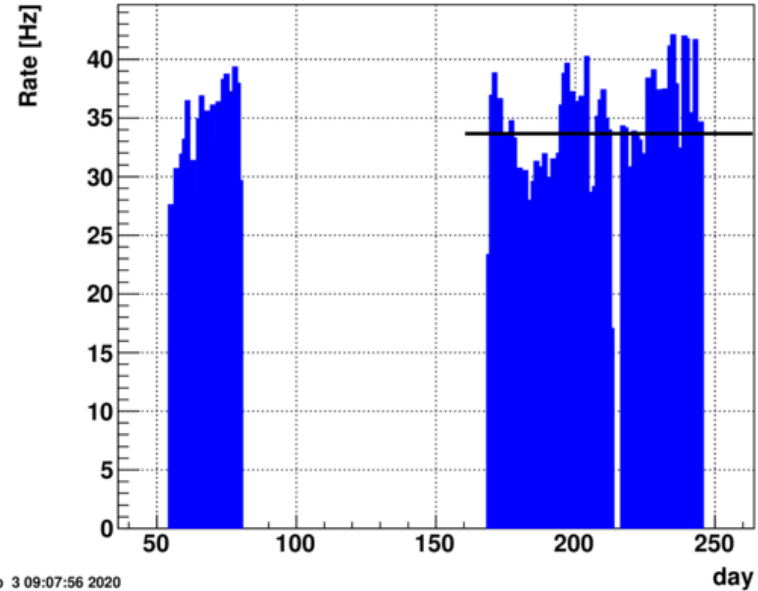
- Jun 17th to Sep 01st
- Runs: 21169036 to 21245010
- Accumulated: 161.8 M (1st and 2nd period)

hours_perday_mb_hlt-effective.txt



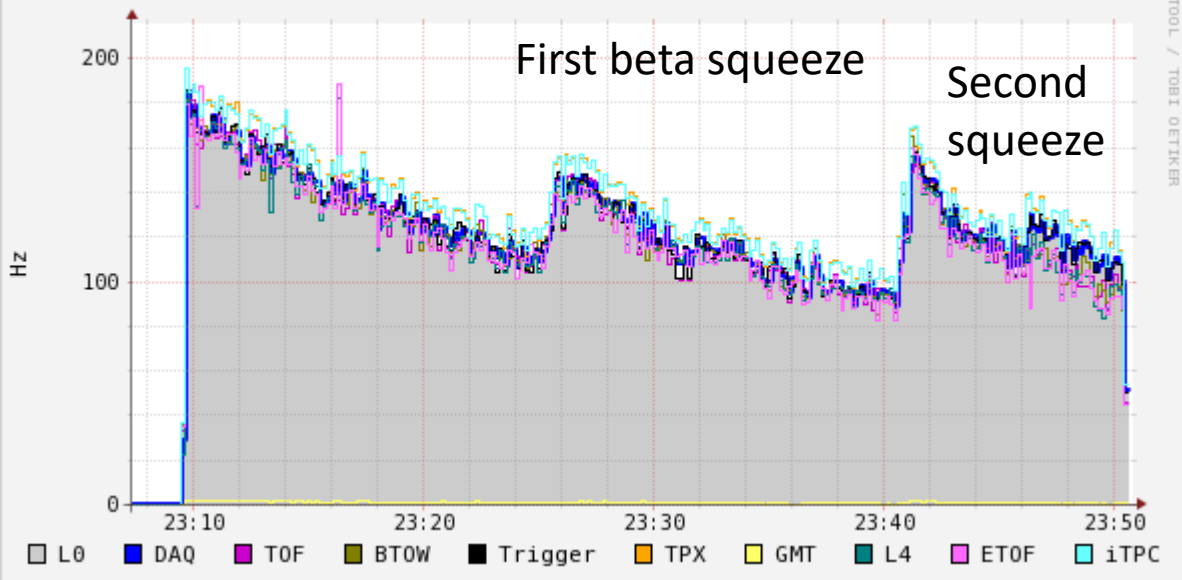
Thu Sep 3 09:07:56 2020

minbias-hlt-effective Average Rate [Hz]



Thu Sep 3 09:07:56 2020

21244034_Trigger_Rate



Collider conduct of operations included two beta squeezes. There was no gap cleaning during the fill; after STAR turned off, there was a short cleaning before the beam dump.

STAR Event Display

BROOKHAVEN NATIONAL LABORATORY

Run: 21039009; Event: 46722; OFL.Trig.IDs: 780010,780008,780002,780003,780004,16,780005; B: -0.5015; EvtTime: Sa
 Feb 08 2020 06:45:27 GMT-0500 (Eastern Standard Time)
 Trig.ID: 780010 = minbias; Trig.ID: 780008 = minbias withetof; Trig.ID: 780002 = minbias-hlt70; Trig.ID: 780003
 minbias-hlt150; Trig.ID: 780004 = minbias-allvtx; Trig.ID: 16 = minbias-sendvtxt; Trig.ID: 780005 =
 mb_epdcomponent;

*** SELECT GEOMETRY ***

Camera 1

*** 2D/3D MODE ***

Scene rotation: ON

Events: Live events

ZOOM IN

SAVE IMAGE

ZOOM OUT

DETECTOR GEOMETRY

BASICS

BOTTOM PLANE

BLUE BEAM

YELLOW BEAM

TIME PROJECTION CHAMBER

BARREL TPC

TRACKS

HITS

U.S. DEPARTMENT OF ENERGY

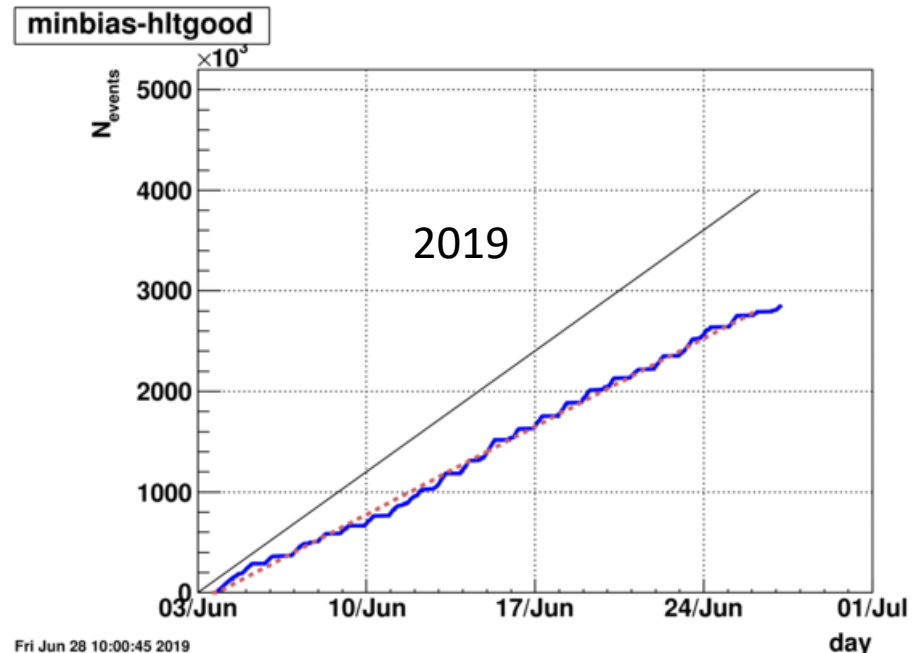
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6:45 AM 2/8/2020

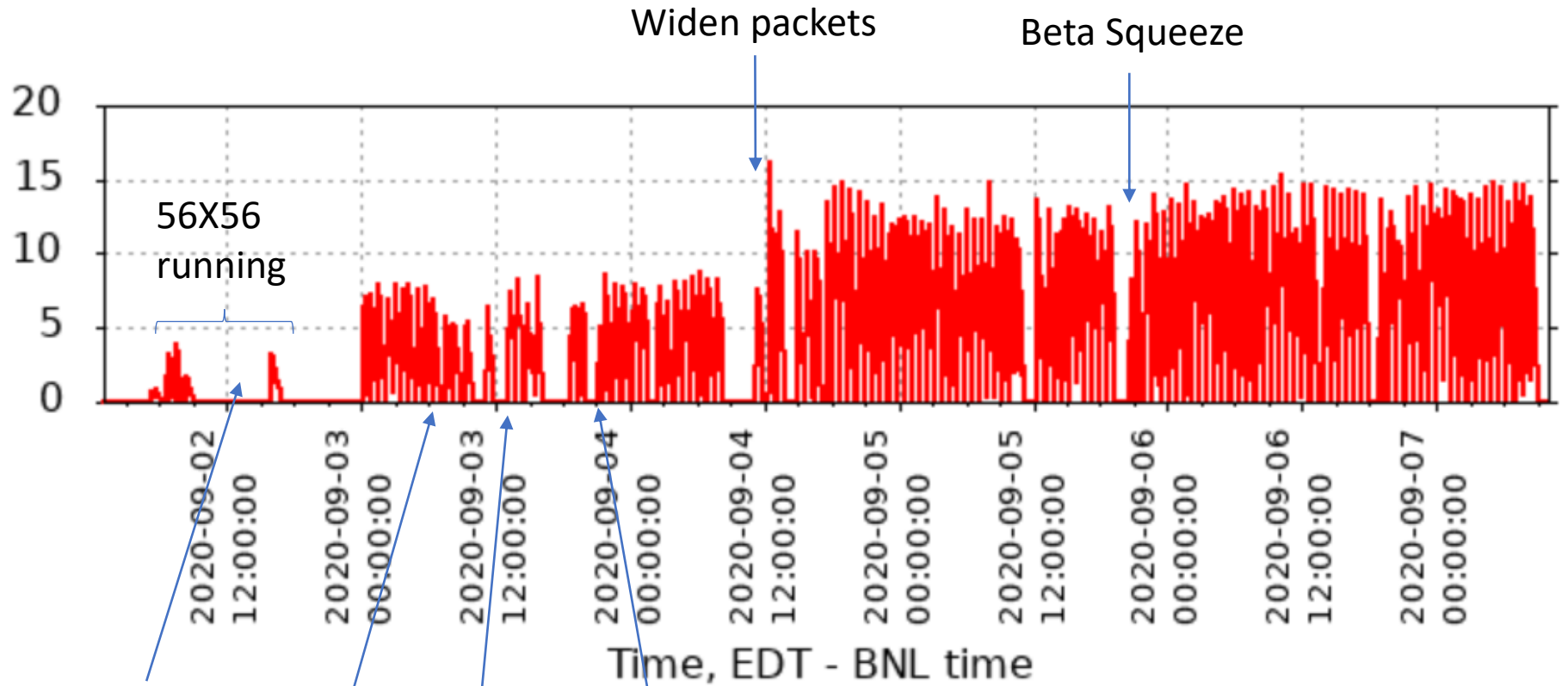
7.7 GeV Overview

	2010/2019	predicted	achieved
Average HLTgood event rate (Hz)	7/5.8	16-24	16
Data taking (hours per day)	10/8	12-15	15
Fill Length (minutes)	10/20	20-45	30
DAQ Rate at start of fill (Hz)	80/450	400	100/500
Ratio of HLTgood/triggers (%)	18%/10%	20%	18%

- 2019 -- 7.7 ran from June 4th to Jun 28th
- 2019 -- 2.8 M good events
 - Target for 2019 was 4 M
- 2019 Good event rate = **5.8 Hz**
- 2019 Average hours per day = **6 hours**
- 2020 Performance:



7.7 GeV Collider Running



First run: 21246010

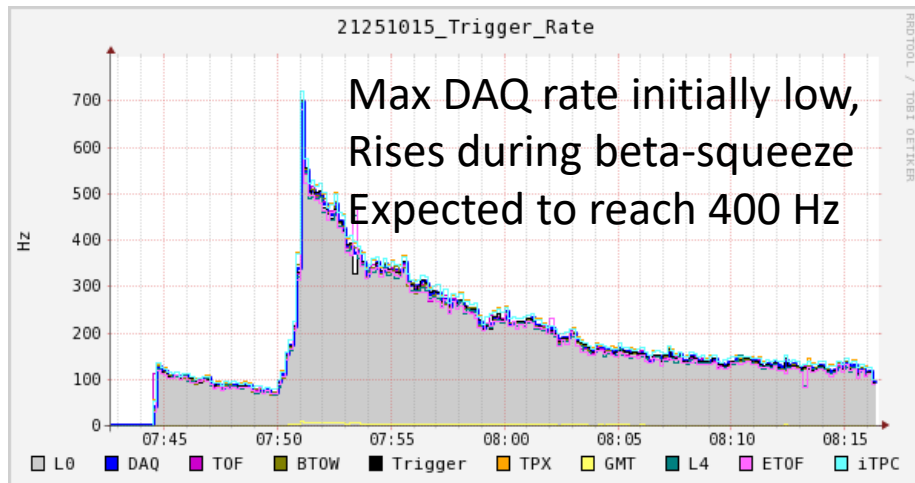
Switch from EBIS to Tandem: 21247009

Global timing change: 21247014

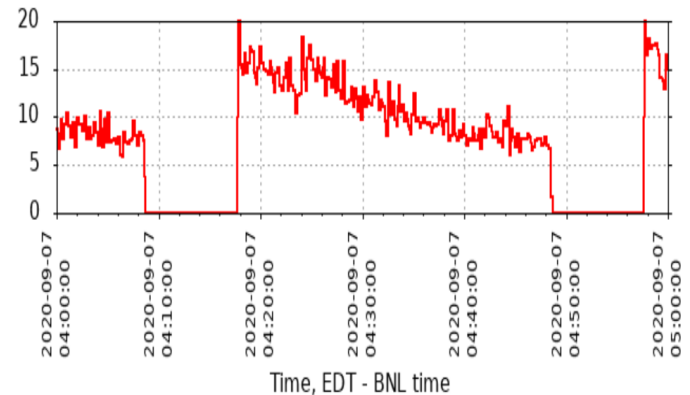
MCR shifted the vertex Z: 21247034-35

HLT good (70cm vtx) —

Intensities reached 85E9;
 Almost twice that achieved in 2010 7.7 GeV run

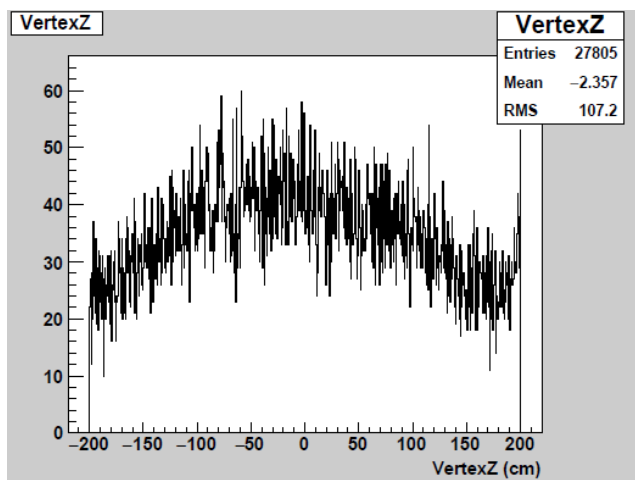


Fill Length: 30 minutes (as expected)

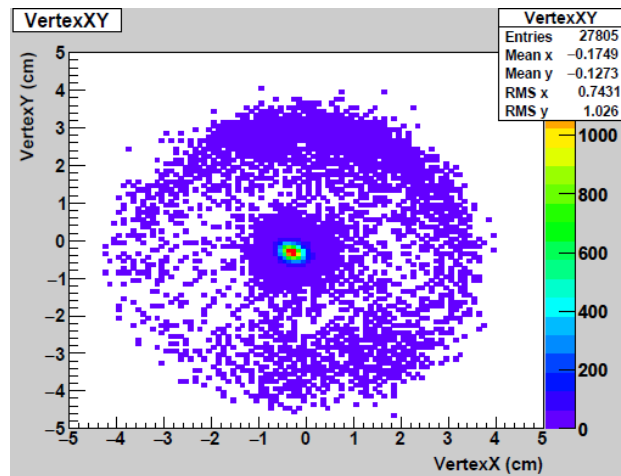


Average HLTgood rate: 16 Hz
 (want this to be 16-24 Hz)

Vertex Z look OK

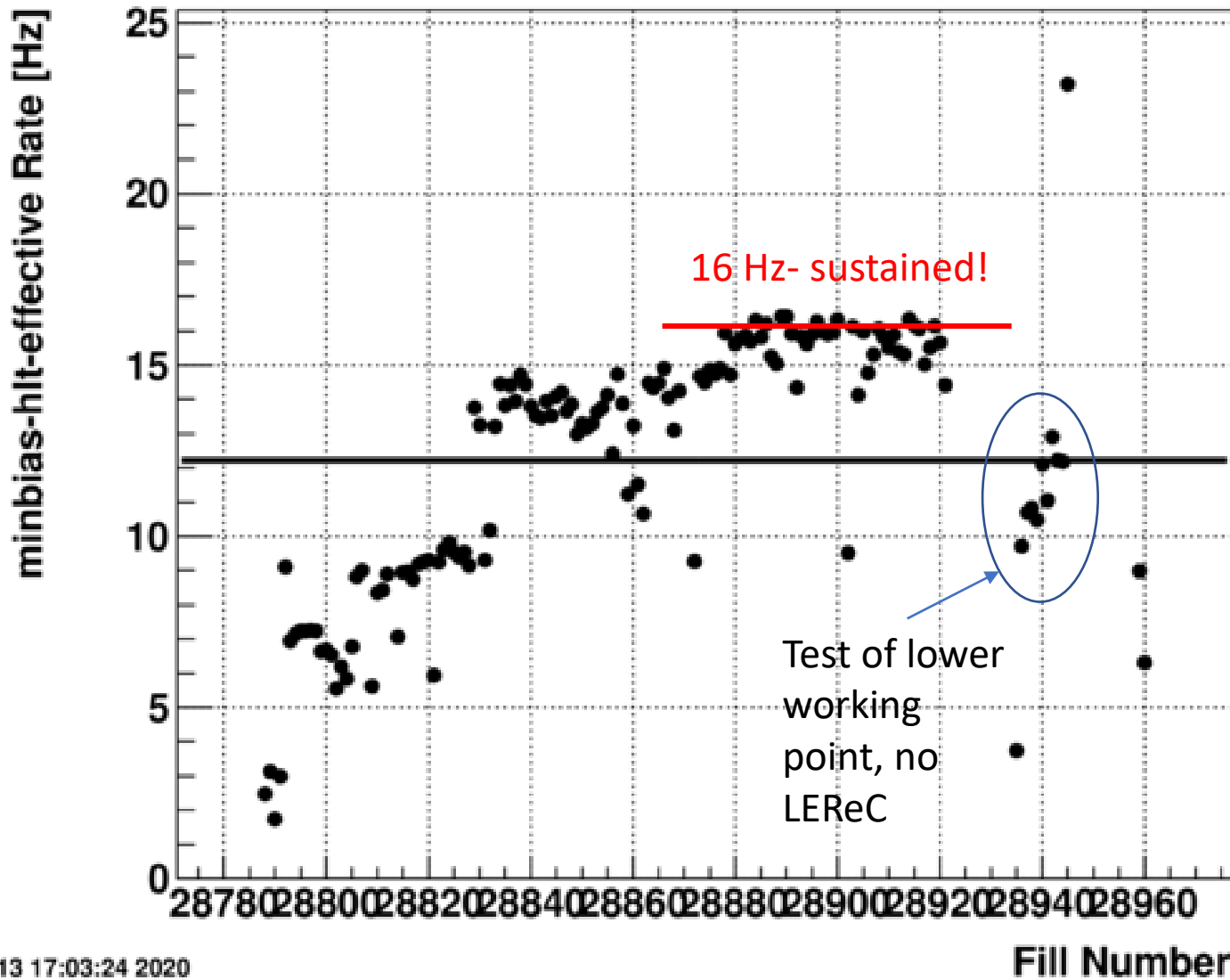


Vertex XY look clean



HLTgood ineffective fraction is 18%,
 (as expected)

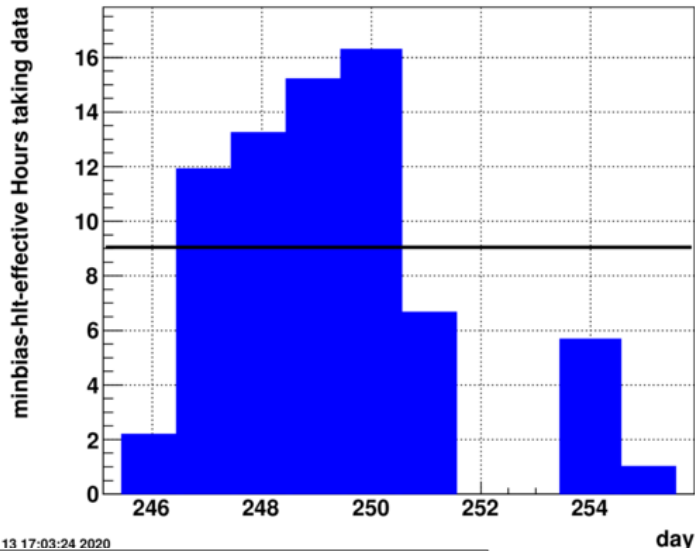
nev_rate_perfill_mb_hlt-effective.txt



Sun Sep 13 17:03:24 2020

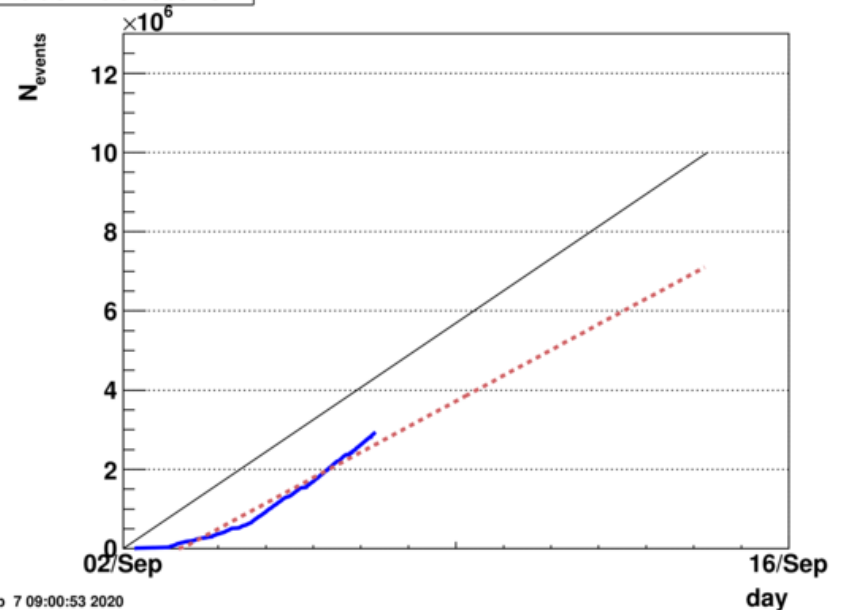
7.7 GeV collisions Run Overview

hours_perday_mb_hlt-effective.txt

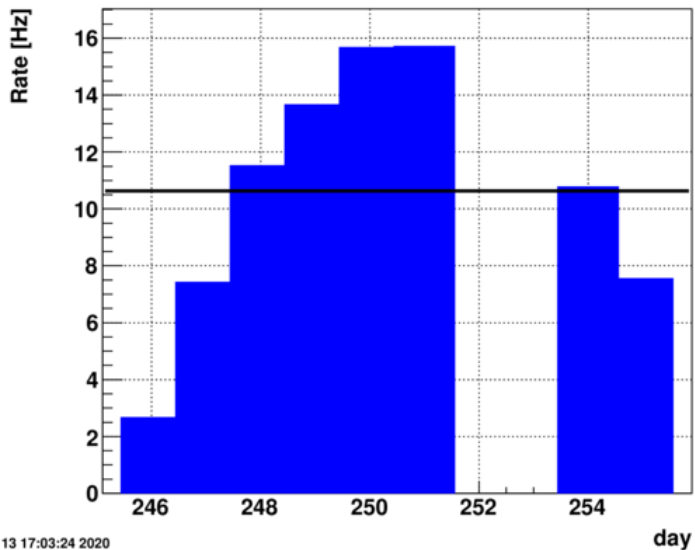


- Average hours per day was 15 over the weekend
- HLTgood average event rate achieved was 16 Hz
- Final total for the dataset: 3.19 M

minbias-hlt-effective



minbias-hlt-effective Average Rate [Hz]



Mon Sep 7 09:00:53 2020

STAR Event Display

*** SELECT GEOMETRY ***
Camera 1
*** 2D/3D MODE ***
Scene rotation: ON
Events: Live events
ZOOM IN
SAVE IMAGE
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DETECTOR GEOMETRY

BASICS

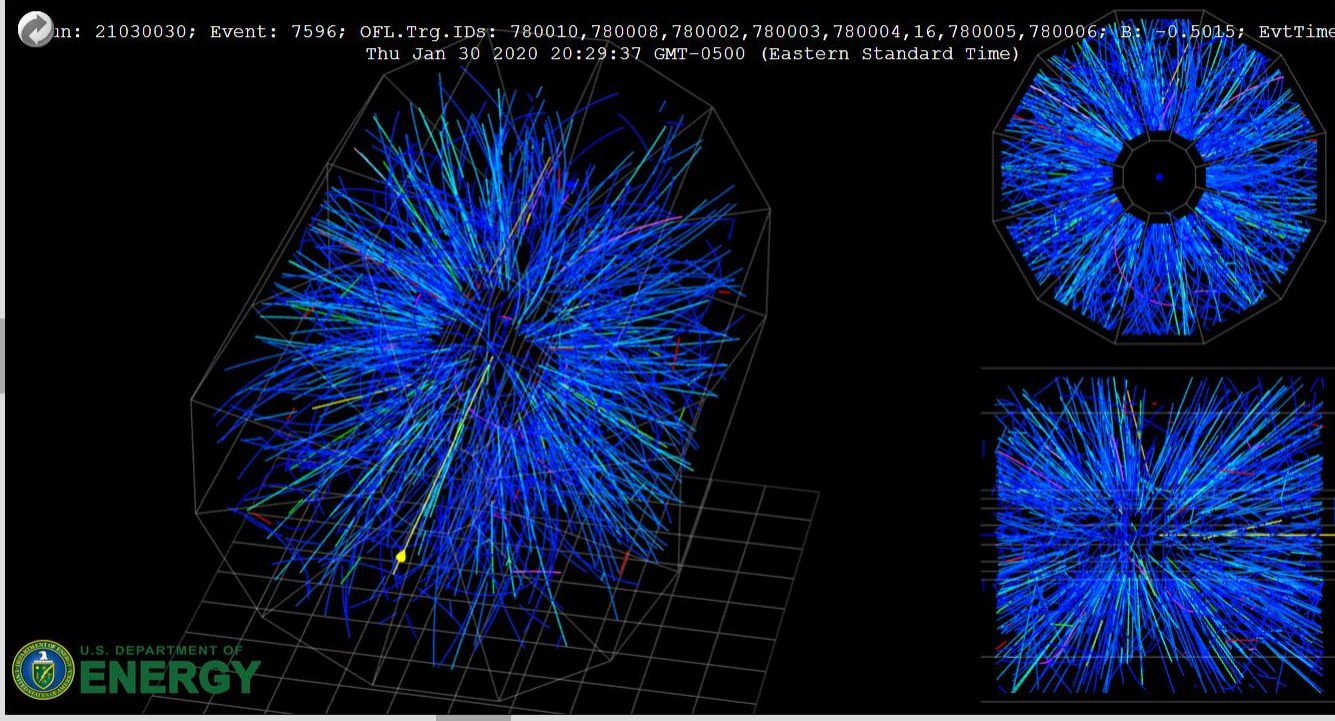
BOTTOM PLANE
BLUE BEAM
YELLOW BEAM

TIME PROJECTION CHAMBER

BARREL TPC

TRACKS

HITS



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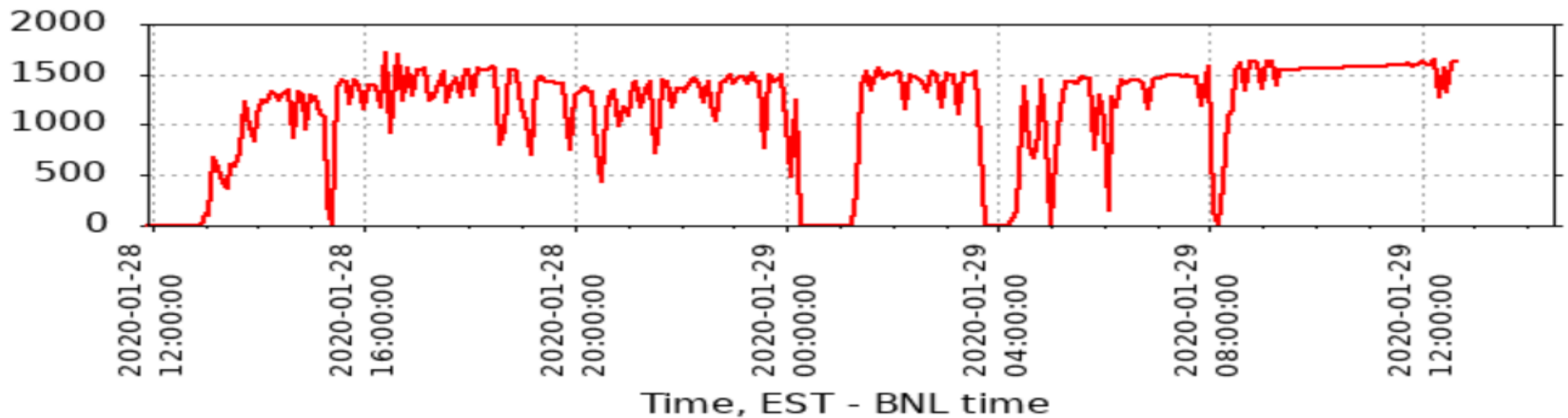
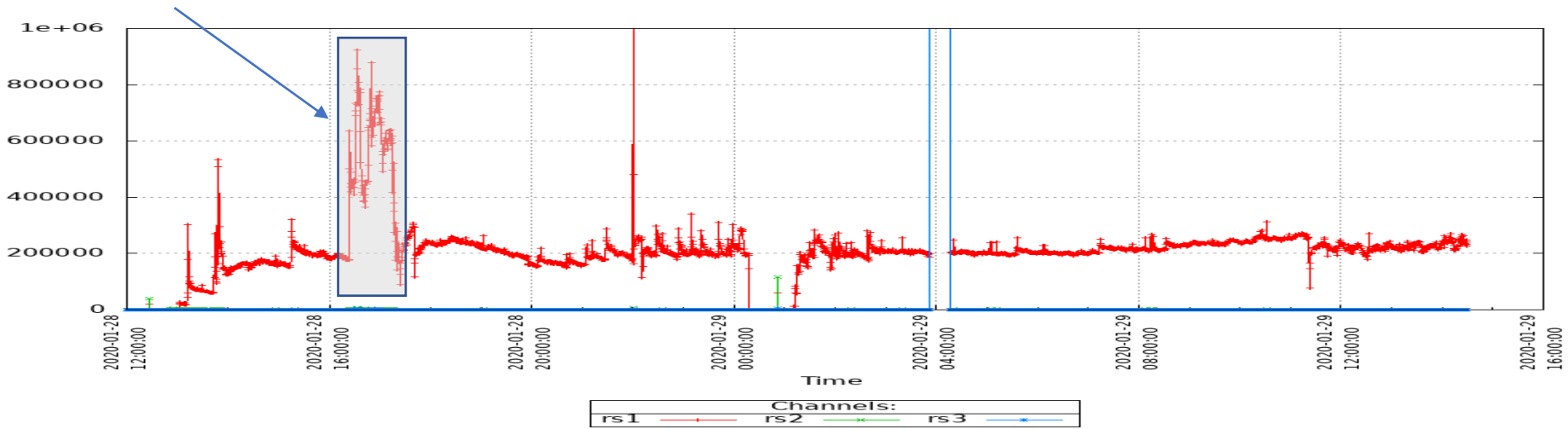
Slide 6 of 34

Notes Comments 61%

FXT Runs 2020

31.2 (7.7) GeV FXT: Jan 28th 12:30 PM to Jan 29th 14:30 PM

- Two fills – MCR controlled min bias trigger to 3 kHz
- Runs 21028011 to 21029037
- Acquired 112.5 HLT good (101.7 M w/ eTOF)
- Run 21028018 and parts of runs 17 and 19 have to be rejected due to high rates





Event Display

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*** SELECT GEOMETRY ***

Camera 1

*** 2D/3D MODE ***

Scene rotation: ON

Events: Live events

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DETECTOR GEOMETRY

BASICS

BOTTOM PLANE

BLUE BEAM

YELLOW BEAM

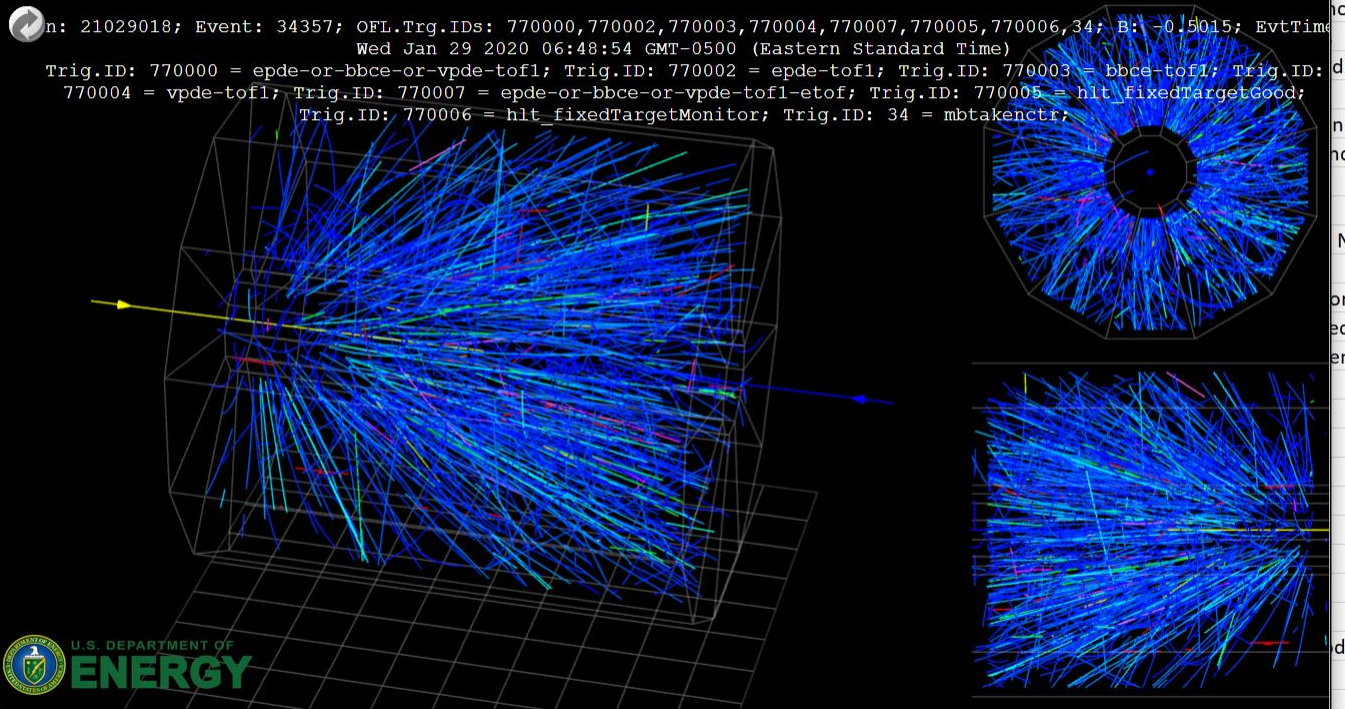
TIME PROJECTION CHAMBER

BARREL TPC

TRACKS

HITS

n: 21029018; Event: 34357; OFL.Trig.IDs: 770000,770002,770003,770004,770007,770005,770006,34; B: -0.5015; EvtTime
Wed Jan 29 2020 06:48:54 GMT-0500 (Eastern Standard Time)
Trig.ID: 770000 = epde-or-bbce-or-vpde-tof1; Trig.ID: 770002 = epde-tof1; Trig.ID: 770003 = bbce-tof1; Trig.ID:
770004 = vpde-tof1; Trig.ID: 770007 = epde-or-bbce-or-vpde-tof1-etof; Trig.ID: 770005 = hlt_fixedTargetGood;
Trig.ID: 770006 = hlt_fixedTargetMonitor; Trig.ID: 34 = mbtakenctr;



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he is a great and ferocious warrior, who laughs as he personally slaughters witches and grants and

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Page 1

Page: 1 of 1

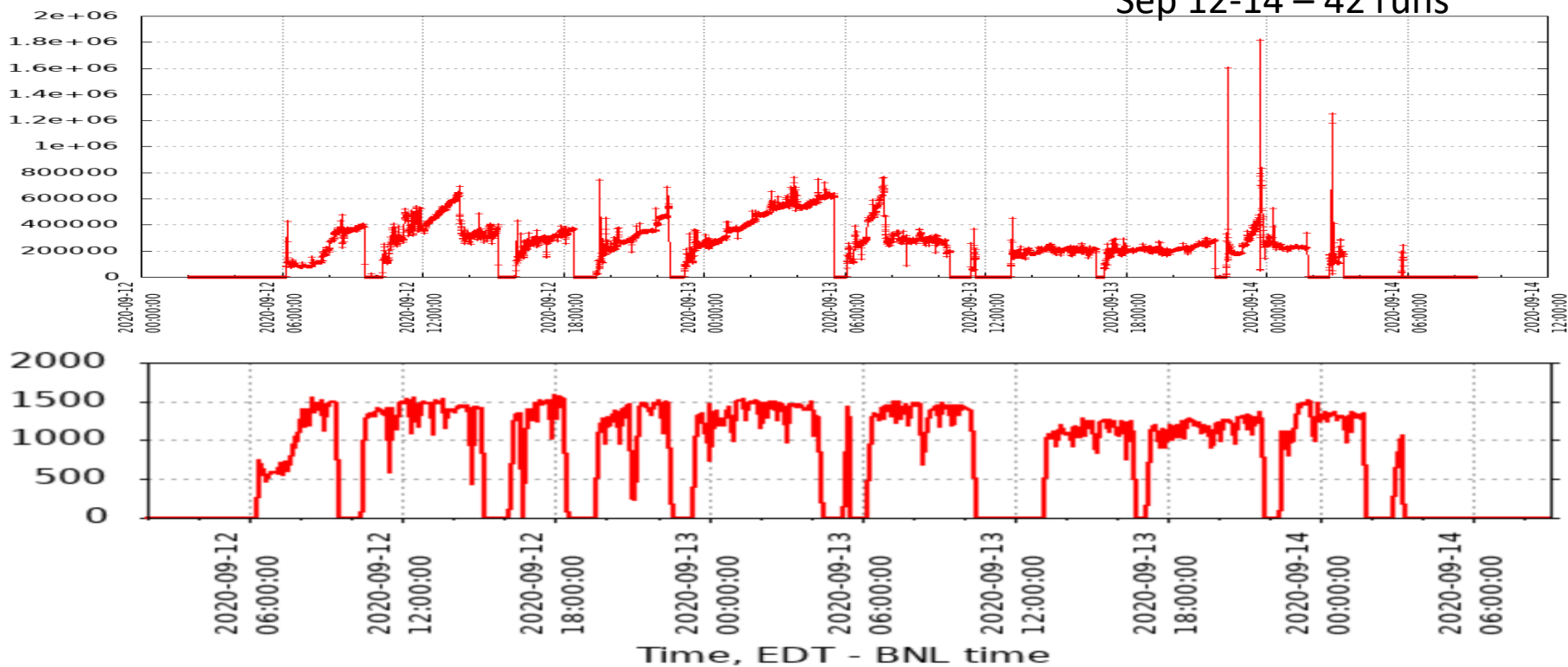
100%

Windows taskbar with search bar, task icons, and system tray showing time 6:49 AM and date 1/29/2020.

26.5 (7.2) GeV FXT: July 29th to September 14th

- Parasitic running during dedicated CeC beam time
- Runs 21211028 to 21258004
- Acquired 317 M HLT good (298.7 M w/ eTOF)

Jul 29 – one run
Aug 13 – 14 runs
Aug 19 – one run
Aug 27 – 9 runs
Sep 7 and 8 – 29 runs
Sep 12-14 – 42 runs



Physics topics:

- H4 Λ – 300-500 M
- Ω baryons yields – 300 M
- Global Lambda polarization – 300-500 M
- ϕ meson flow – 150 M



Event Display



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Events: Live events

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DETECTOR GEOMETRY

BASICS

BOTTOM PLANE

BLUE BEAM

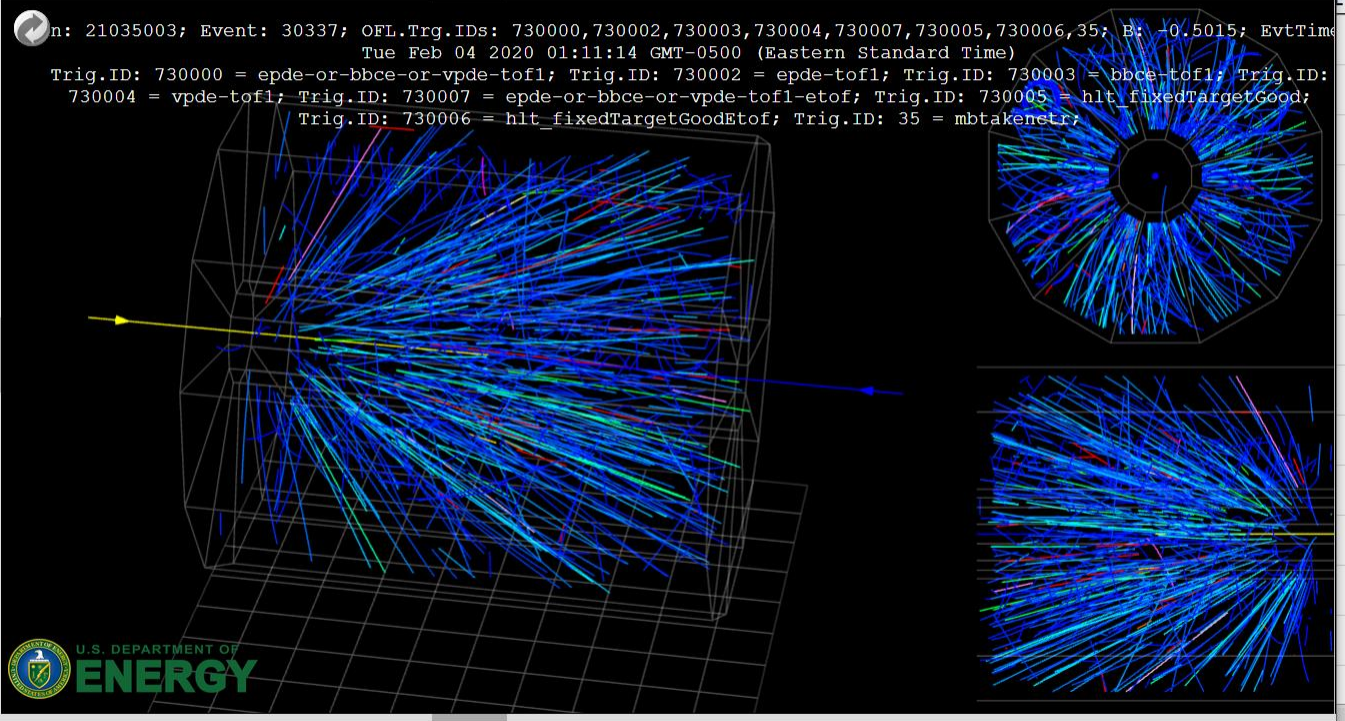
YELLOW BEAM

TIME PROJECTION CHAMBER

BARREL TPC

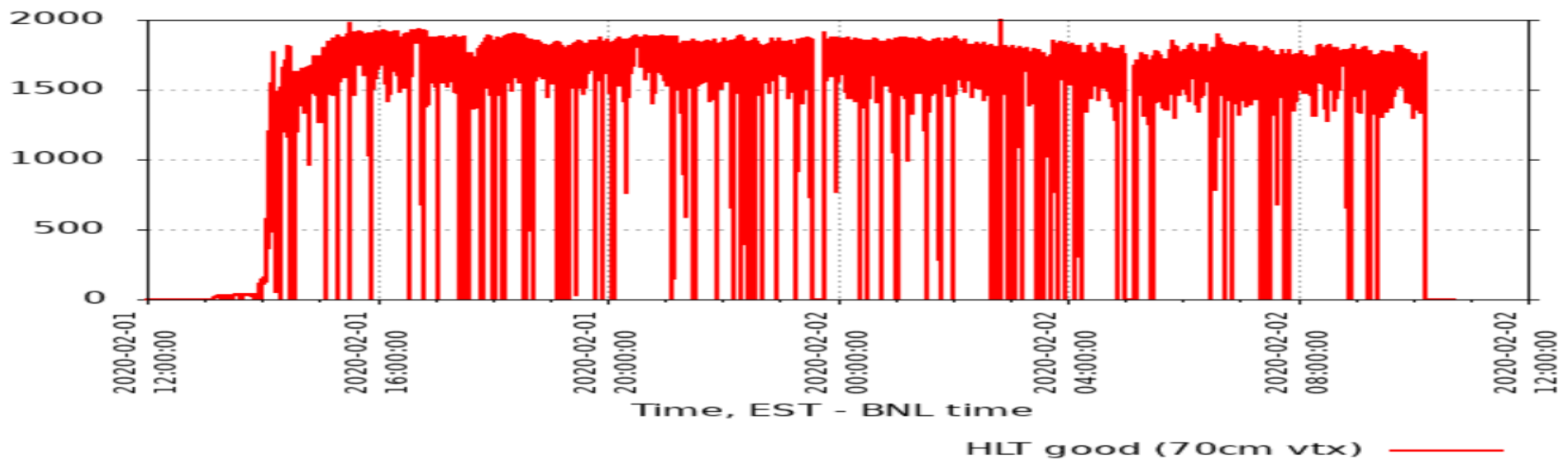
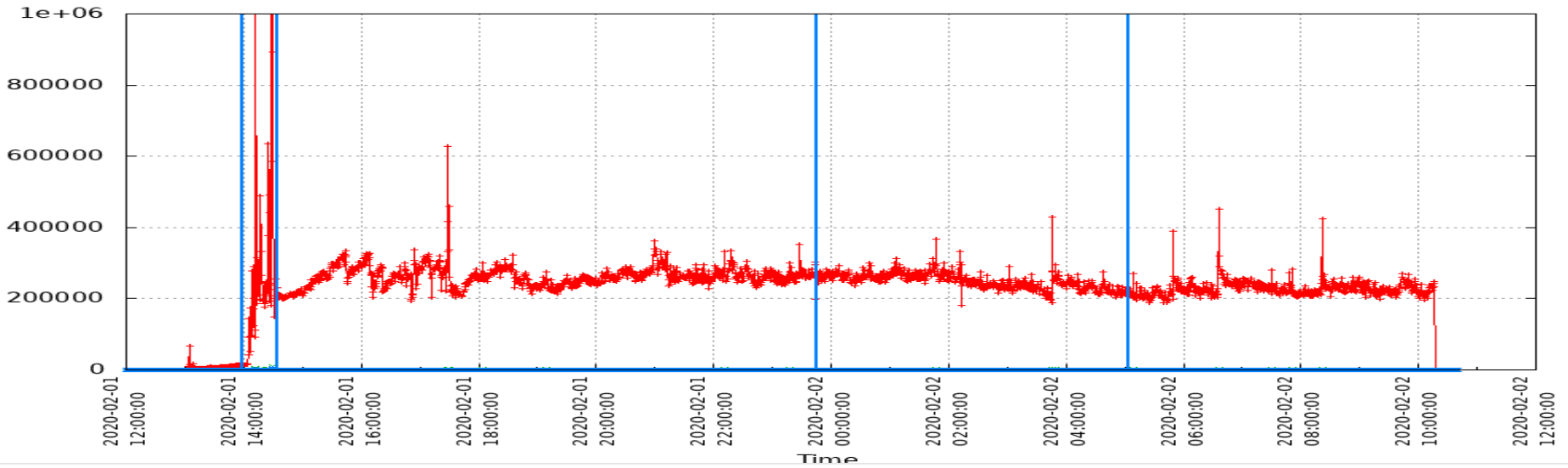
TRACKS

HITS



19.5 (6.2) GeV FXT: Feb 1st 1:30 PM to Feb 2nd 10:30 AM

- One long fill
- Runs 21032049 to 21033017
- Acquired 118.5 M HLTgood events (80.4 M with eTOF)



STAR Event Display

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*** 2D/3D MODE ***

Scene rotation: ON

Events: Live events

ZOOM IN
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DETECTOR GEOMETRY

BASICS

BOTTOM PLANE

BLUE BEAM

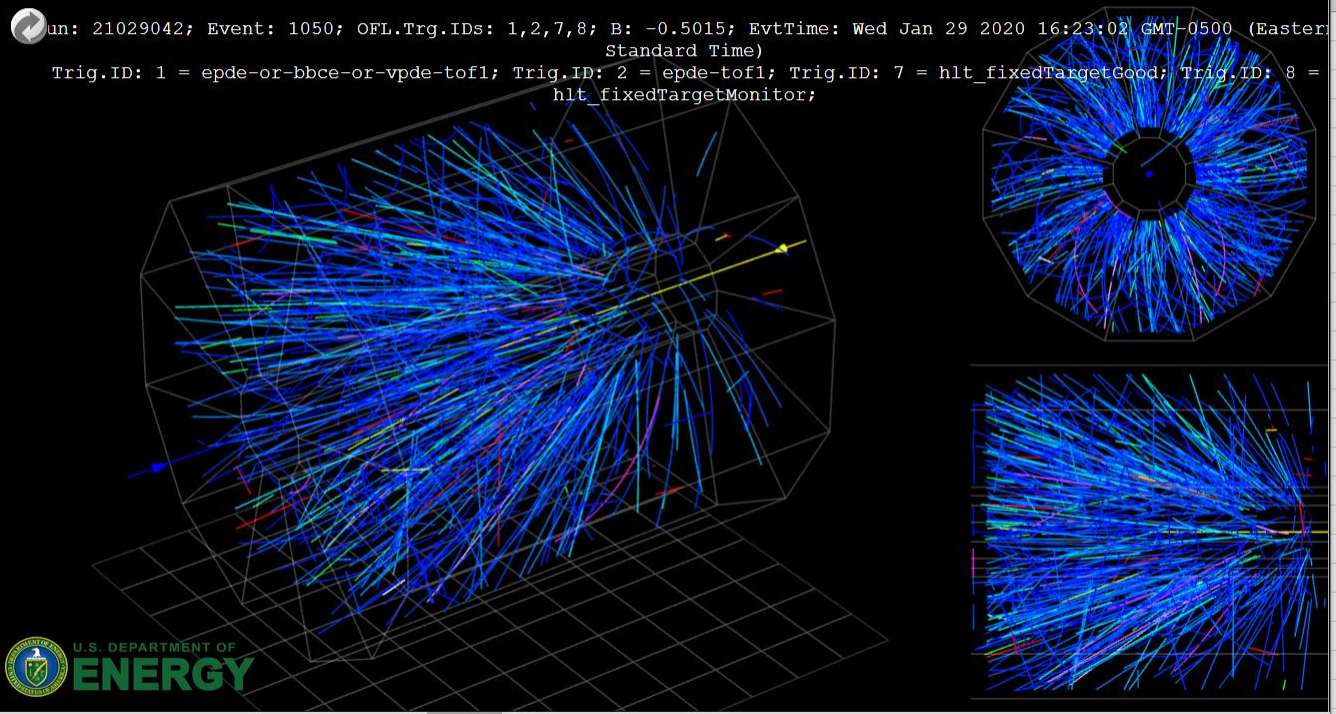
YELLOW BEAM

TIME PROJECTION CHAMBER

BARREL TPC

TRACKS

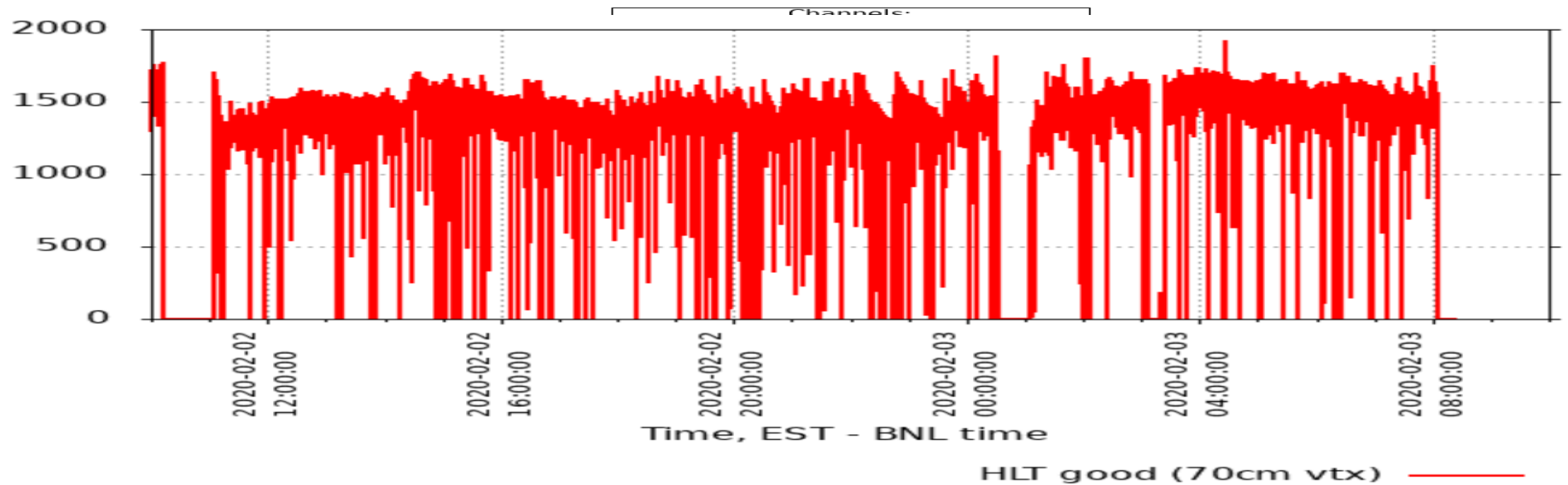
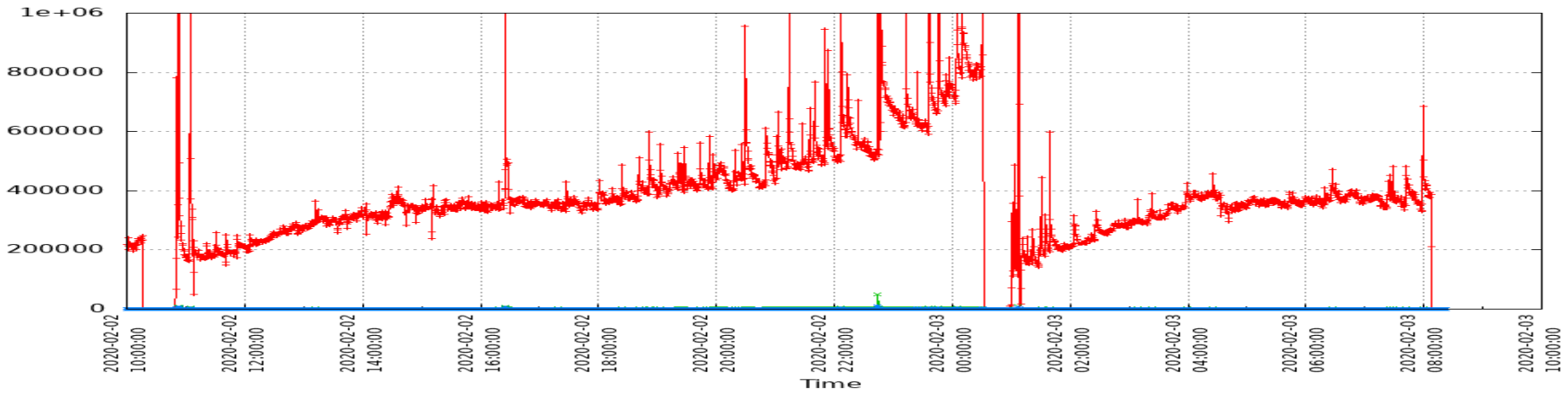
HITS



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13.5 (5.2) GeV FXT: Feb 2nd 10:45 AM to Feb 3rd 08:00 AM

- two fills
- Runs 21033026 to 21034013
- Acquired 103 M HLTgood (88.9 M w/ eTOF)



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Scene rotation: ON

Events: Live events

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DETECTOR GEOMETRY

BASICS

BOTTOM PLANE

BLUE BEAM

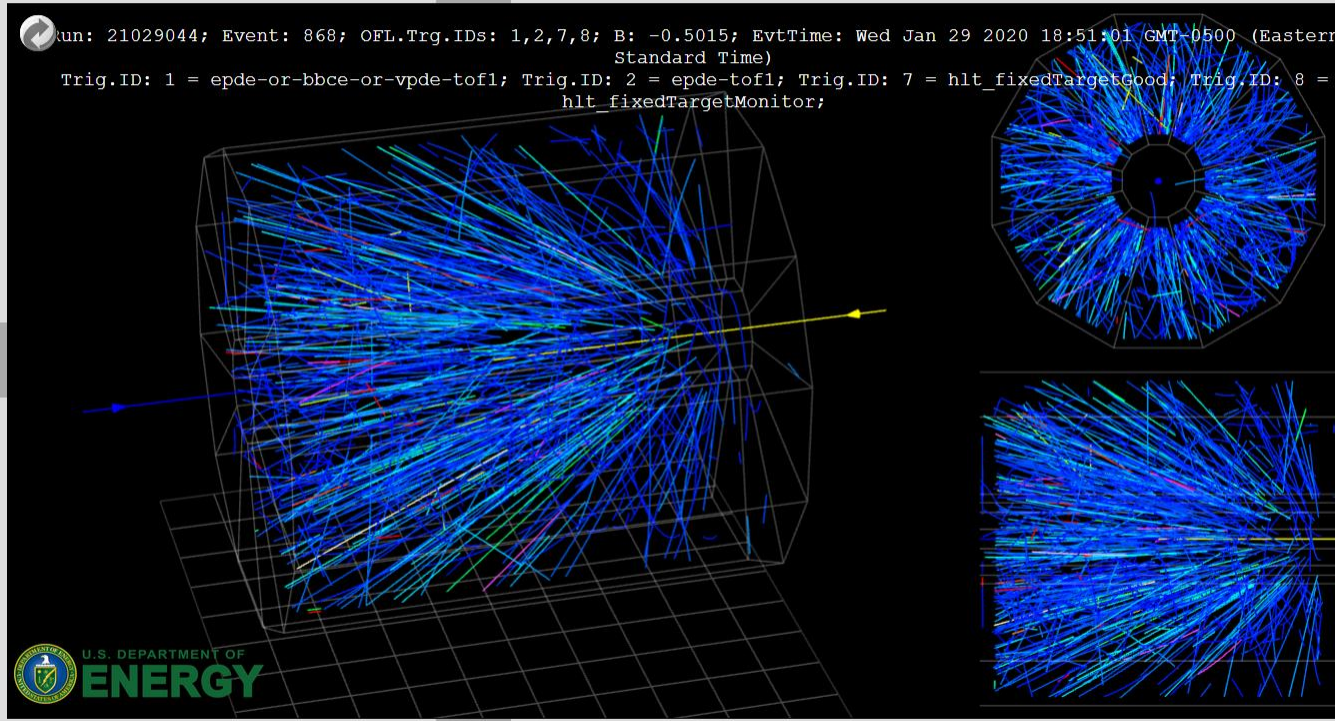
YELLOW BEAM

TIME PROJECTION CHAMBER

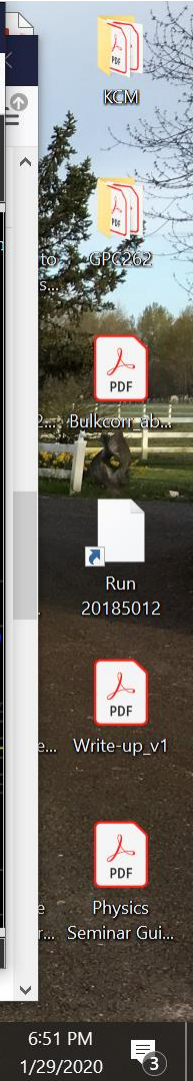
BARREL TPC

TRACKS

HITS

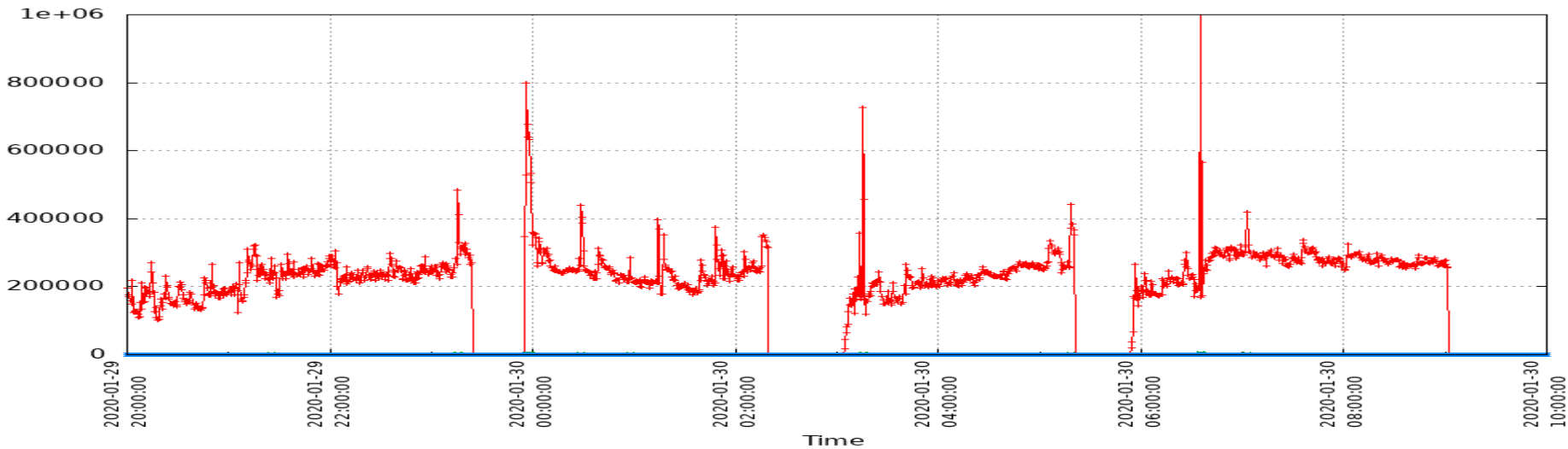


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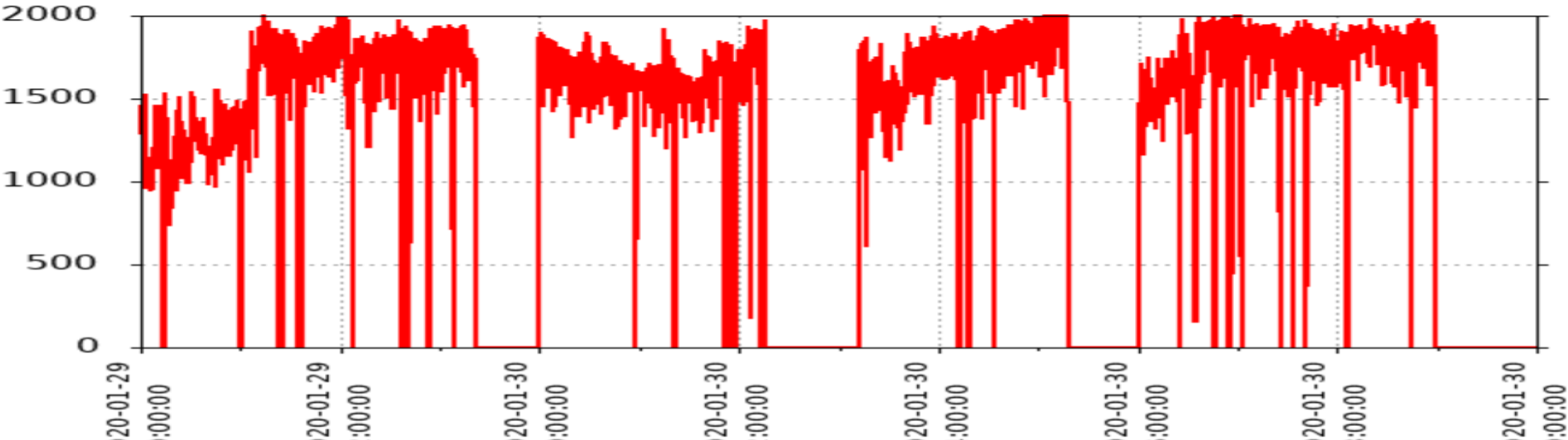


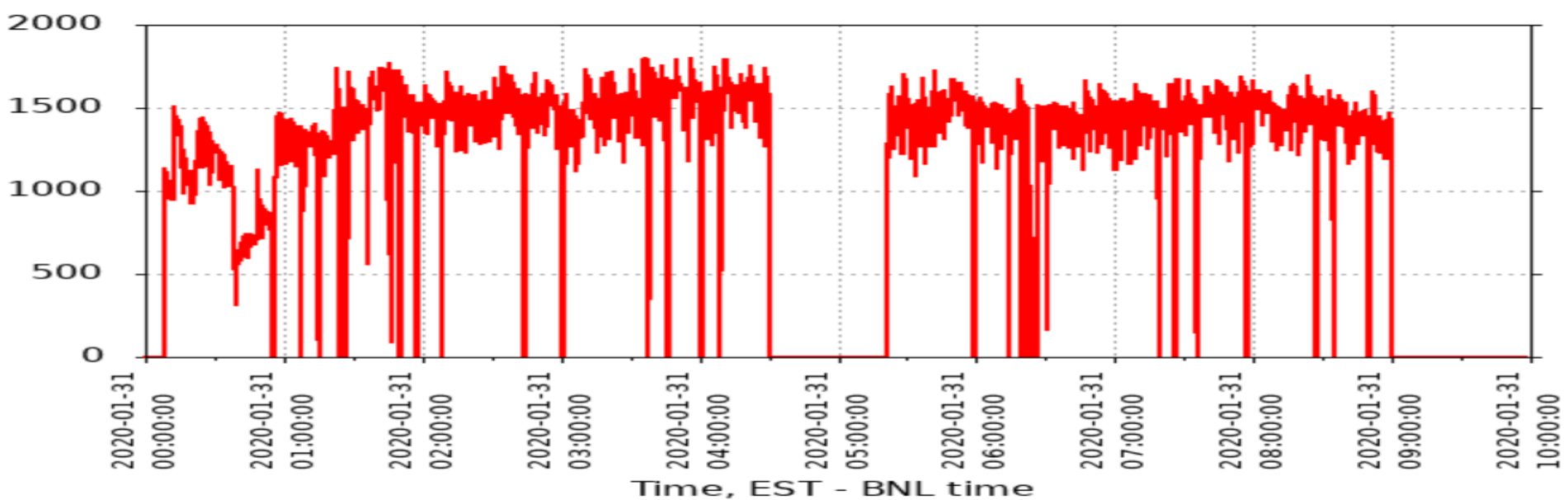
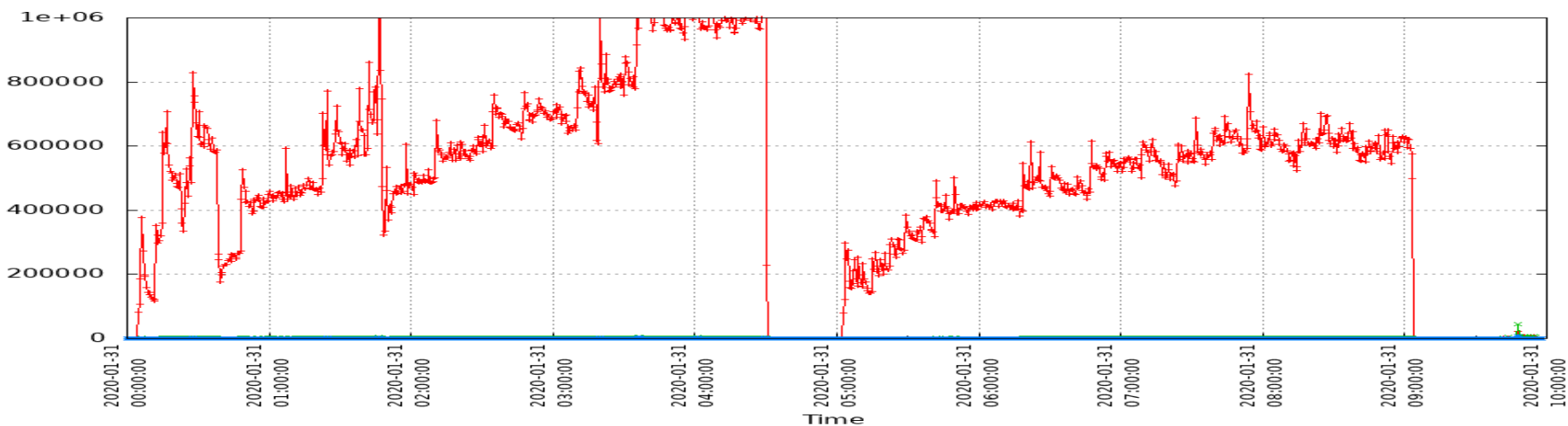
9.8 (4.5) GeV FXT: Jan 29th 8 PM to Jan 30th 10 AM, Jan 31st 0 AM to Jan 31st 9 AM and Jan 31st 10 PM to Feb 1st 7AM

- Four fills over the first night, two fills on second night, two fills on third night
- Runs 21029051 to 21030011, 21031001 to 21031016, and 21031029 to 21032016
- Acquired 108 M HLTgood events (72.7 M with eTOF)

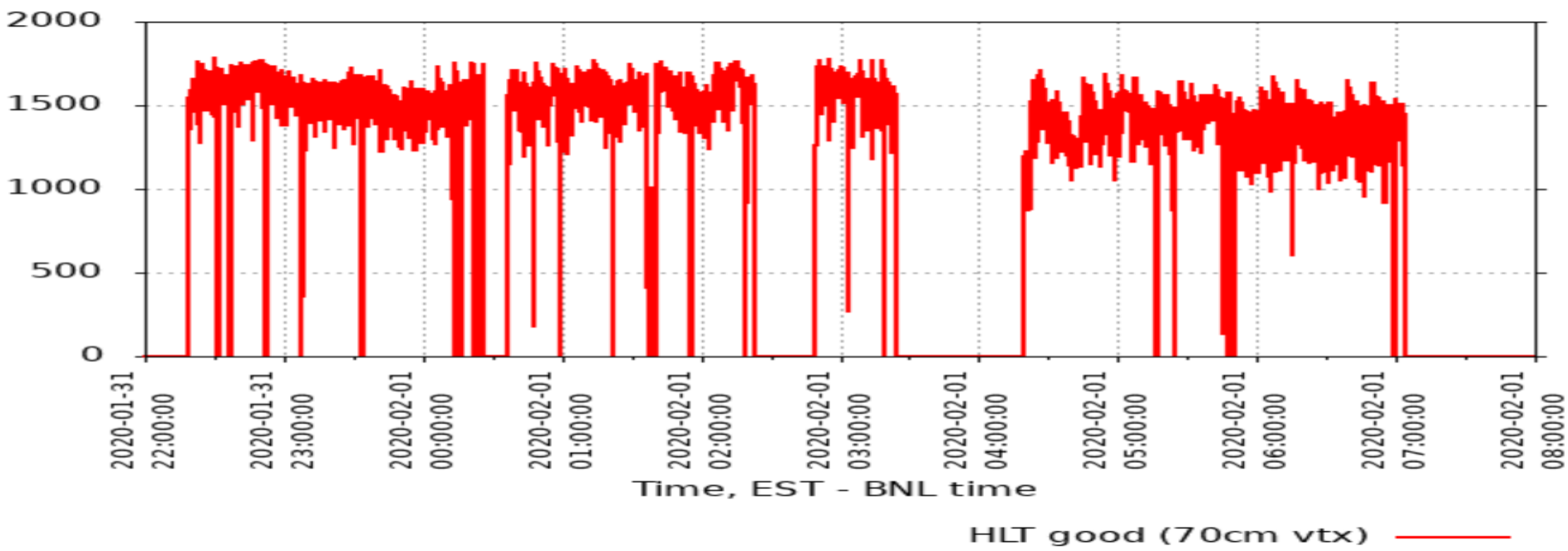
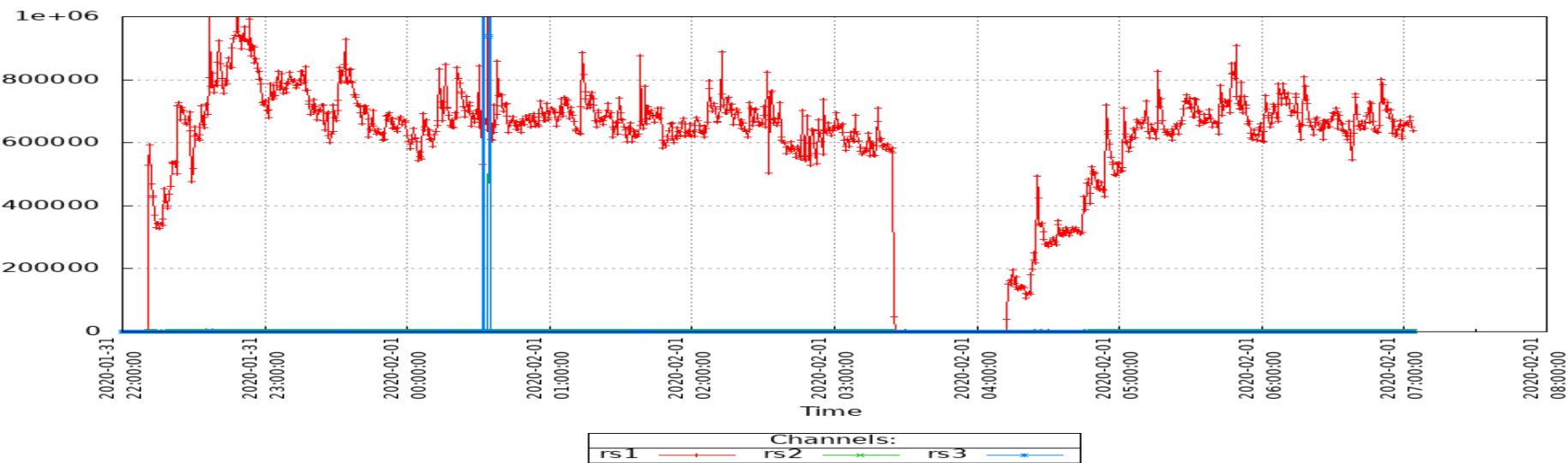


Channels:
rs1 — rs2 — rs3 —





HLT good (70cm vtx) — red line



STAR Event Display

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*** SELECT GEOMETRY ***

Camera 1

*** 2D/3D MODE ***

Scene rotation: ON

Events: Live events

ZOOM IN

SAVE IMAGE

ZOOM OUT

DETECTOR GEOMETRY

BASICS

BOTTOM PLANE

BLUE BEAM

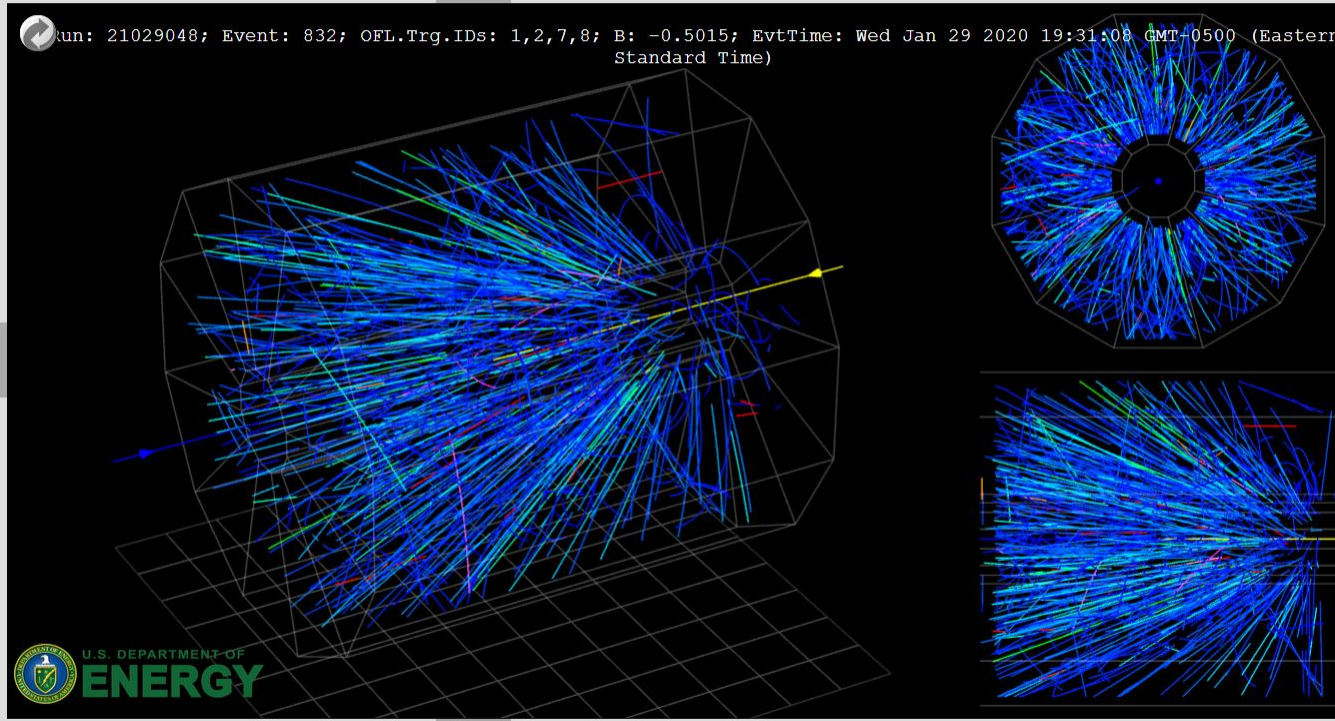
YELLOW BEAM

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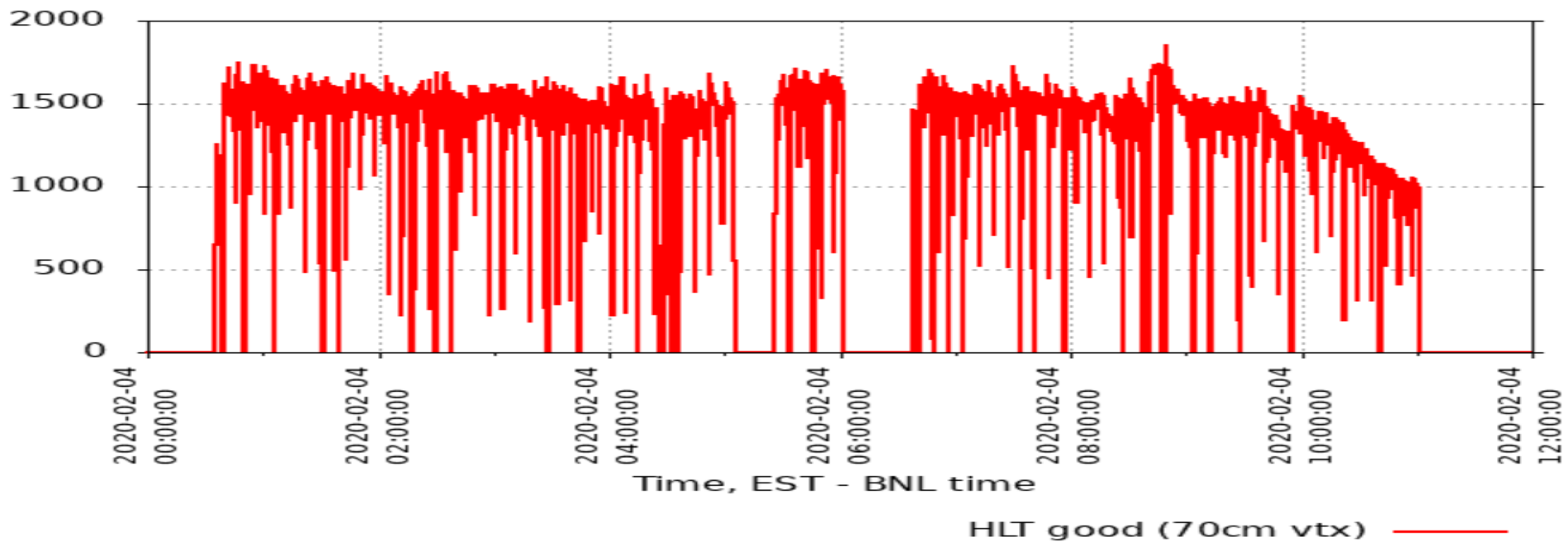
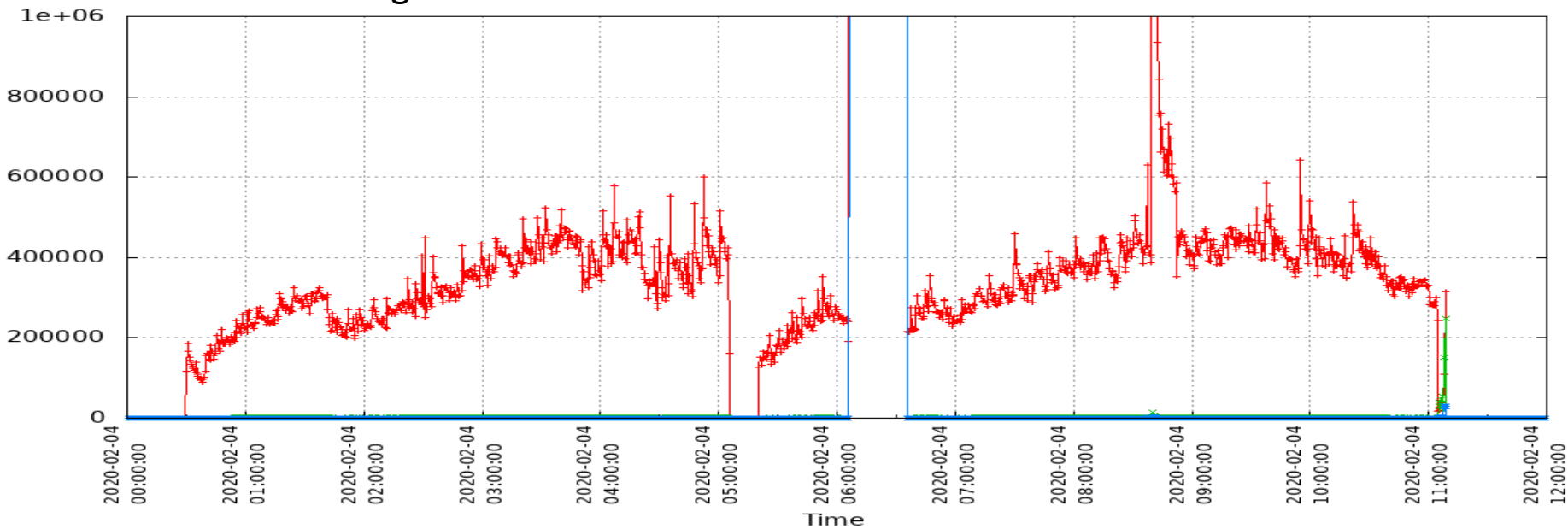
7.3 (3.9) GeV FXT:

- Two overnights, for both fills last about 4 hours
- February 4th 10 PM to 10 AM
- Runs 21035003 to 21035017

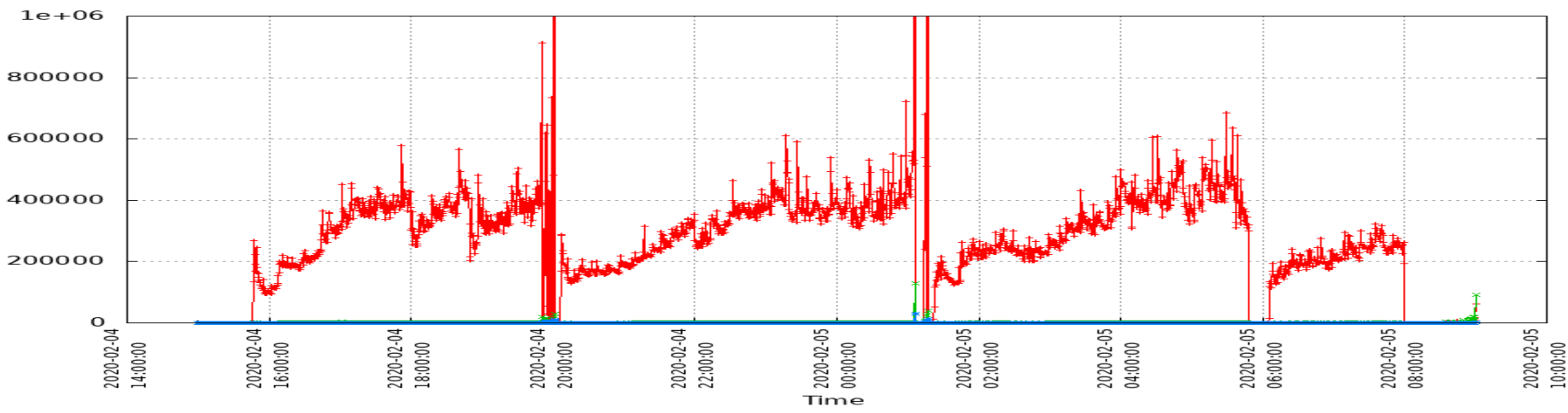
- February 4th 3 PM to February 5th 8 AM
- Runs 21035025 to 21036013

- Acquired 117.4 M HLTgood events (106.4 w/ eTOF)

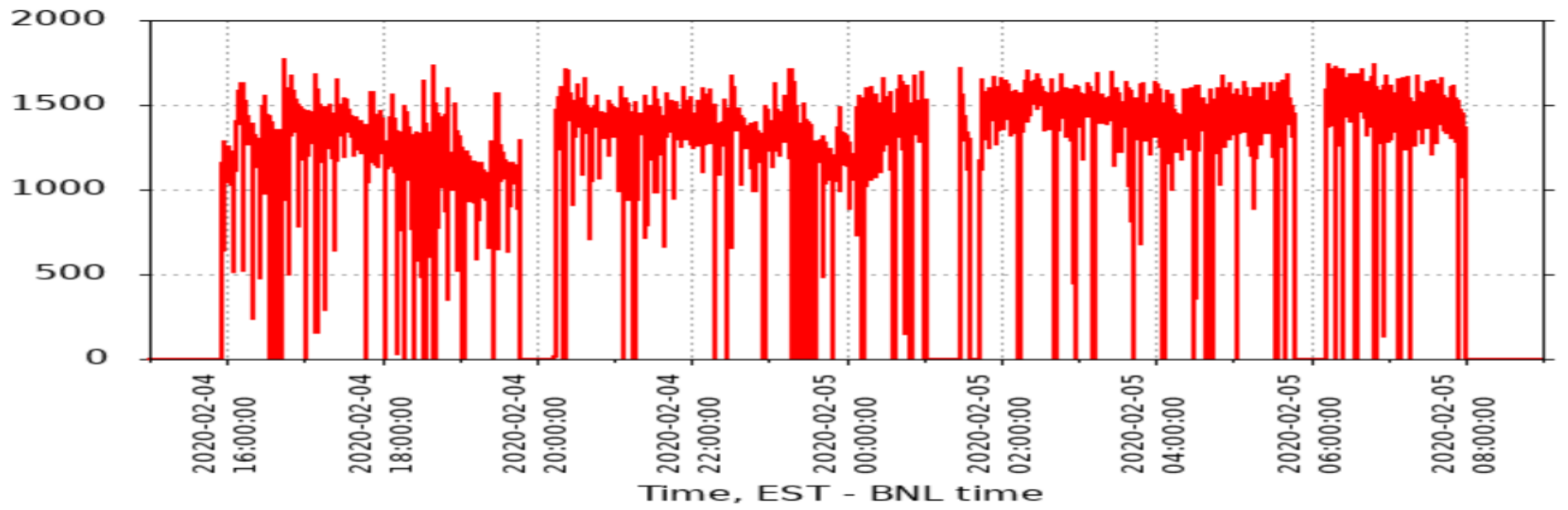
First overnight



Second overnight



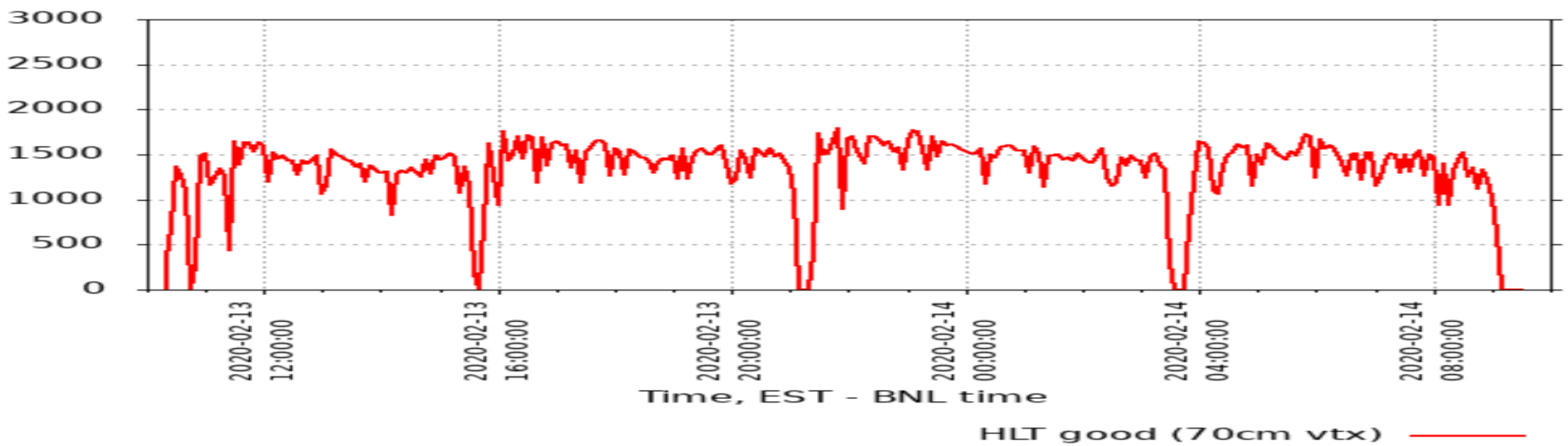
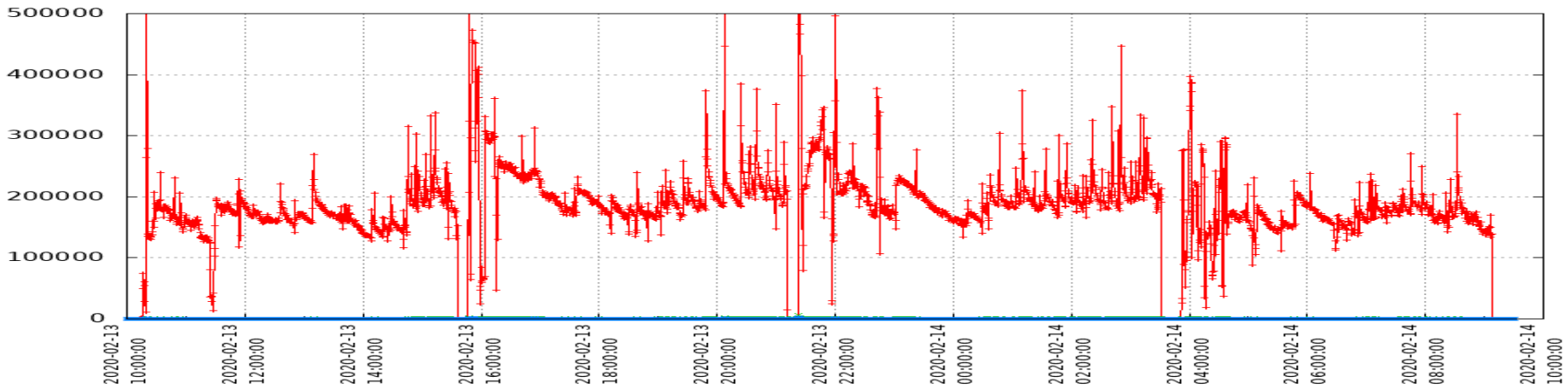
Channels:
rs1 — rs2 — rs3 —



HLT good (70cm vtx) —

5.75 (3.5) GeV FXT: February 13th 10:00 AM to February 14th 9:00 AM

- Four 5.5 hour long fills
- Runs 21044023 to 21045011
- Acquired 115.6 M good events (99.4 M w/ eTOF)



[Inbox \(48,600\) - danielcebra@g](#) | [\(14\) Facebook](#) | [ShiftLog](#) | [STAR RunLog](#) | [21036007.I4.p](#) | [Run 20: ONLIN](#) | [Conditions DB](#) | [STAR RunLog](#) | [STAR 3D Ev](#)

<https://online.star.bnl.gov/aggregator/livedisplay/>

STAR Event Display

BROOKHAVEN NATIONAL LABORATORY

Run: 21045007; Event: 7261; OFL.Trig.IDs: 720000,720005,9,35; B: -0.5015; EvtTime: Fri Feb 14 2020 06:11:4 GMT-0500 (Eastern Standard Time)
 Trig.ID: 720000 = epde-or-bbce-or-vpde-tof1; Trig.ID: 720005 = hlt_fixedTargetGood; Trig.ID: 9 = hlt_sendVertex; Trig.ID: 35 = mbtakenctr;

*** SELECT GEOMETRY ***

Camera 1

*** 2D/3D MODE ***

Scene rotation: ON

Events: Live events

ZOOM IN

SAVE IMAGE

ZOOM OUT

DETECTOR GEOMETRY

BASICS

BOTTOM PLANE

BLUE BEAM

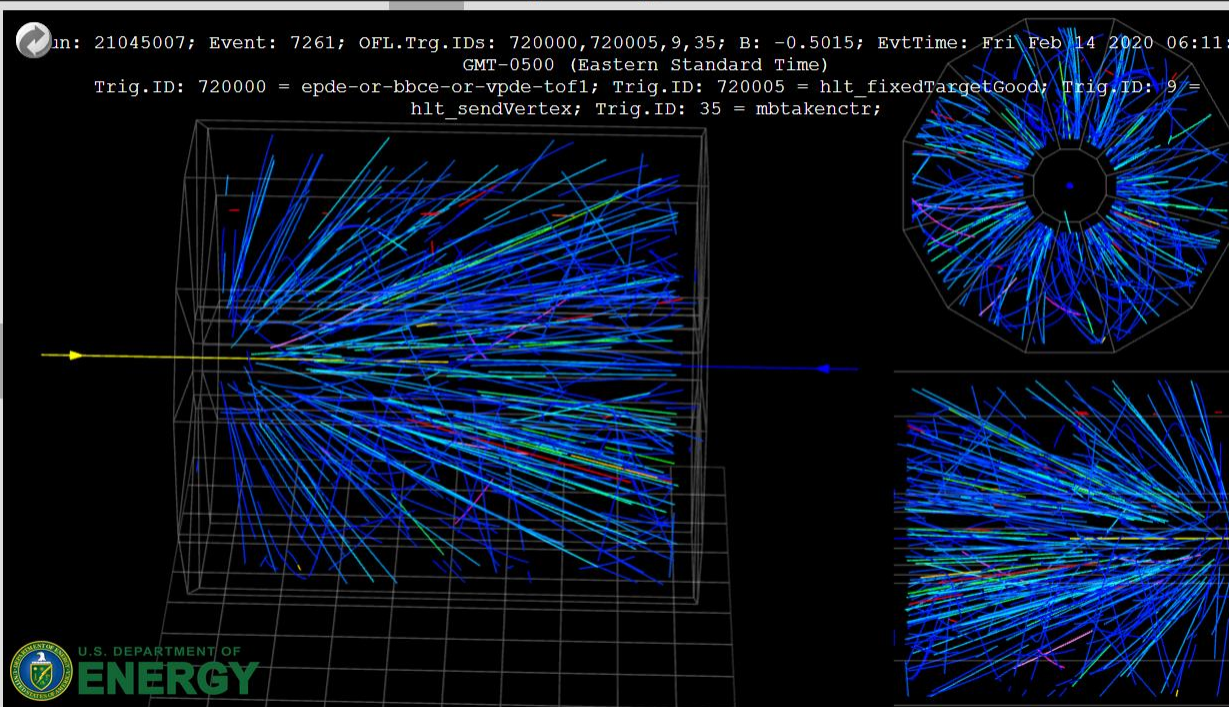
YELLOW BEAM


TIME PROJECTION CHAMBER

BARREL TPC

TRACKS

HITS



 U.S. DEPARTMENT OF ENERGY

STAR Collaboration (c) 2013-2019, comments: Dmitry Arkhipkin arkipkin@bnl.gov

Windows taskbar: Type here to search | 6:11 AM 2/14/2020

Summary

- All goals completed

Energy	Start	Finish	First Run	Last Run	HLTgood	Target
11.5 GeV	Dec 10 th	Feb 24 th	20056032	21055017	235 M	230 M
31.2 FXT	Jan 28 th	Jan 29 th	21028011	21029037	112.5 M	100 M
9.8 FXT	Jan29 th	Feb 1 st	21029051	21032016	108 M	100 M
19.5 FXT	Feb 1 st	Feb 2 nd	21032049	21033017	118 M	100 M
13.5 FXT	Feb 2 nd	Feb 3 rd	21033026	21034013	103 M	100 M
7.3 FXT	Feb 4 th	Feb 5 th	21035003	21036013	117 M	100 M
5.75 FXT	Feb 13 th	Feb 14 th	21044023	21045011	115.6 M	100 M
9.2 GeV	Feb 24 th	Sep 1 st	21055032	21245010	161.8 M	160 M
7.2 FXT	July 29 th	Sep 14 th	21211028	21258004	317 M	(300 M)
7.7 GeV	Sep 2 nd	Sep 11 th	21246012	21255021	3.19 M	(2.5 M)