

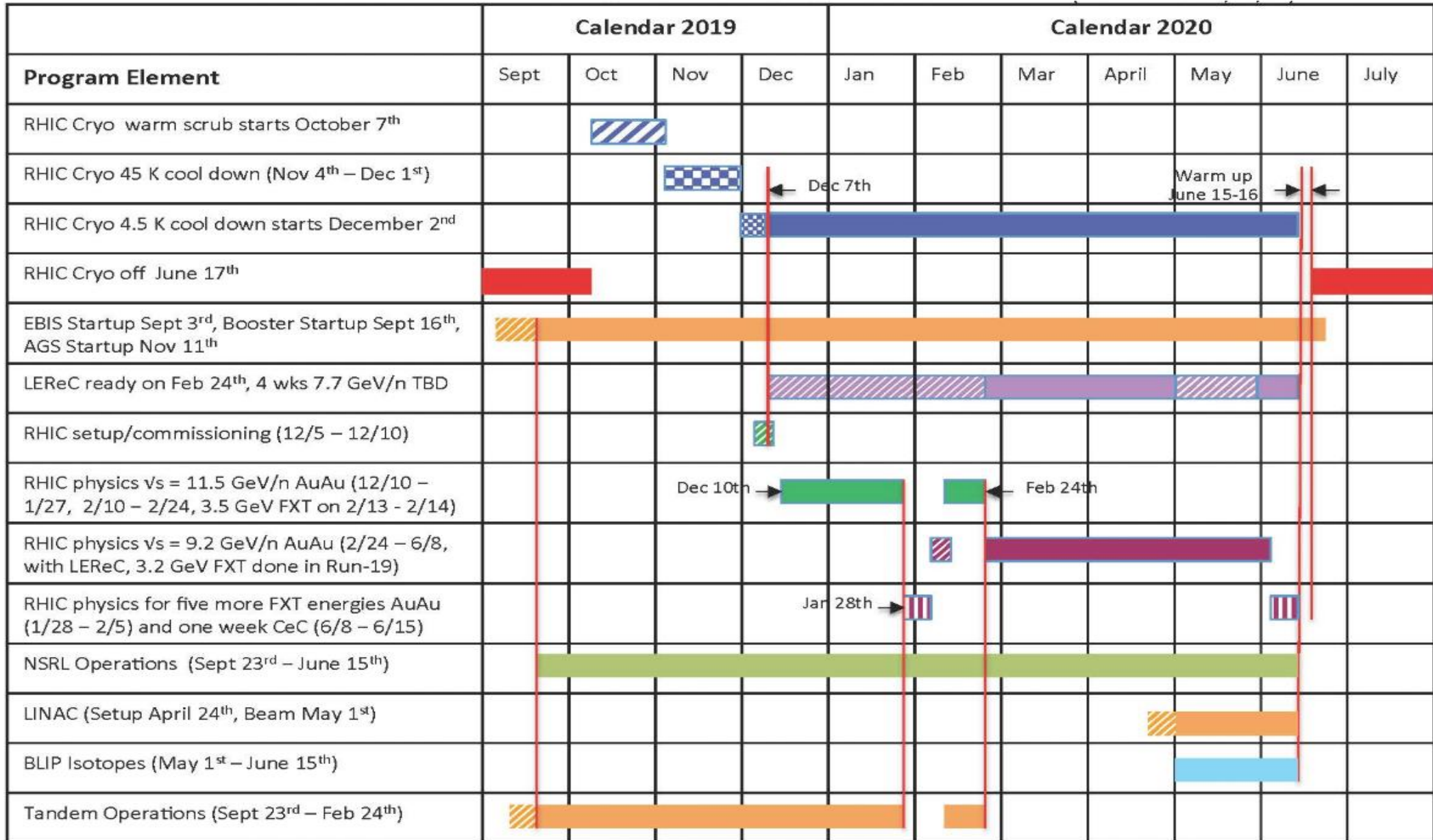
**Run 2020**

# Scheduling Physicist: Robert Pak

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Office Phone: (631) 344-4380

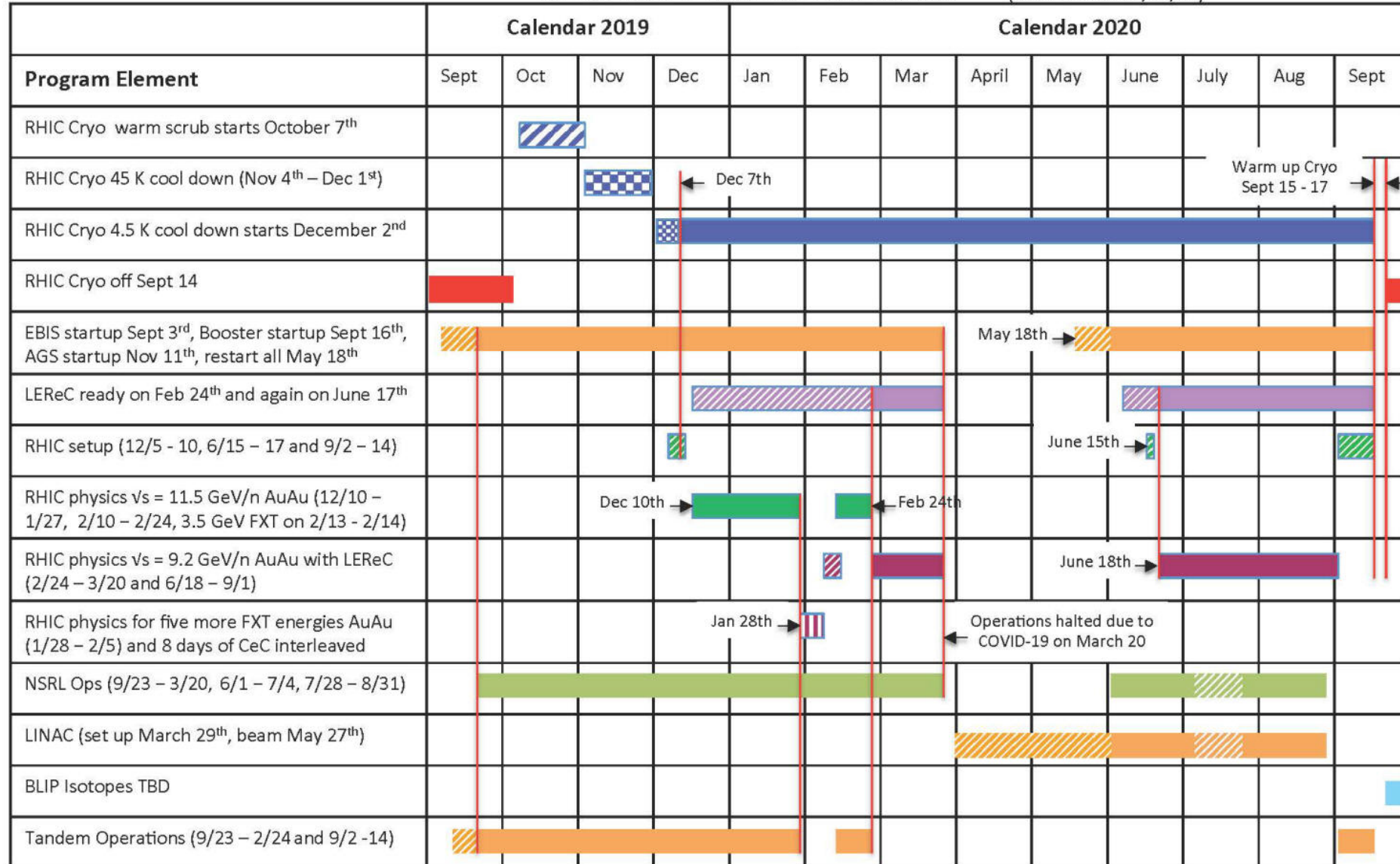
# Run20 Planned Schedule



# Run20 Final Schedule

## RHIC Run FY20 Run Schedule

(Revision date: 9/15/20)



# Run 2020 Schedule

- **Blue cooldown begins:** 11/04/2019
- **Yellow cooldown begins:** 11/04/2019
- **Blue 4K reached:** 12/03/2019
- **First circulating bunch (Au) in Blue:** 12/05/2019
- **Yellow 4K reached:** 12/06/2019
- **First circulating bunch in Yellow (Au):**12/07/2019
- **LEReC Running Start:** 12/12/2019
- **Physics Start for  $^{197}\text{Au}^{79+}$  on  $^{197}\text{Au}^{79+}$ :** 12/10/2019
- **Fixed Target  $^{197}\text{Au}^{79+}$  Start:** 01/27/2019
- **End Physics Operations:** 03/20/2019
- **Suspension of RHIC and LEReC activities:** 03/20/2019
- **Resumption of RHIC activities:** 06/15/2020
- **Begin Cryo Warmup:** 09/15/2020
- **Cryo Warmup Complete:** 09/18/2020

# Mode Schedule

- Mode 1A:  $^{197}\text{Au}^{79+}$  on  $^{197}\text{Au}^{79+}$  at 5.75GeV/nucleon
  - Beam operation: 12/05/2019 - 02/24/2020
- Mode 1B:  $^{197}\text{Au}^{79+}$  on  $^{197}\text{Au}^{79+}$  at 4.59GeV/nucleon
  - Beam operation: 12/16/2020-03/20/2020
  - Beam operation cont.:06/15/2020-09/01/2020
- Mode 1C:  $^{197}\text{Au}^{79+}$  at 31.2GeV/nucleon on fixed target  $^{197}\text{Au}$  foil
  - Beam operation: 01/27/2020 - 01/29/2020
- Mode 1D:  $^{197}\text{Au}^{79+}$  at 9.8GeV/nucleon on fixed target  $^{197}\text{Au}$  foil
  - Beam operation: 01/29/2020 - 02/01/2020
- Mode 1E:  $^{197}\text{Au}^{79+}$  at 19.5GeV/nucleon on fixed target  $^{197}\text{Au}$  foil
  - Beam operation: 02/01/2020 - 02/02/2020
- Mode 1F:  $^{197}\text{Au}^{79+}$  at 13.5GeV/nucleon on fixed target  $^{197}\text{Au}$  foil
  - Beam operation: 02/02/2020 - 02/03/2020
- Mode 1G:  $^{197}\text{Au}^{79+}$  at 7.3GeV/nucleon on fixed target  $^{197}\text{Au}$  foil
  - Beam operation: 02/03/2020 - 02/05/2020
- Mode 1H:  $^{197}\text{Au}^{79+}$  at 5.75GeV/nucleon on fixed target  $^{197}\text{Au}$  foil
  - Beam operation: 02/13/2020 - 02/14/2020
- Mode 1I: LEReC cooling commissioning with  $^{197}\text{Au}^{79+}$  3.85GeV/nucleon
  - Beam operation: 09/01/2020-09/07/2020
- Mode 1J:  $^{197}\text{Au}^{79+}$  in Yellow ring for CeC PoP at 26.5GeV/nucleon particle energy
  - Beam operation: 03/11/2020-09/14/2020

# Run Coordinators

- **Chuyu Liu [RHIC and STAR Operations]**
  - **Email:** cliu1@bnl.gov
  - **Office Phone:** (631) 344-4431
  - **Modes:** 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H
- **Vladimir Litvinenko [CeC Operations]**
  - **Email:** vl@bnl.gov
  - **Office Phone:** (631) 344-2570
  - **Modes:** 1J
- **Igor Pinayev [CeC Operations]**
  - **Email:** pinayev@bnl.gov
  - **Office Phone:** (631) 344-5706
  - **Modes:** 1J

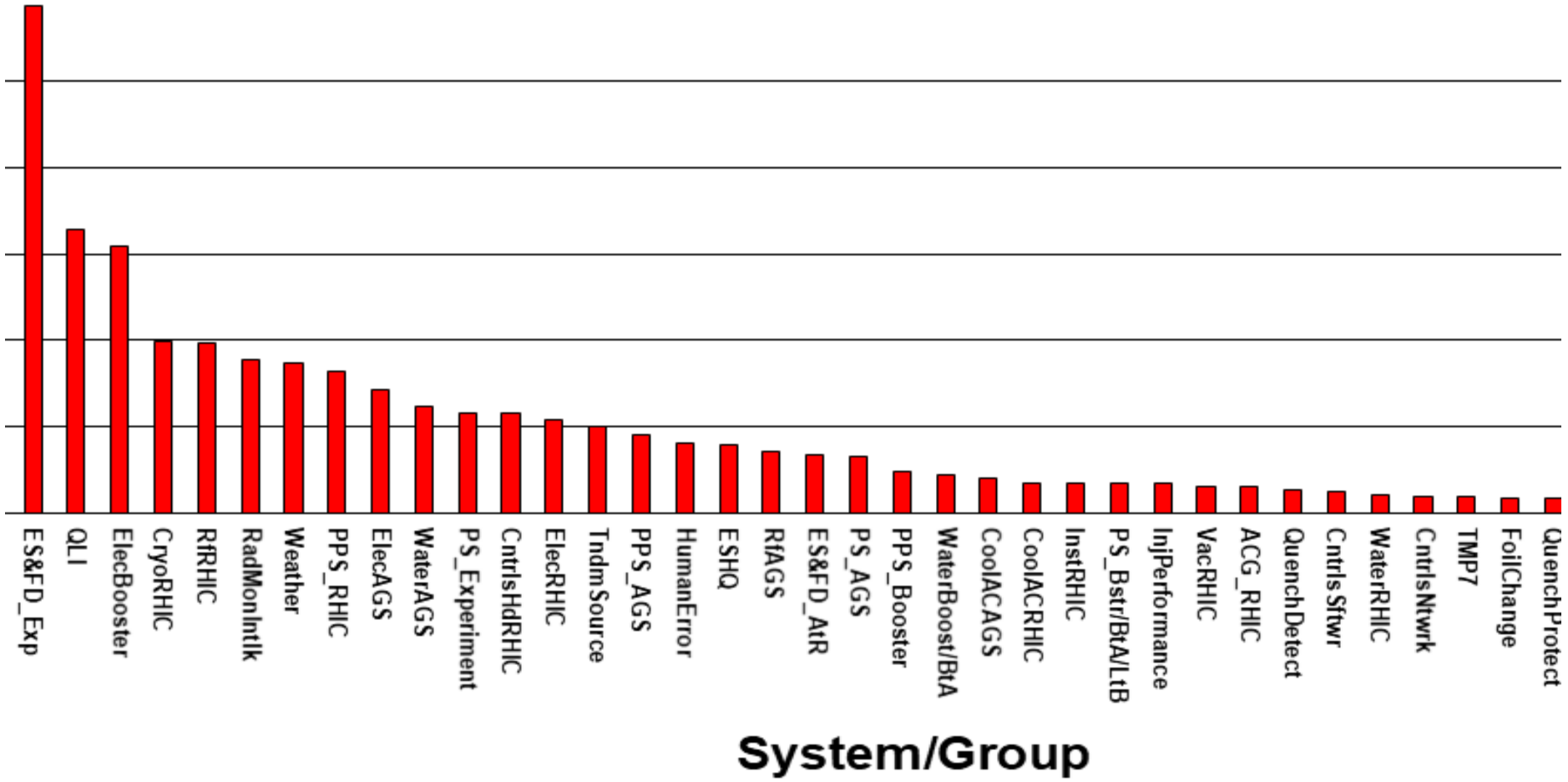
# Run Overview



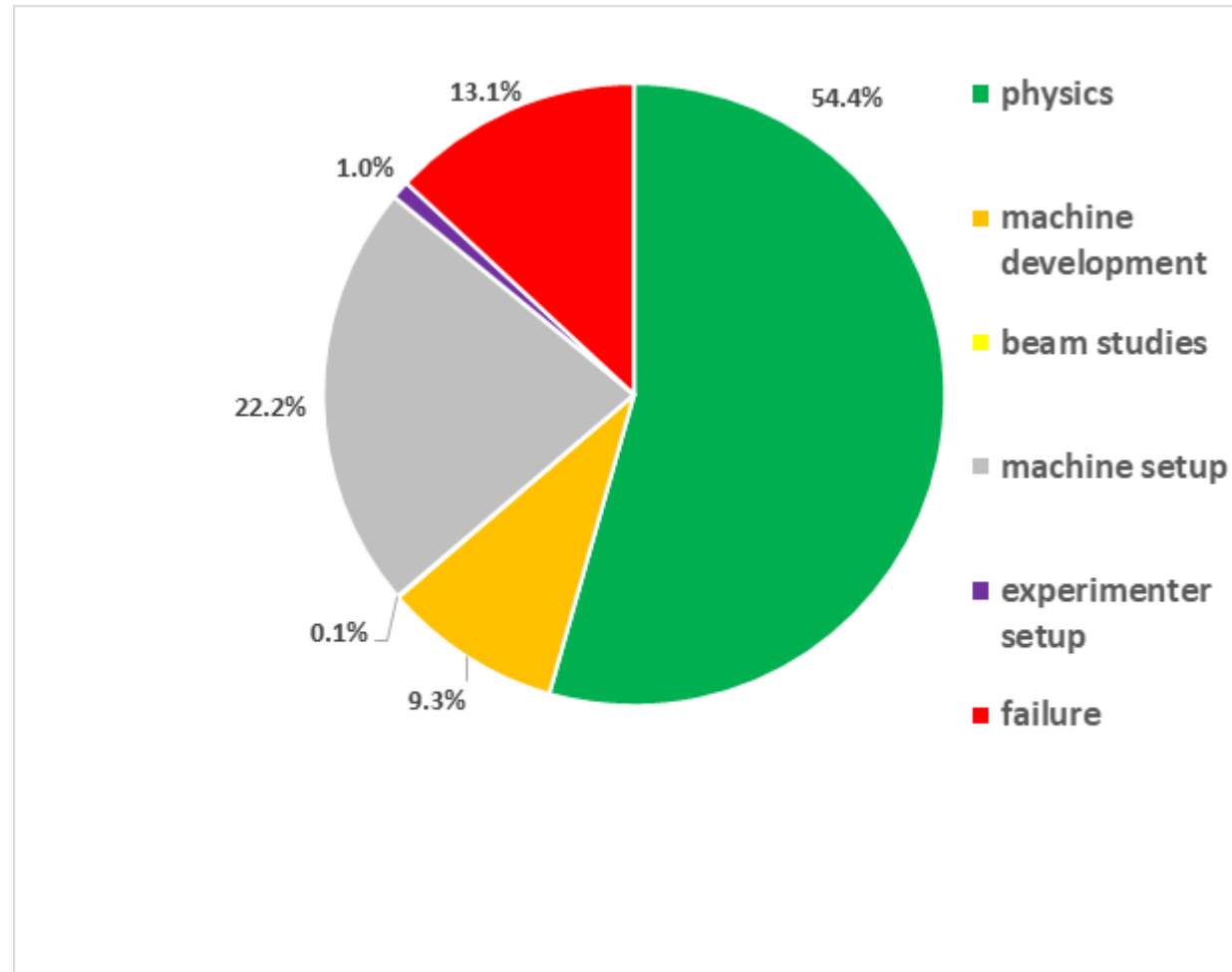
# Basic Run Parameters

Mode Name	Energy/ Nucleon [GeV]	No. Bunches	Ions/ bunch [10 <sup>9</sup> ]	B* [m]	rms emittance [μm]	Peak Luminosity [cm <sup>-2</sup> s <sup>-1</sup> ]	Average Luminosity [cm <sup>-2</sup> s <sup>-1</sup> ]	STAR Luminosity [μb <sup>-1</sup> ]
1A	5.75	111	1.3	4	2.0	90×10 <sup>24</sup>	50×10 <sup>24</sup>	143
1B	4.59	111	1.2	4.5→3.5→3.0	1.5	48×10 <sup>24</sup>	35.5×10 <sup>24</sup>	176
1C	31.2	12	1.5	5	3→3			23
1D	9.8	12	1.25	10	2→2			23
1E	19.5	12	1	10	1.5			25
1F	13.5	12	1	10	2.4→1.8			21
1G	7.3	12	1	10	1.4			24
1H	5.75	12	1	10	2→1.5			24
1I	3.85	111	0.8	4.5→3.0	1.5→0.5	44×10 <sup>24</sup>	19×10 <sup>24</sup>	

## RHIC Run20 Failure Hours (> 1 hr.) by System/Group

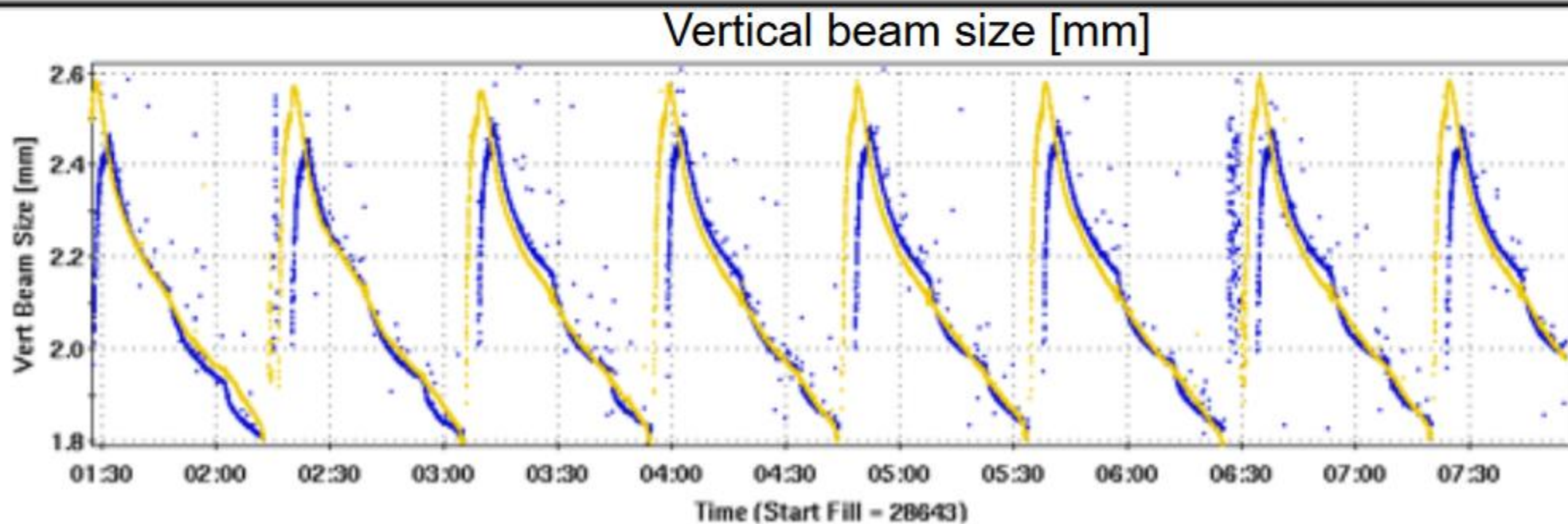
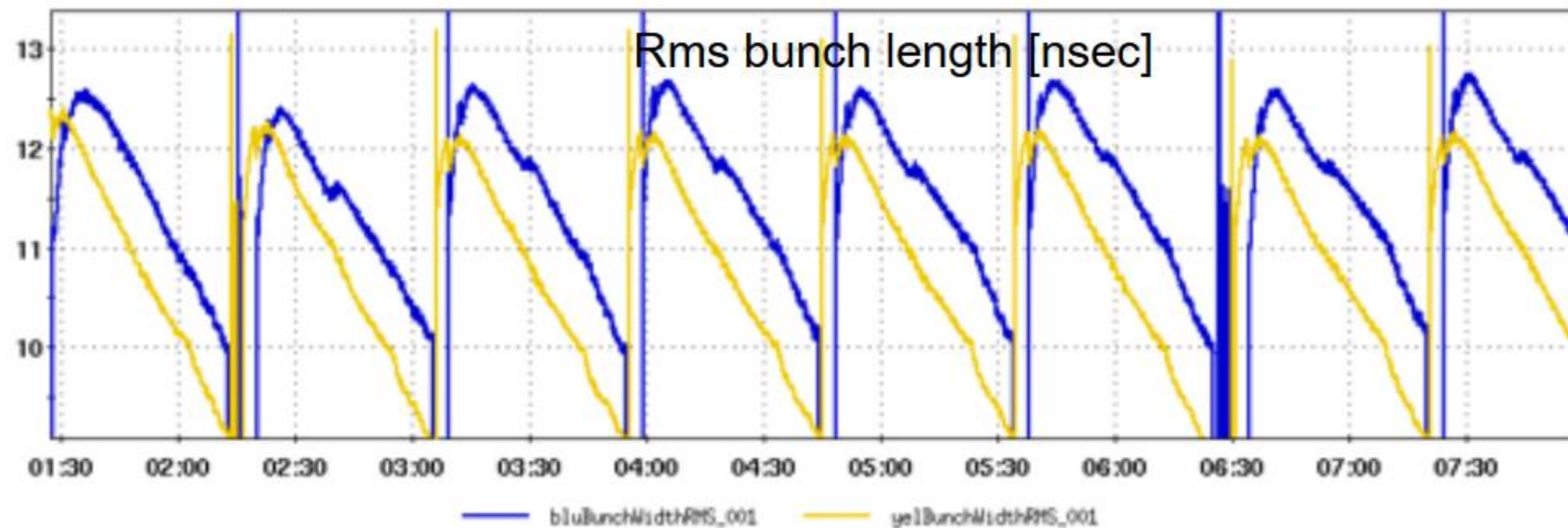


# Percentage of Time per Mode Run20

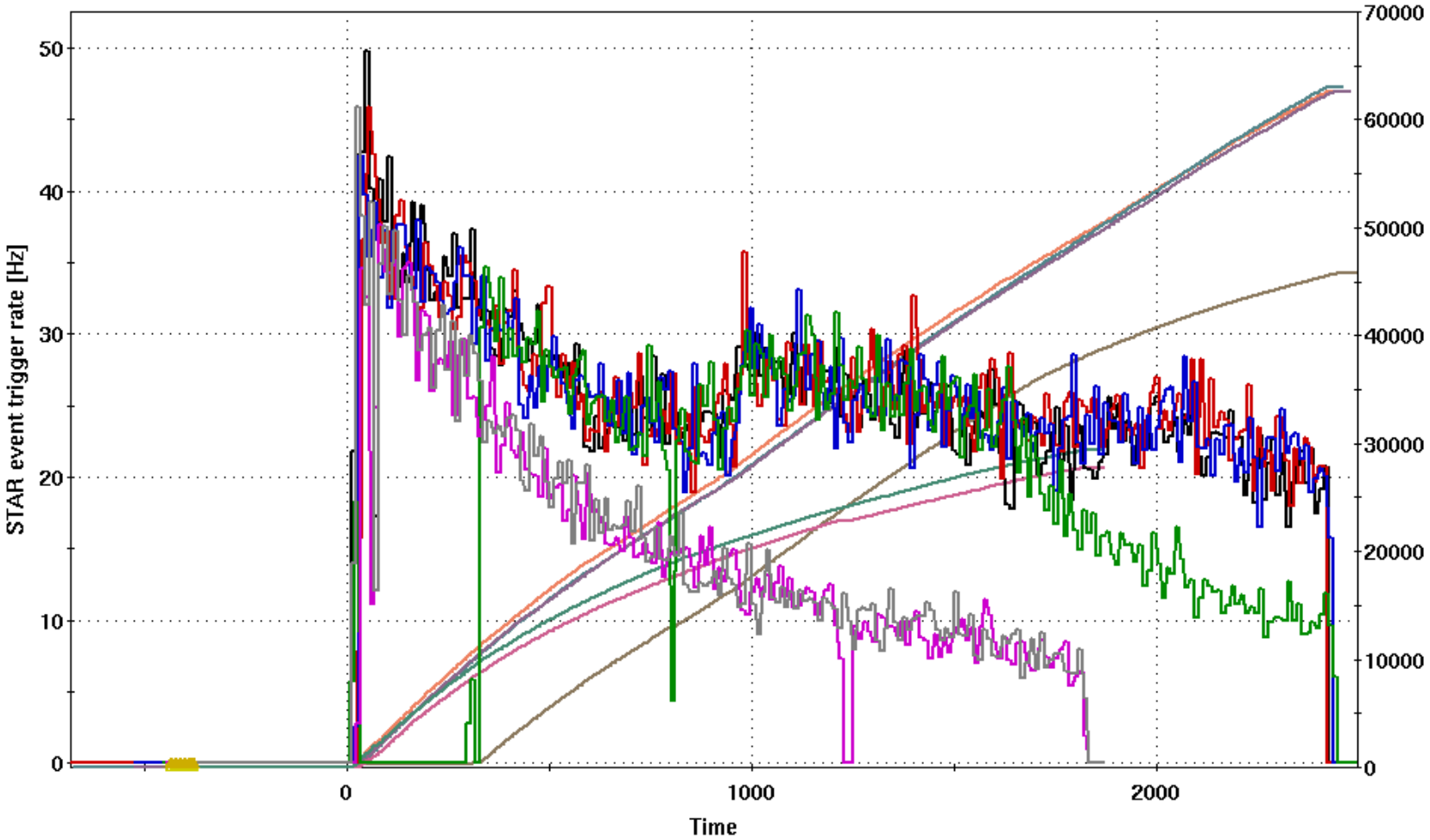


# LEReC Cooling

Image  
courtesy of  
A. Fedotov



# Event rate comparison cooling vs no cooling for 4.59 GeV

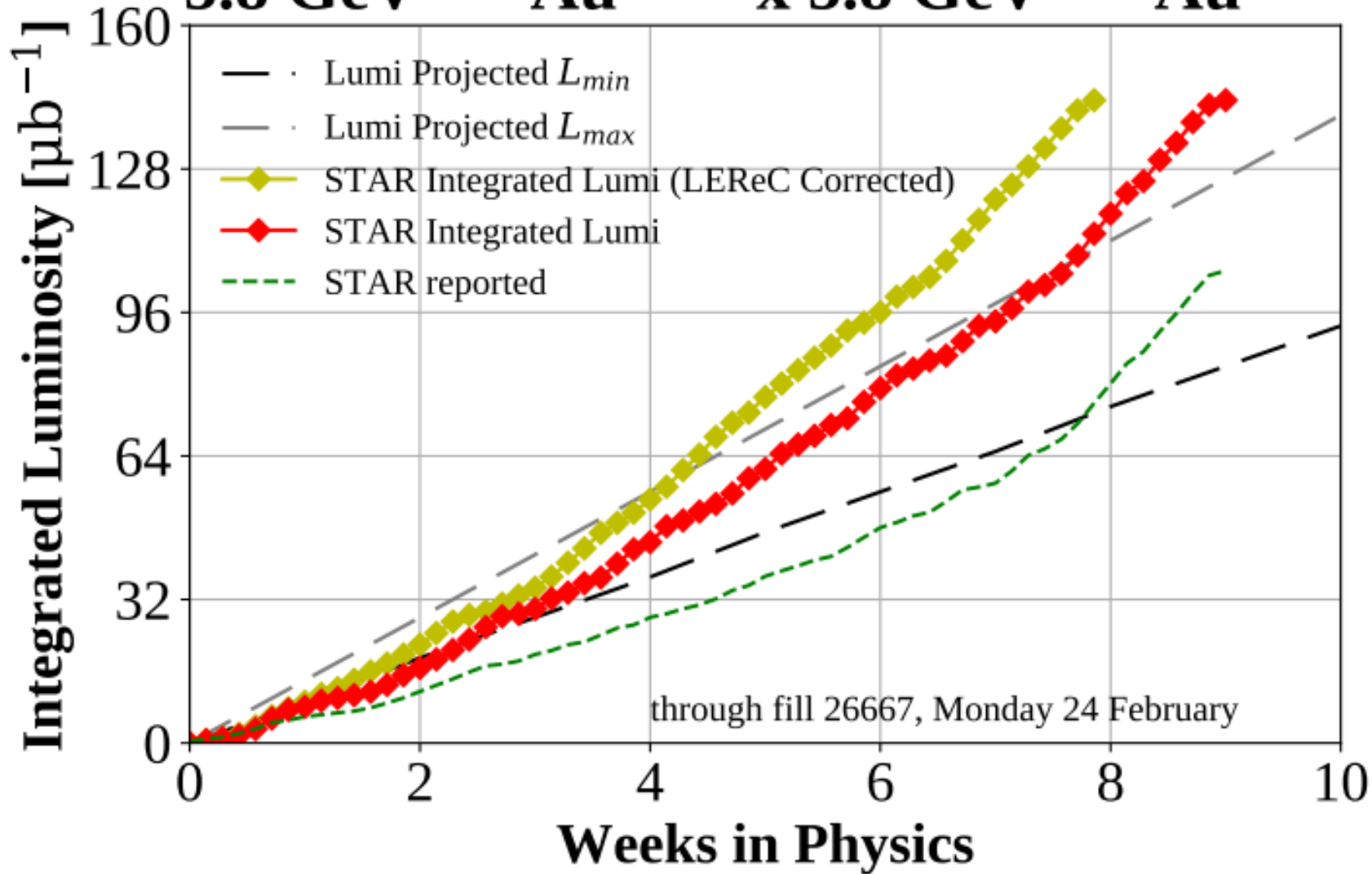


- |  |  |  |
|--|--|--|
| — starEventTrigger:rate:27235 (D) (Y1)   | — starEventTrigger:rate:27236 (D) (Y1)   | — starEventTrigger:rate:27237 (D) (Y1)   |
| — starEventTrigger:rate:27238 (D) (Y1)   | — starEventTrigger:rate:27239 (D) (Y1)   | — starEventTrigger:rate:27240 (D) (Y1)   |
| ▲ starEventTrigger:rate:27241 (D) (Y1)   | — starEventTrigger:rate:27235_integ (Y2) | — starEventTrigger:rate:27236_integ (Y2) |
| — starEventTrigger:rate:27237_integ (Y2) | — starEventTrigger:rate:27238_integ (Y2) | — starEventTrigger:rate:27239_integ (Y2) |
| — starEventTrigger:rate:27240_integ (Y2) | ◻ starEventTrigger:rate:27241_integ (Y2) |  |

# Luminosity for $^{197}\text{Au}^{79+}$ on $^{197}\text{Au}^{79+}$ Physics

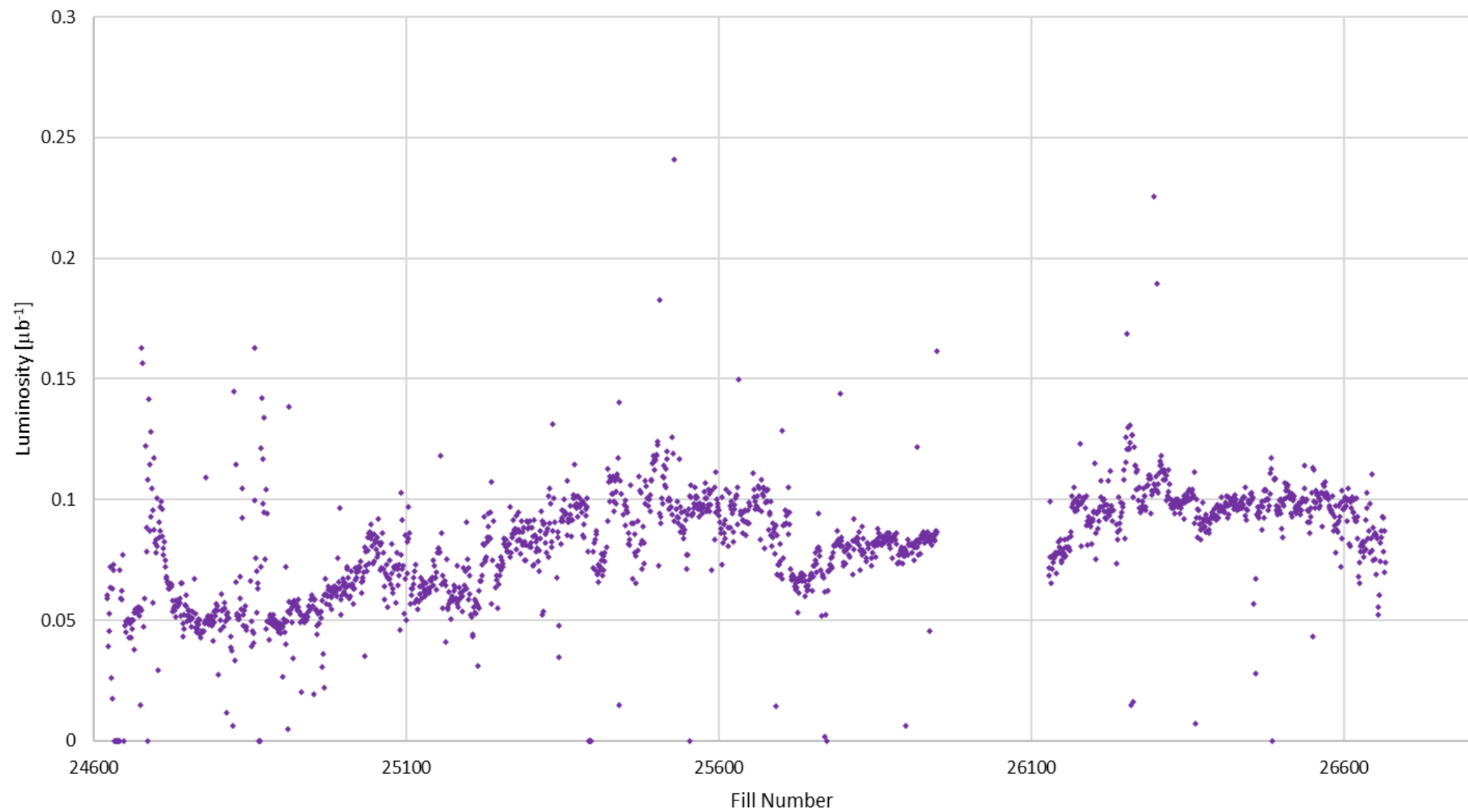
# Run20 Delivered Luminosity

5.8 GeV  $^{197}\text{Au}^{79+}$  x 5.8 GeV  $^{197}\text{Au}^{79+}$



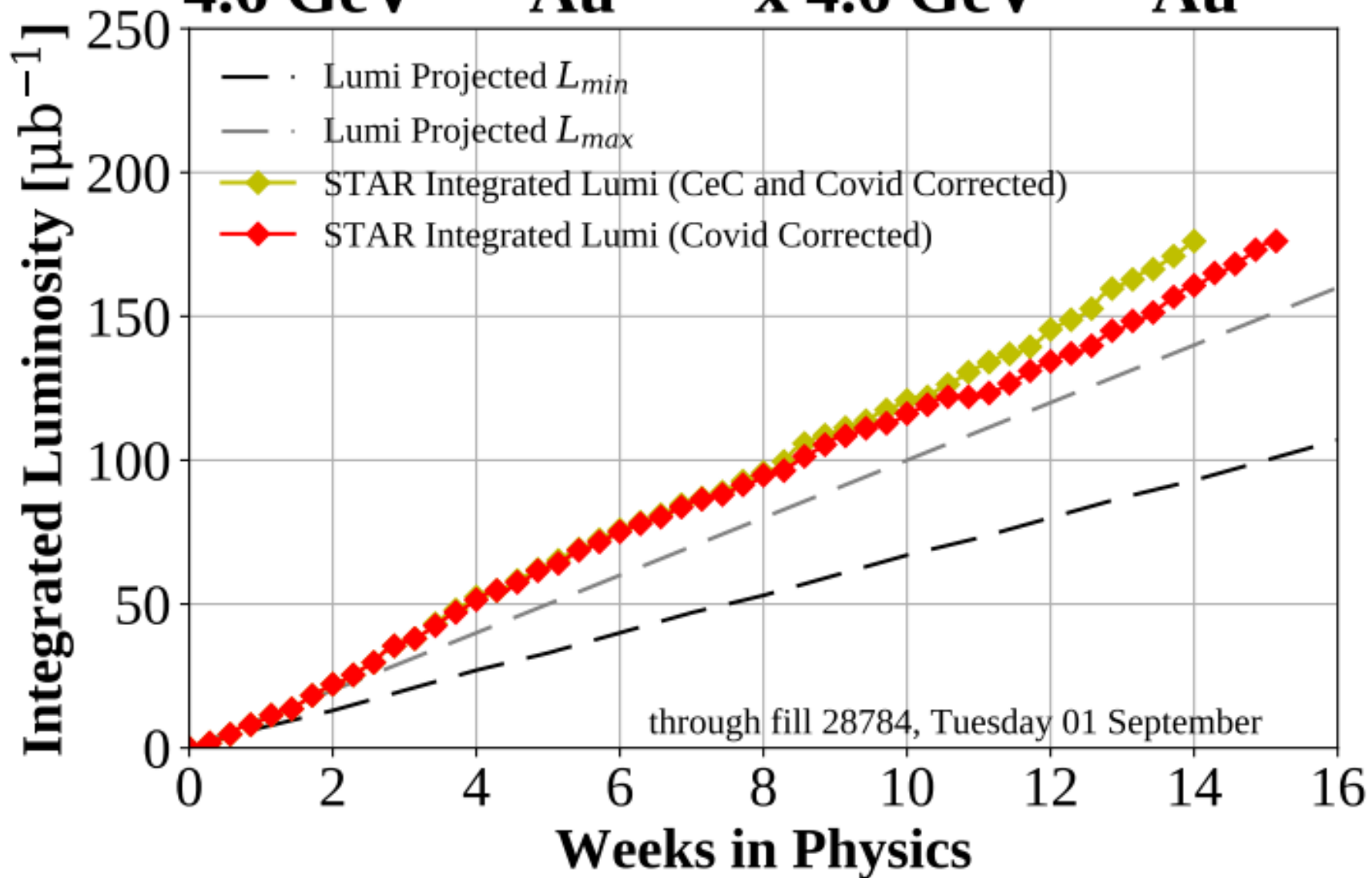


Run20 Luminosity Delivered to STAR per Store  
5.75 GeV  $^{197}\text{Au}^{79+}$  x 5.75 GeV  $^{197}\text{Au}^{79+}$

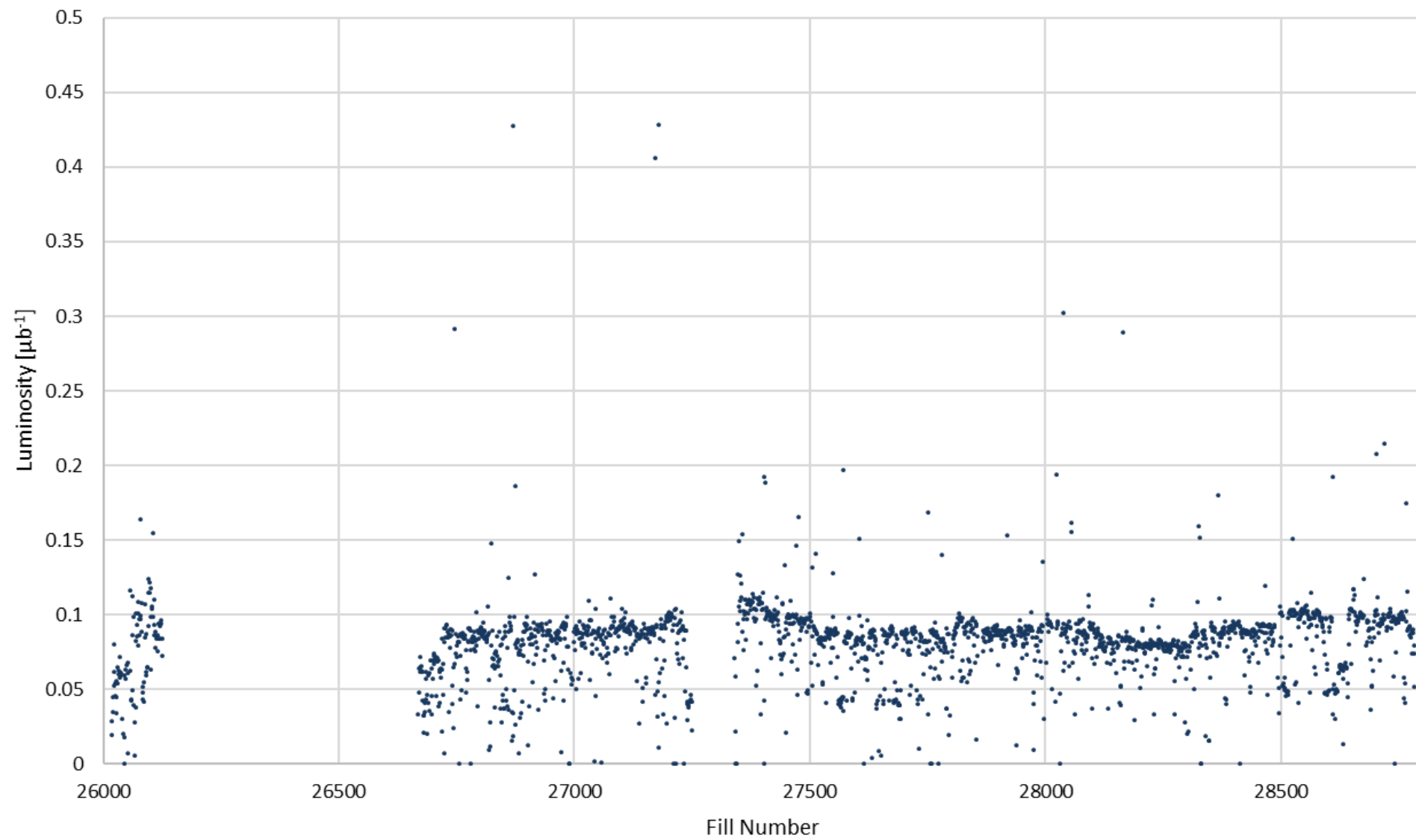


# Run20 Delivered Luminosity

4.6 GeV  $^{197}\text{Au}^{79+}$  x 4.6 GeV  $^{197}\text{Au}^{79+}$

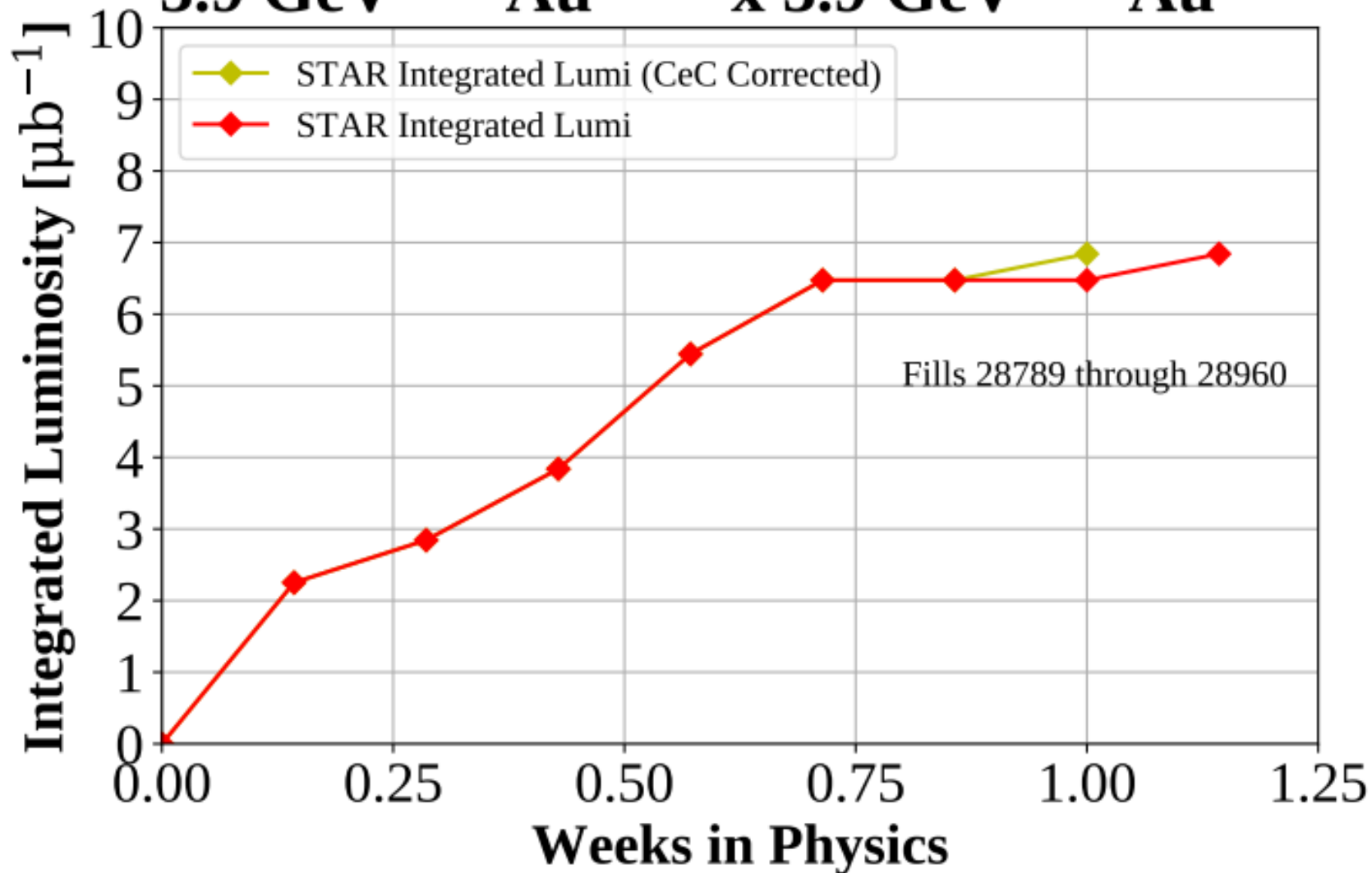


Luminosity Delivered to STAR per Store  
4.59 GeV  $^{197}\text{Au}^{79+}$  x 4.59 GeV  $^{197}\text{Au}^{79+}$



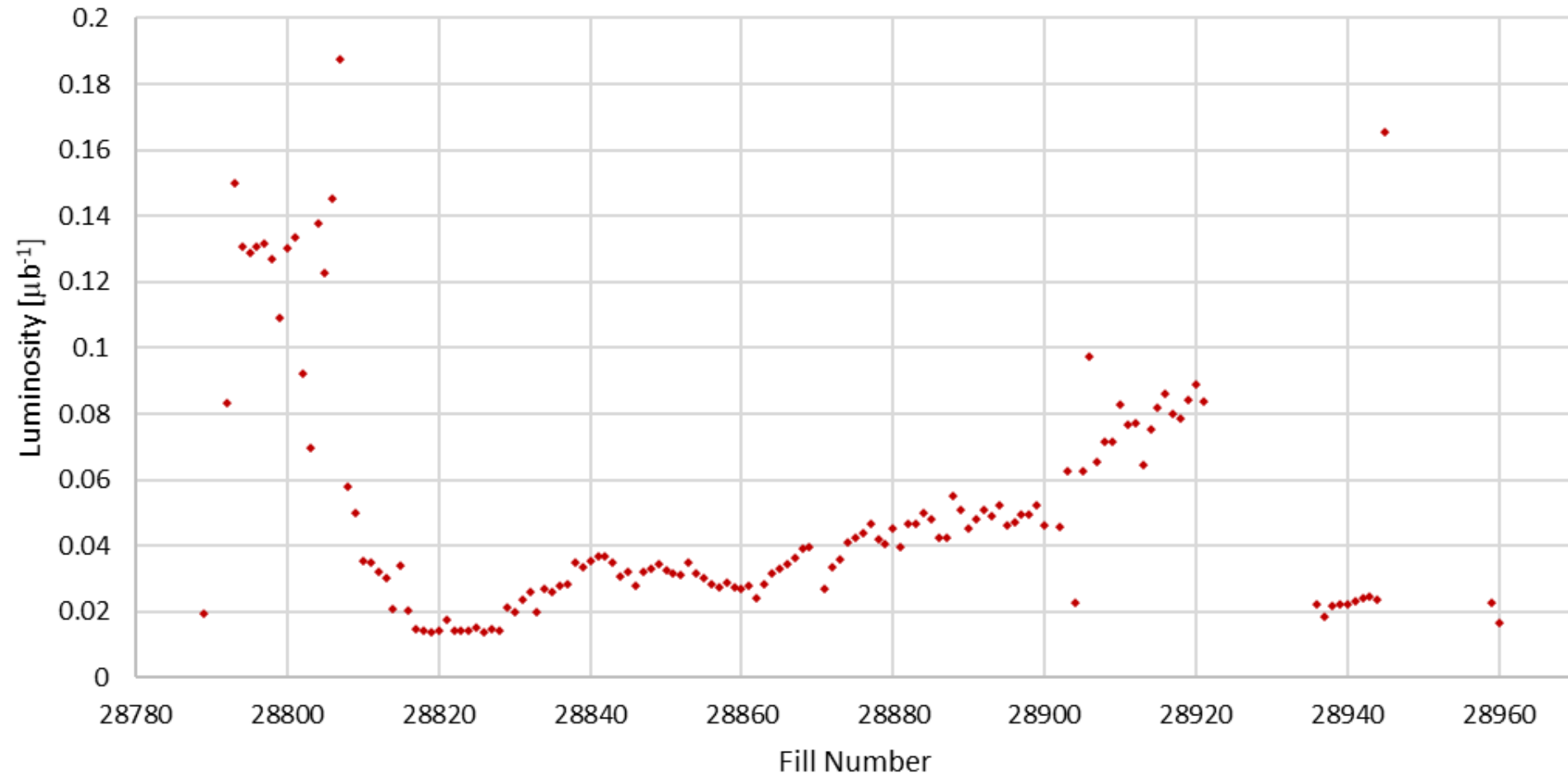
# Run20 Delivered Luminosity

3.9 GeV  $^{197}\text{Au}^{79+}$  x 3.9 GeV  $^{197}\text{Au}^{79+}$



# Run20 Luminosity Delivered to STAR per Store

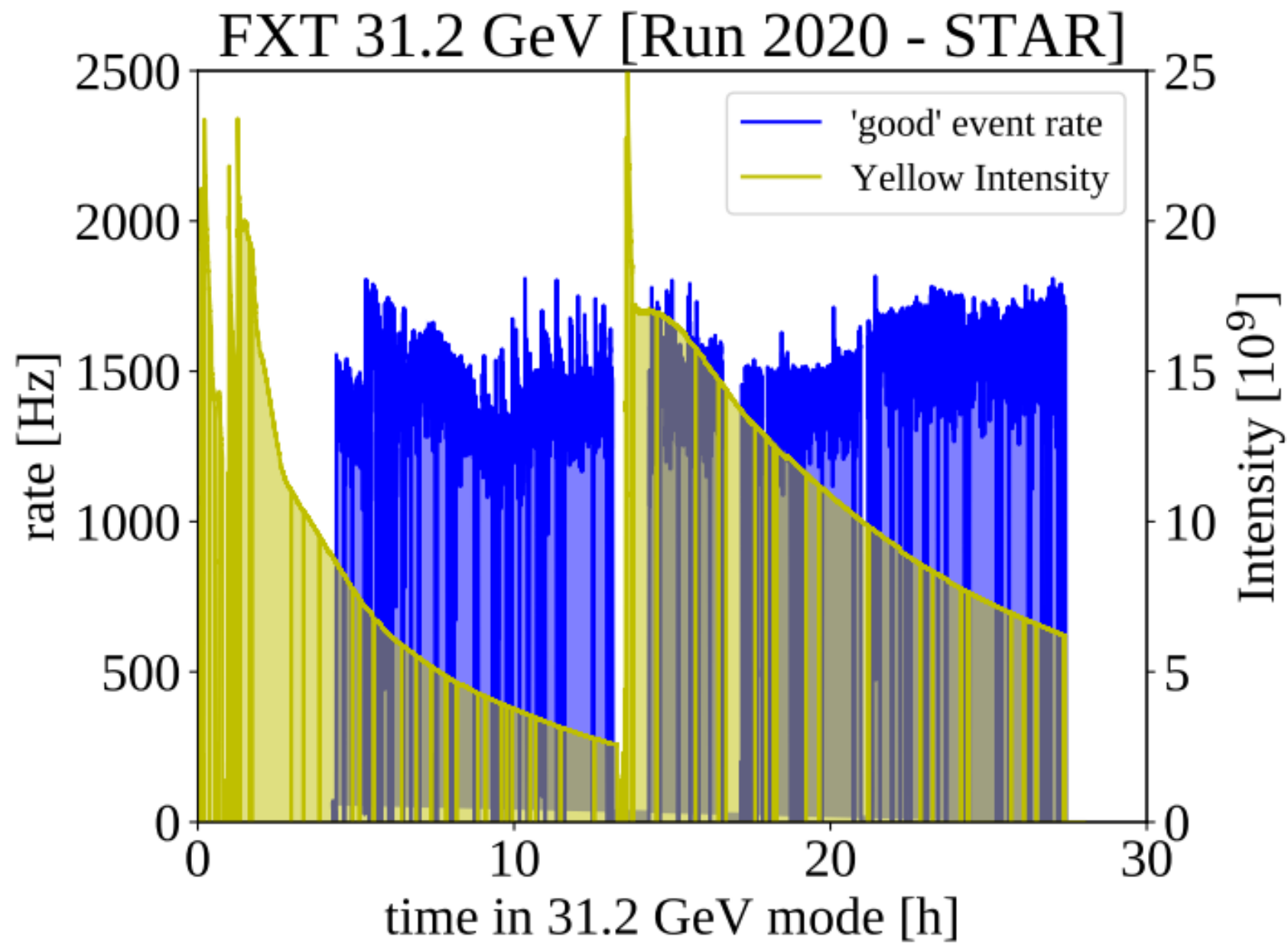
3.85 GeV  $^{197}\text{Au}^{79+}$   $\times$  3.85 GeV  $^{197}\text{Au}^{79+}$



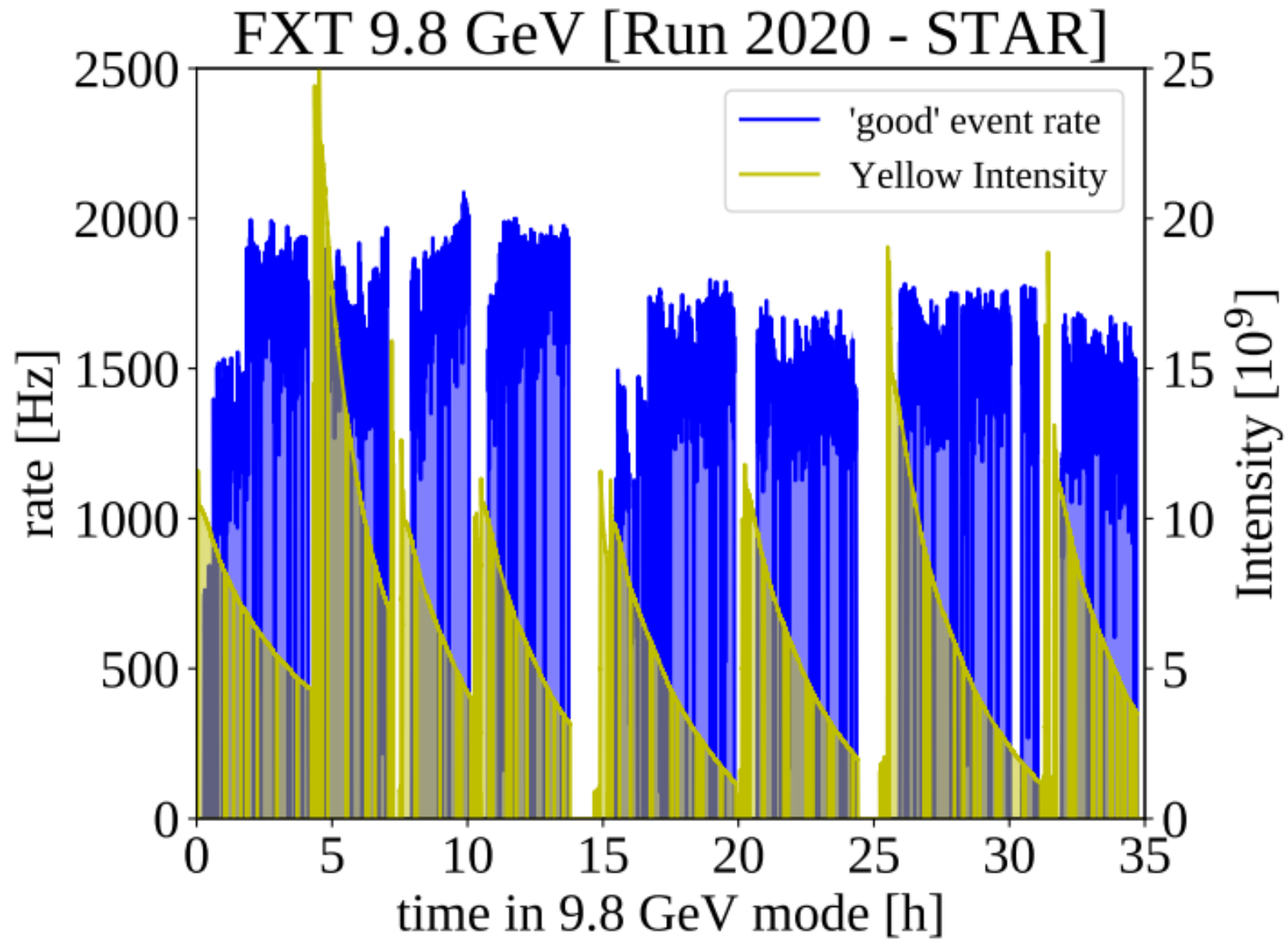
$^{197}\text{Au}^{79+}$  Physics on  
Fixed Target  $^{197}\text{Au}$   
foil

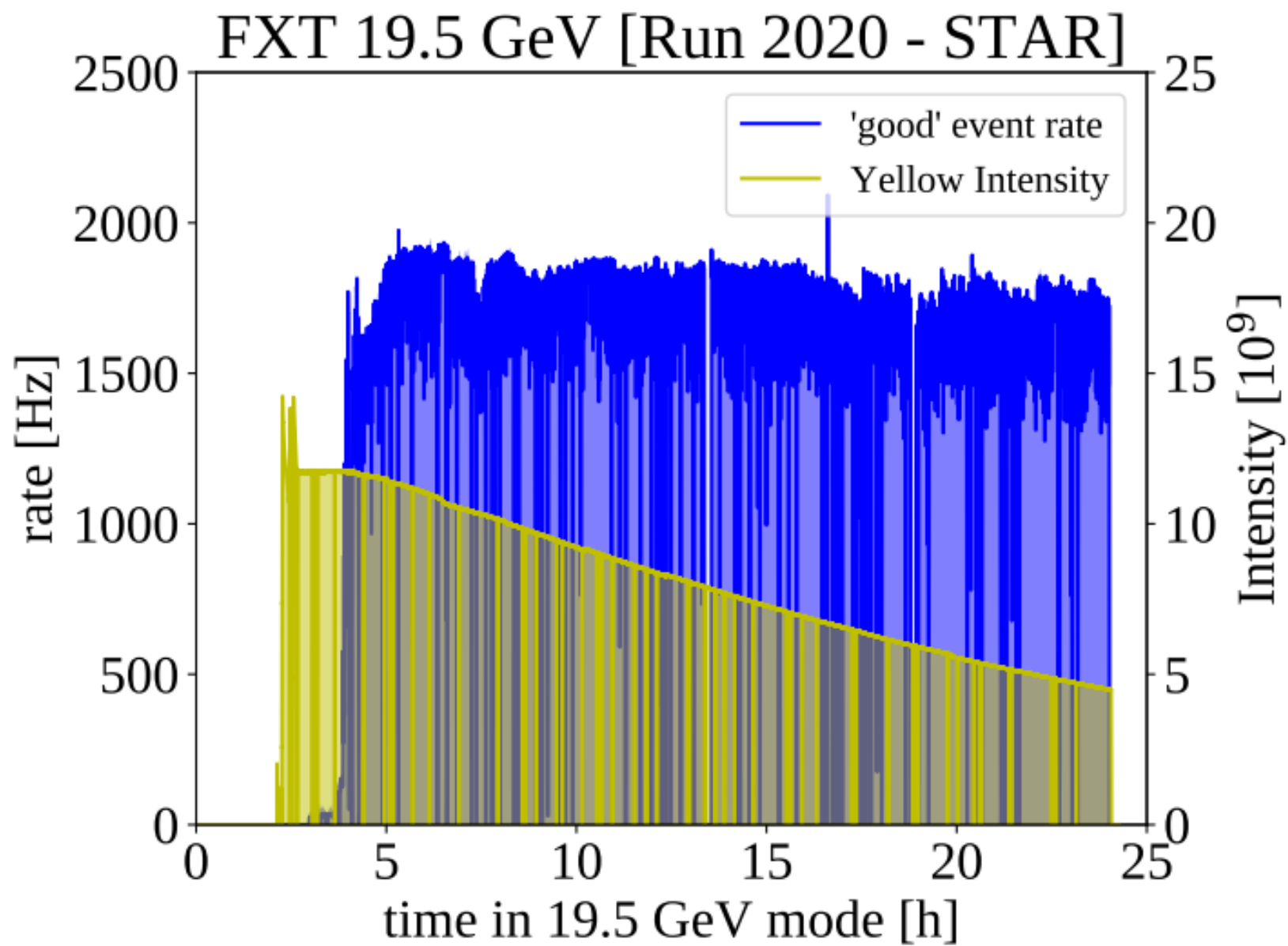
# Basic Fixed Target Numbers

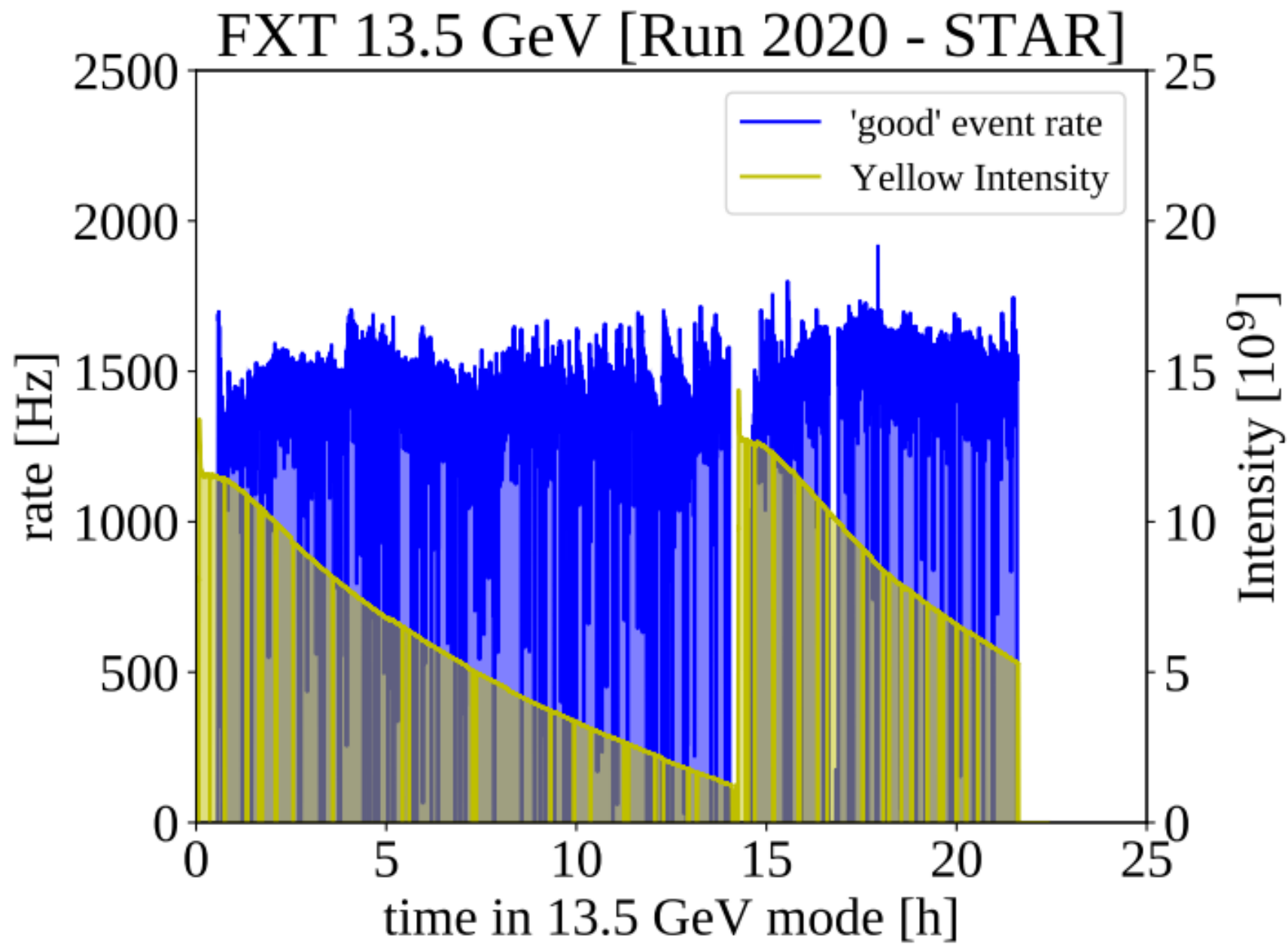
Energy/Nucleon	Time in Physics [Hrs]	Total Events
31.2 GeV	25.5	112M
19.5 GeV	34.5	108M
13.5 GeV	24.25	118M
9.8 GeV	34.5	108M
7.3 GeV	27	117M
5.75 GeV	22.5	116M



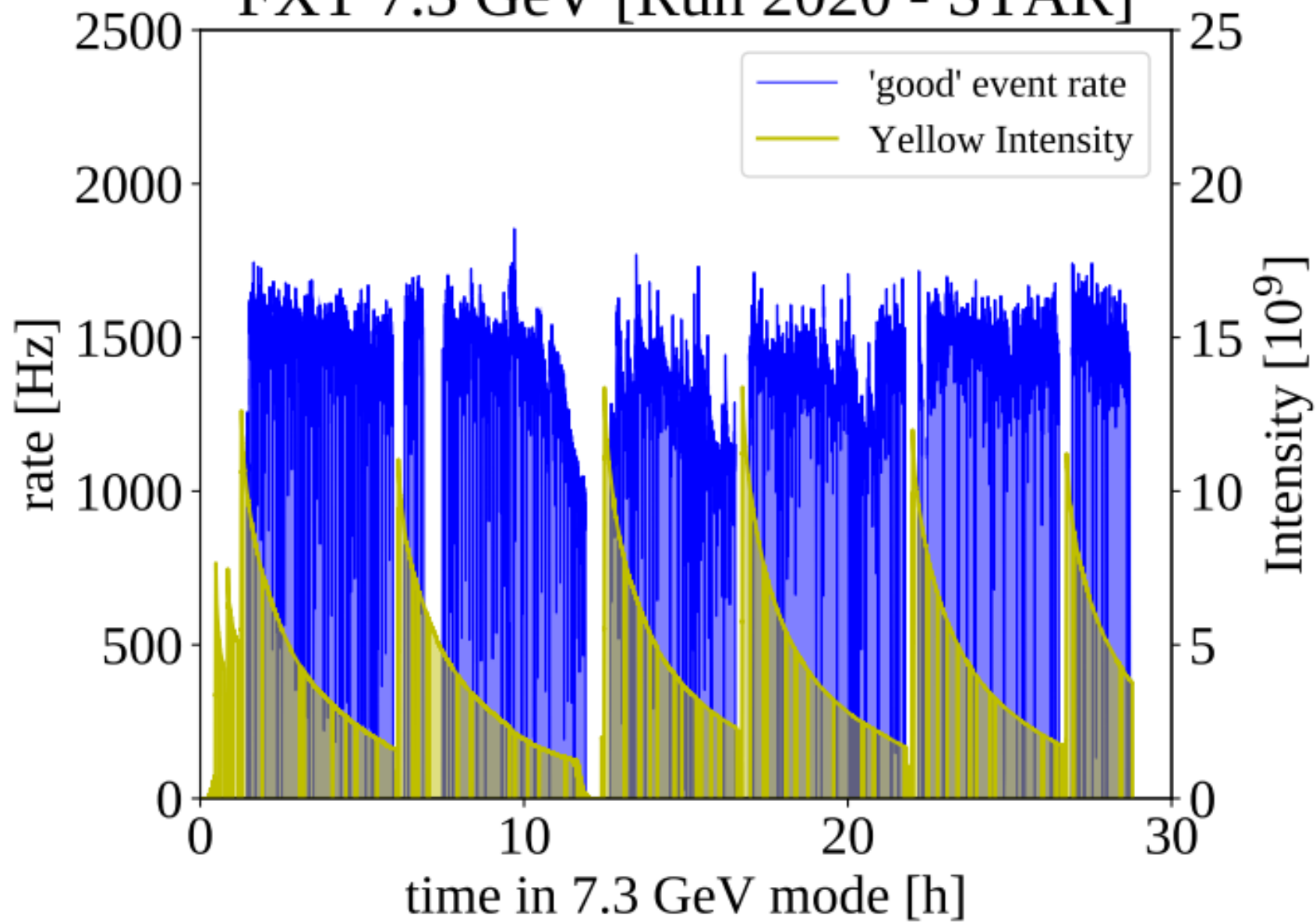




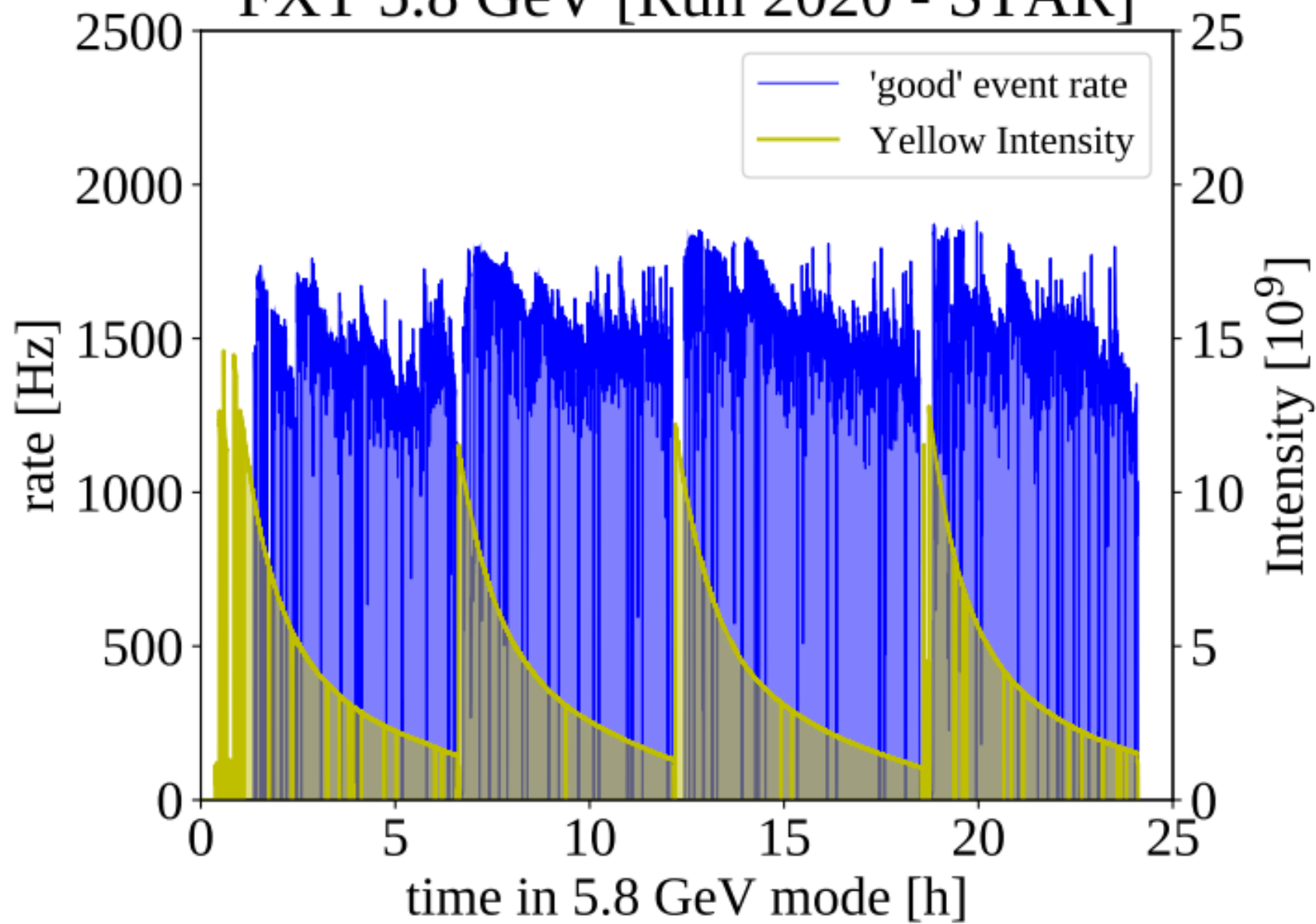




# FXT 7.3 GeV [Run 2020 - STAR]



# FXT 5.8 GeV [Run 2020 - STAR]

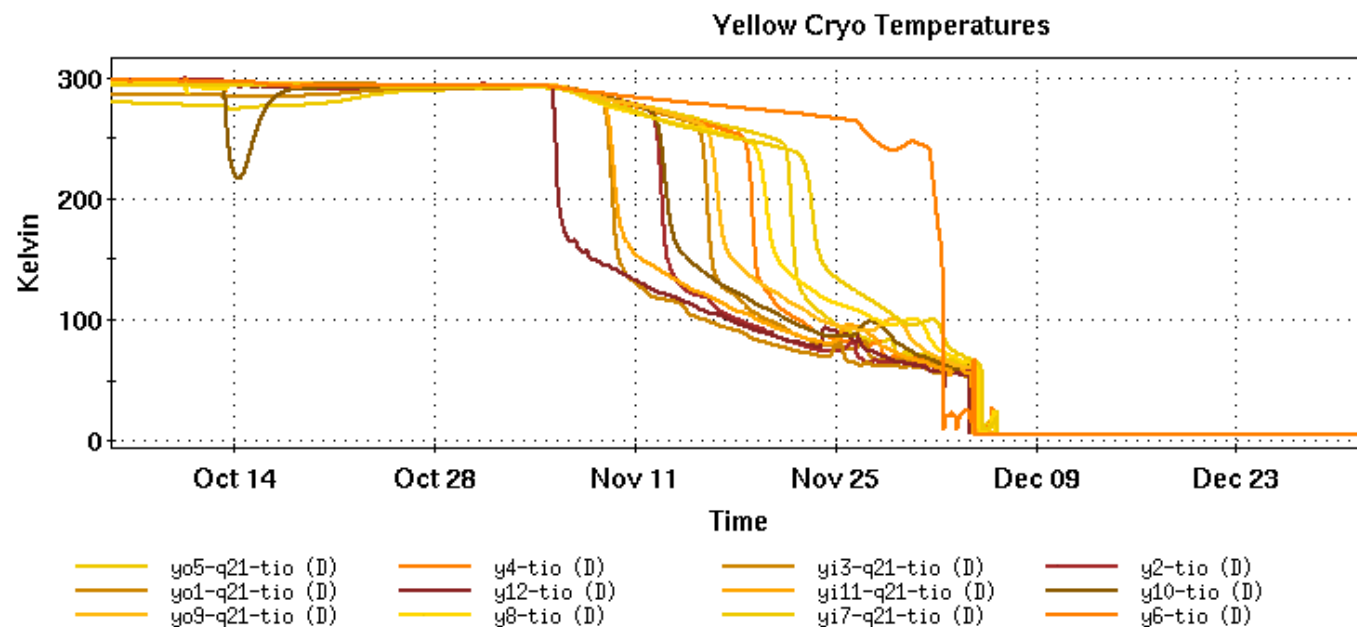
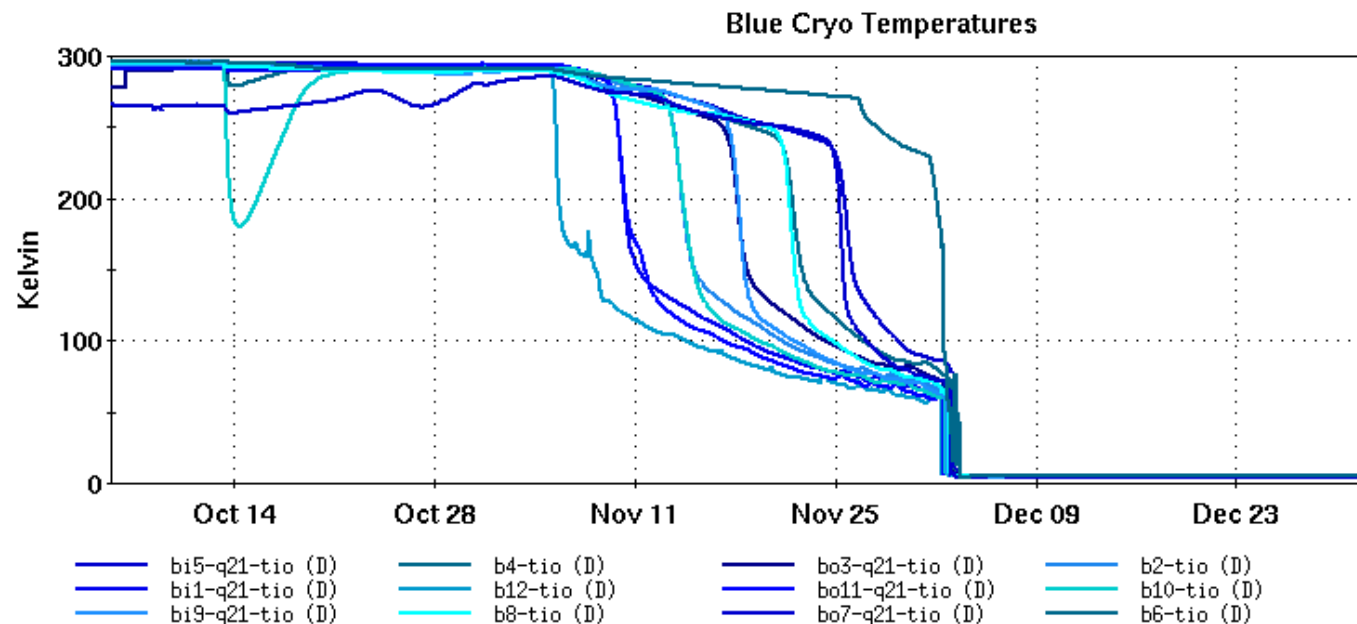


# Power and Cryo Use

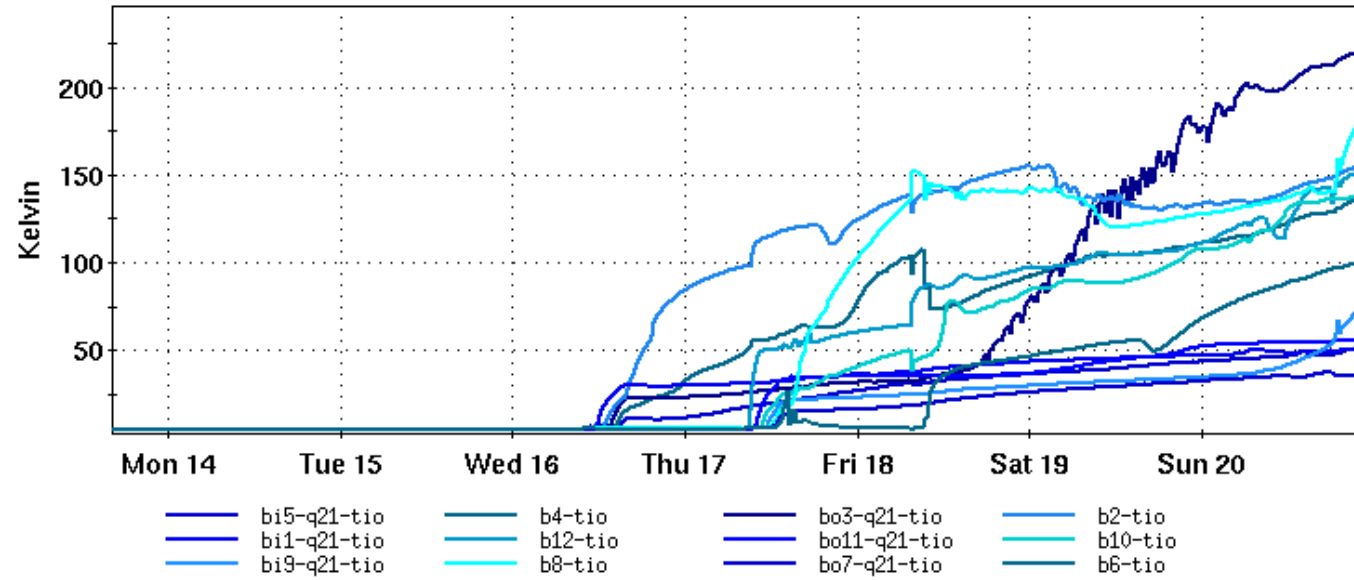
Power consumption data shown through 2020

## 29.0 Cryo Weeks for physics

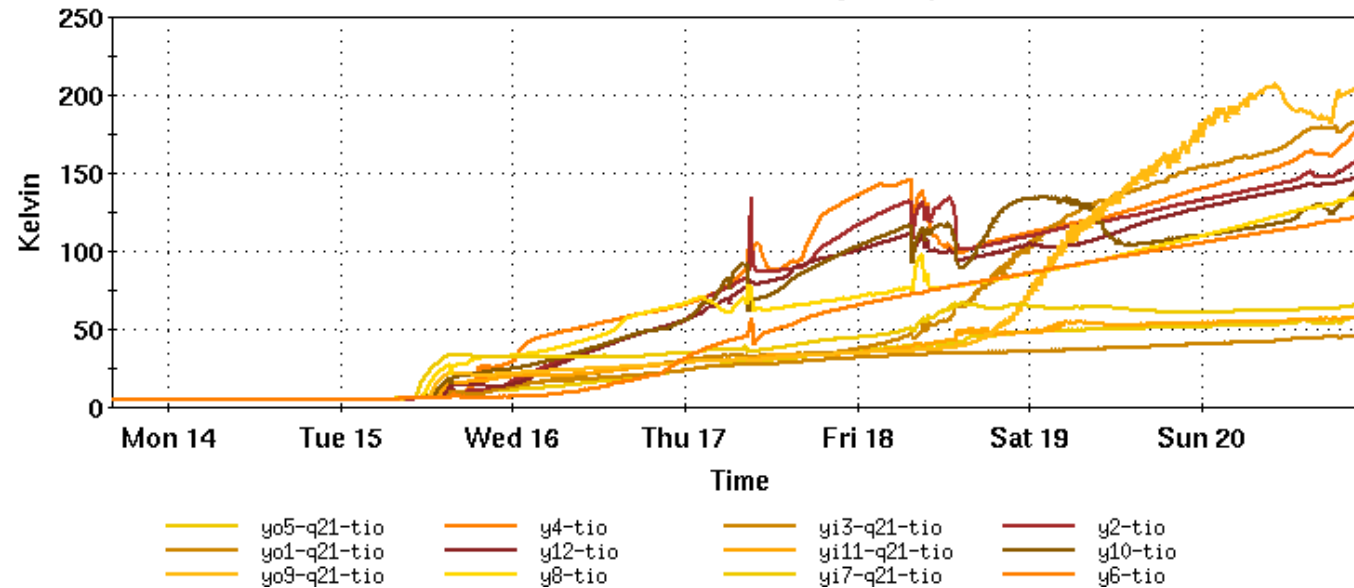
### 12.4 Cryo Weeks with no ops



### Blue Cryo Temperatures



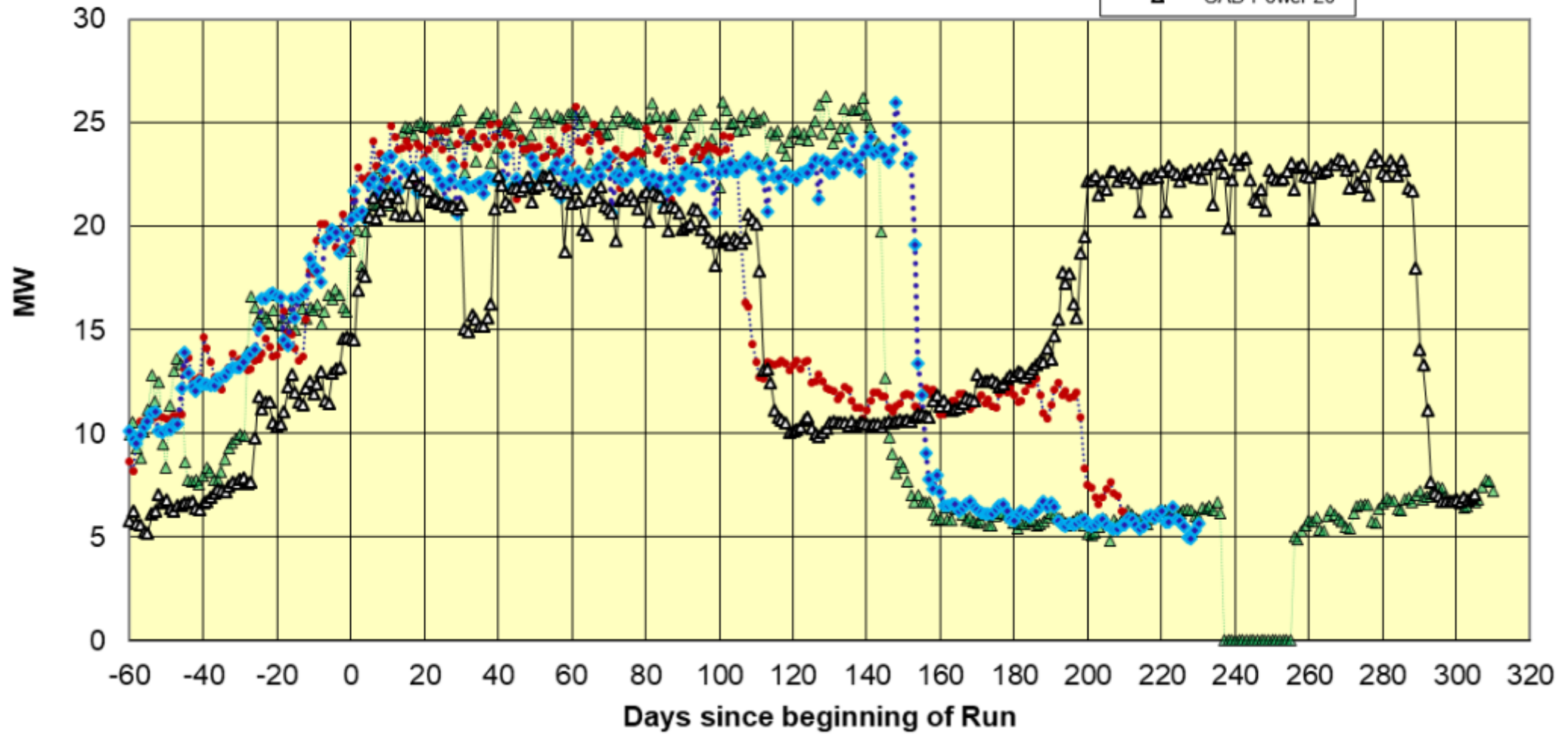
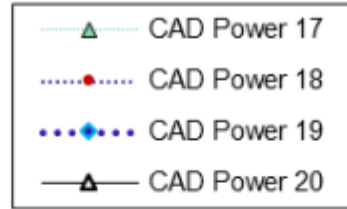
### Yellow Cryo Temperatures





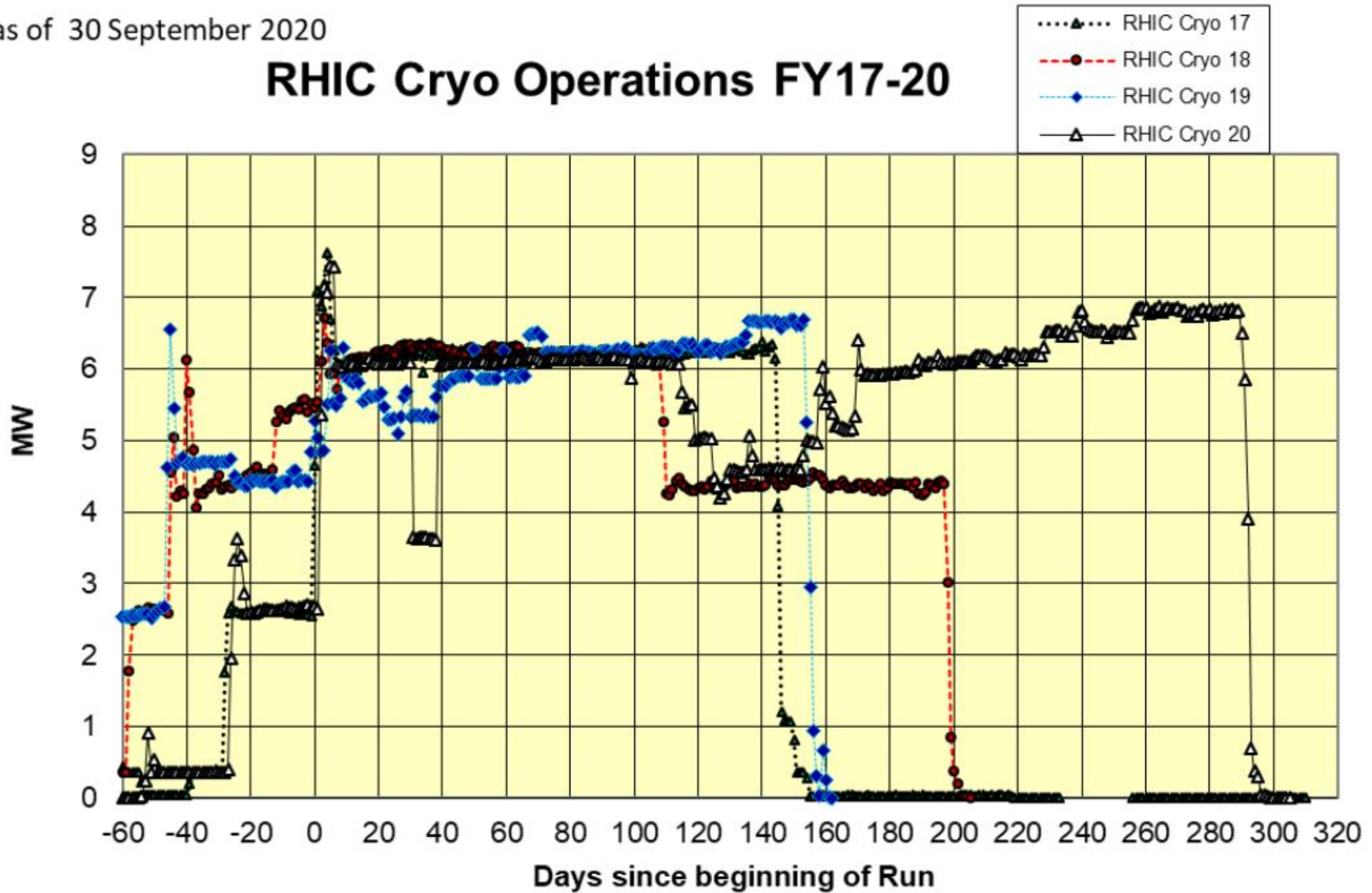
as of 30 September 2020

## RHIC Operations FY17-20



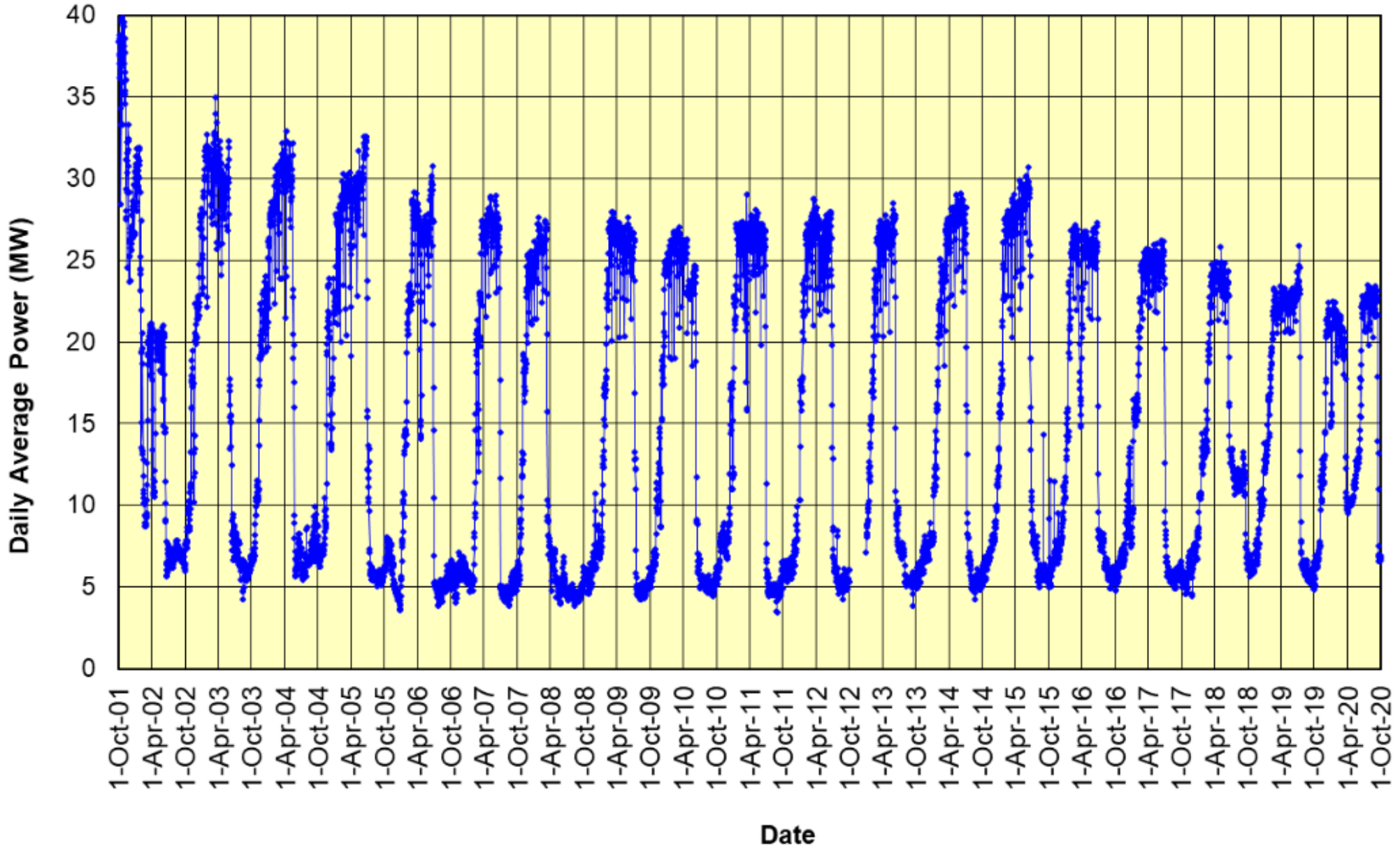
as of 30 September 2020

# RHIC Cryo Operations FY17-20



as of 30 September 2020

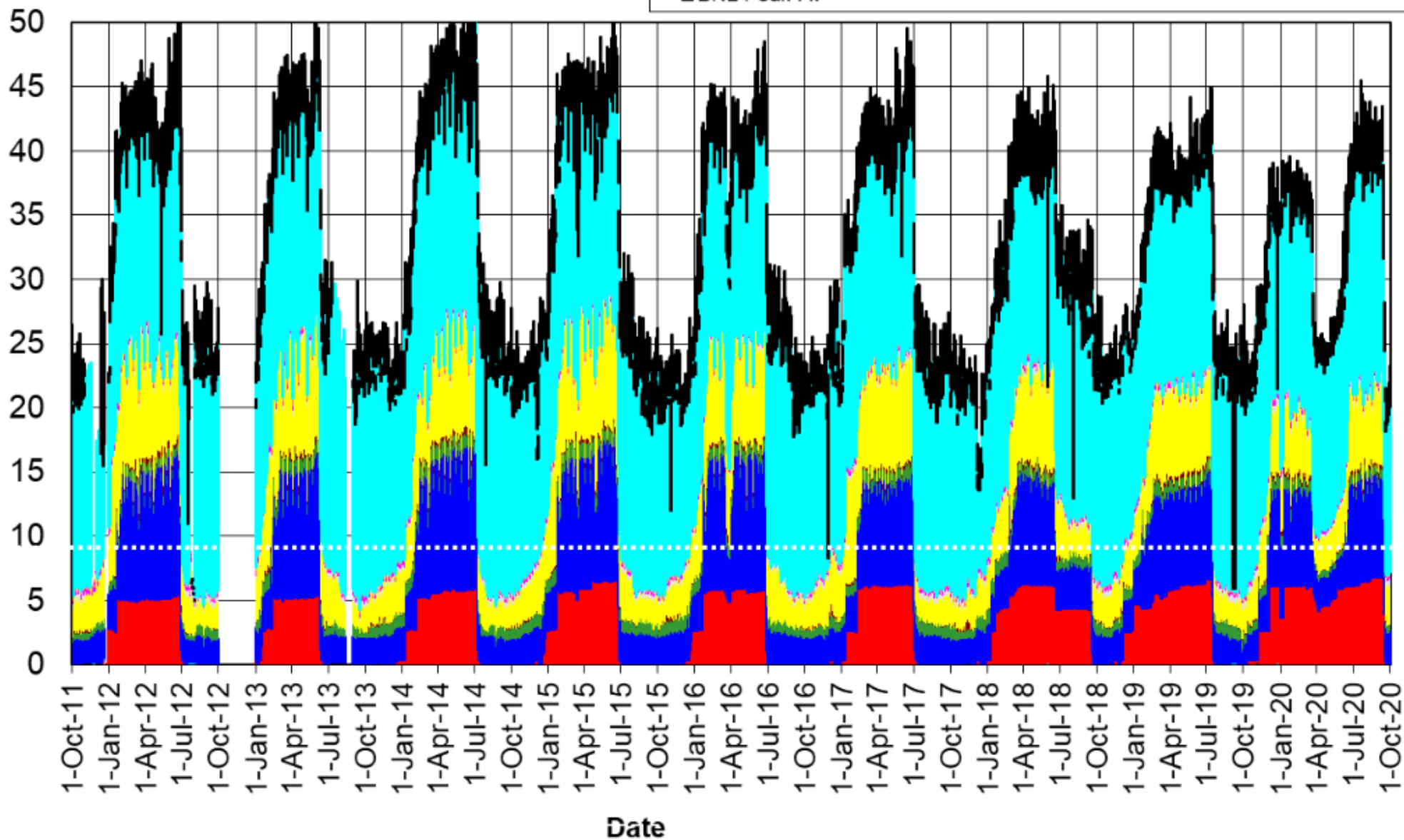
# C-AD Energy Use FY 2002-20



# BNL Energy Use FY 2012-20

as of 30 September 2020

Daily Average Power (MW)



# Useful Websites

- Machine/Detector Planning Page
  - [http://server.c-ad.bnl.gov/esfd/RMEM\\_20/rhic\\_planning.htm](http://server.c-ad.bnl.gov/esfd/RMEM_20/rhic_planning.htm)
- RHIC Run Overview (FY01-FY20)
  - <https://www.rhichome.bnl.gov/RHIC/Runs/index.html#Run-20>
- RHIC Retreat Page (FY20)
  - <https://indico.bnl.gov/event/9276/>
- Store Statistics
  - <https://www.agsrhichome.bnl.gov/AGS/Operations/Run20/>
- Scheduling Physicist
  - [https://www.c-ad.bnl.gov/esfd/Scheduling\\_Physicist/FY20\\_Collider-Accelerator\\_Schedule.htm](https://www.c-ad.bnl.gov/esfd/Scheduling_Physicist/FY20_Collider-Accelerator_Schedule.htm)