All Experimenter's Meeting

Dave McGinnis

January 3, 2005

Store Summary

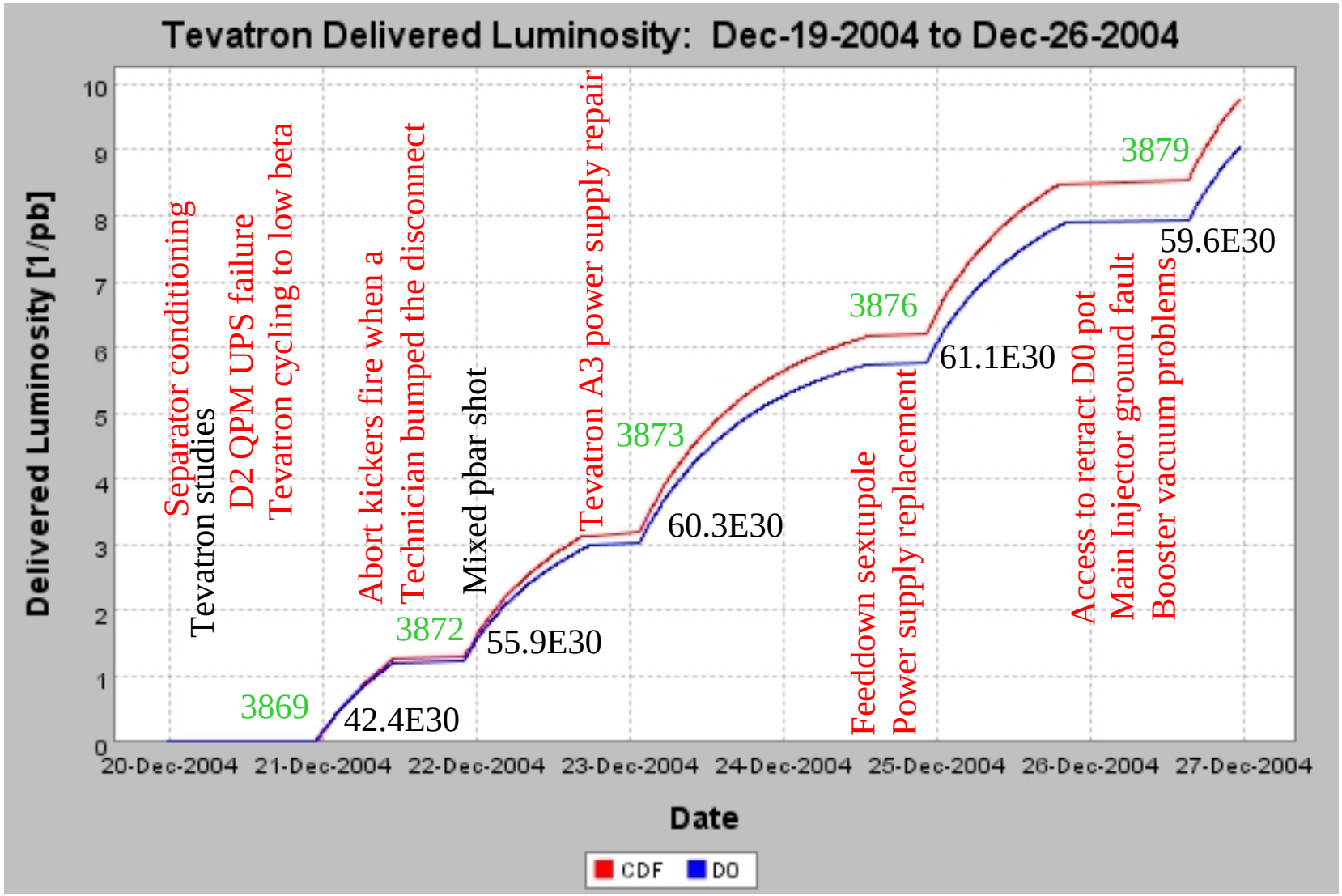
Store	Initial Lum. (E30)	Deliv'd Lum. (nb^{-1})	Termination	Time (hr)	Stack Size (E10)	Comments
3869	42.4	1,240	Loss of store	12.4	143.9	B11H negative power supply at zero to begin store. Lost when abort kicker accidentally turned off
3872	55.9	1,882	Planned	20.3	93.8	Mixed-pbar shot (Recycler stash 43.8E10)
3873	60.3	3,022	Planned	36.0	156.3	
3876	61.1	2,322	Planned	21.8	157.7	
3879	59.6	2,586	Planned	25.7	155.4	

Store Summary

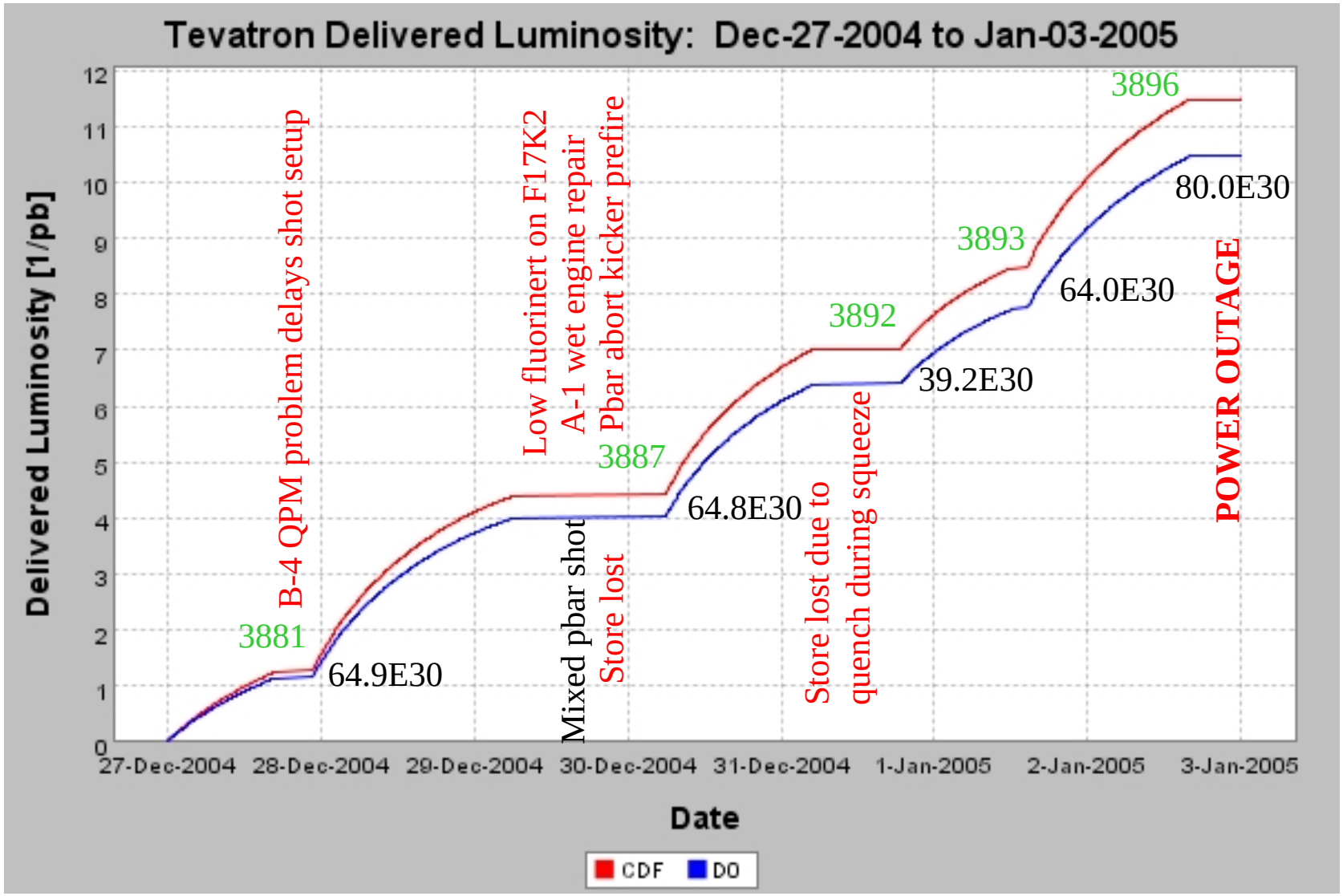
Store	Initial Lum. (E30)	Deliv'd Lum. (nb^{-1})	Termination	Time (hr)	Stack Size (E10)	Comments
3881	64.9	3,134	Planned	31.3	176.1	
3884	0	0	Loss of store	0	171.7	Mixed-pbar shot (Recycler stash 66.1E10), Quench during ramp caused by pbar abort kicker prefire
3887	64.8	2,625	Planned	23.2	124.0	
3888	0	0	Loss of store	0	162.1	D11 quench, losses during squeeze
3892	39.2	1,460	Planned	17.5	84.6	
3893	64.0	3,014	Planned	25.7	158.6	
3896	80.0	513	Loss of store	1.9	169.2	Master Sub-station power outage

Largest non-mixed pbar shot of FY04 was 85.0

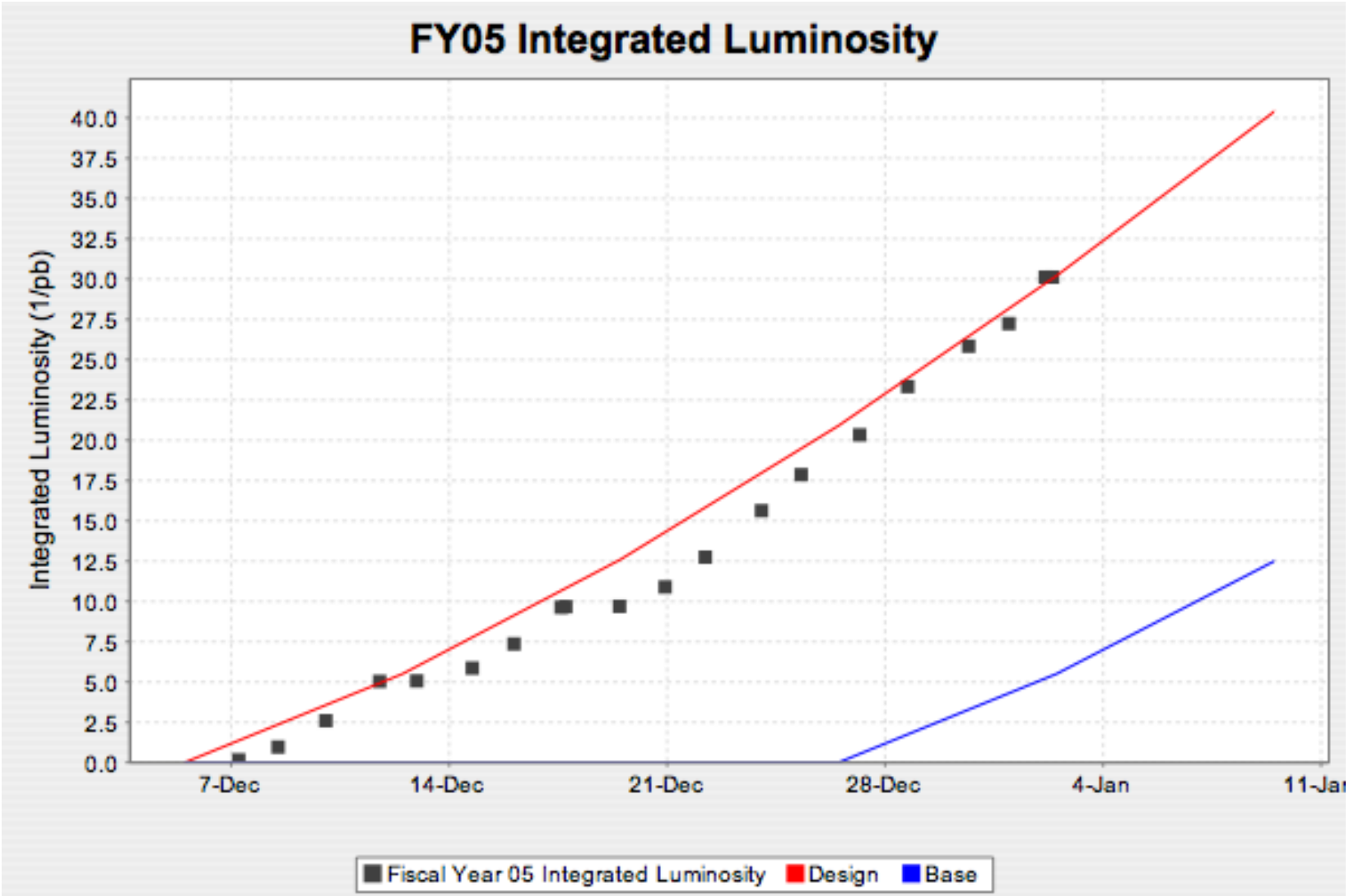
Store Summary



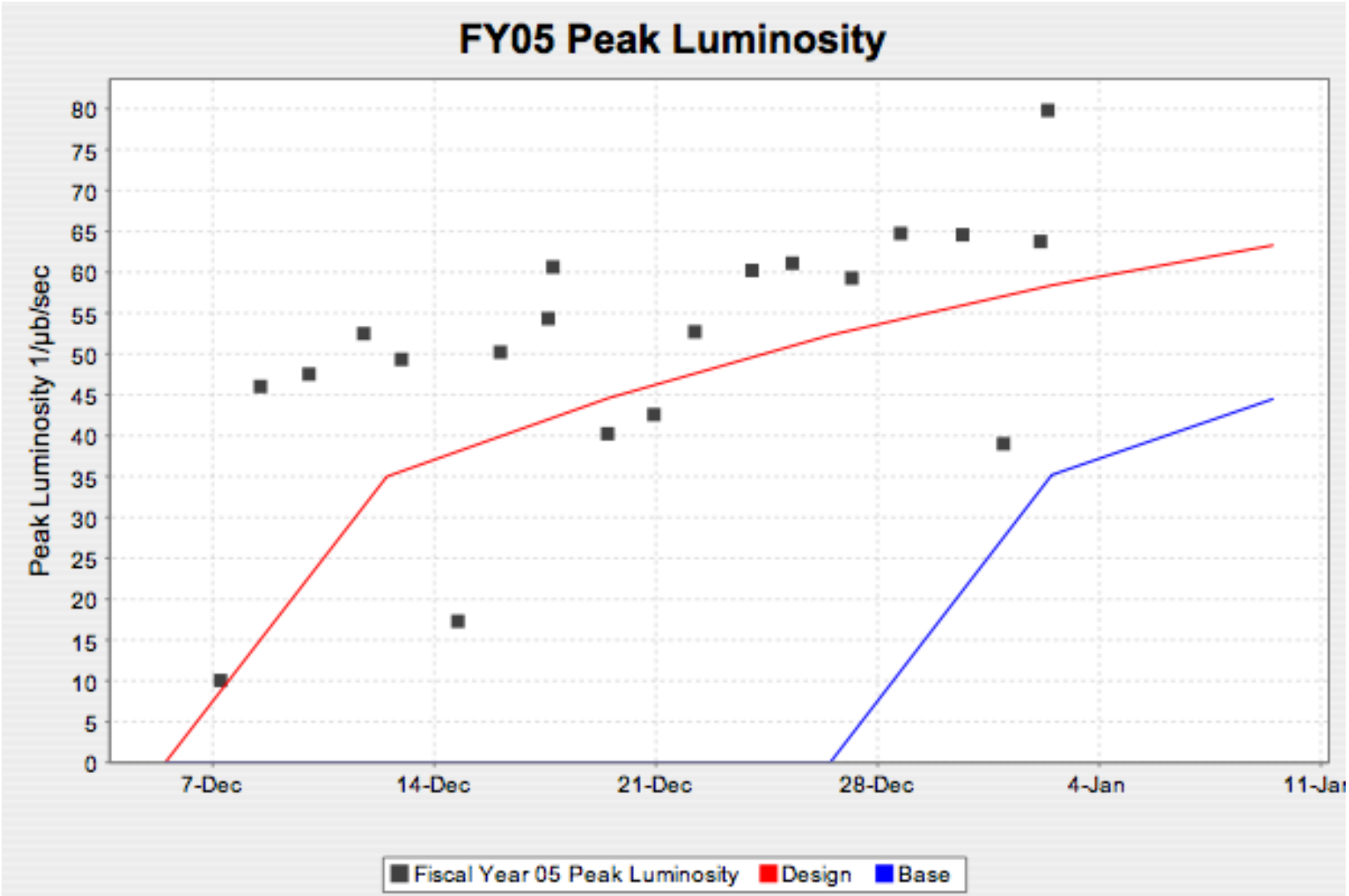
Store Summary



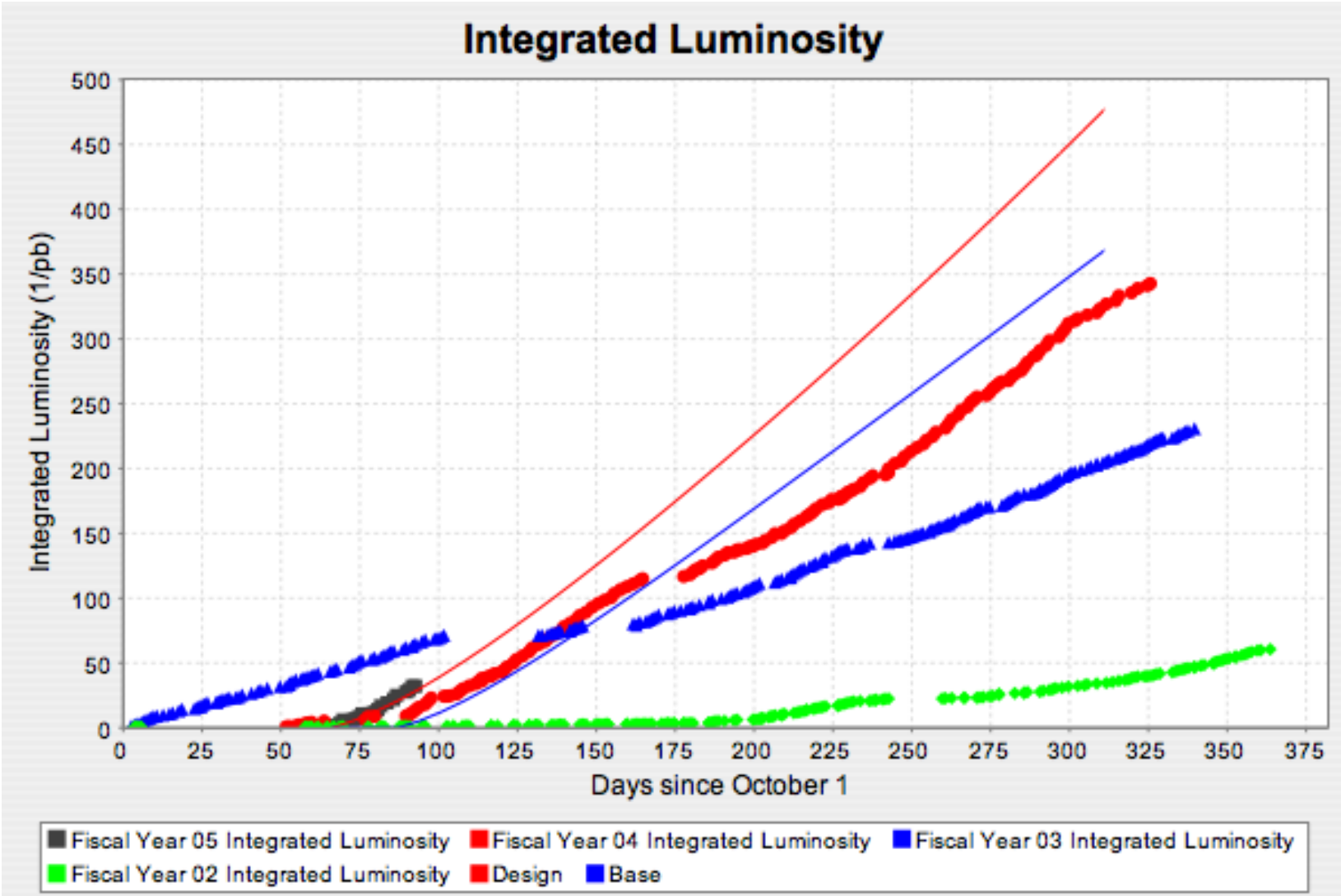
FY05 Integrated Luminosity



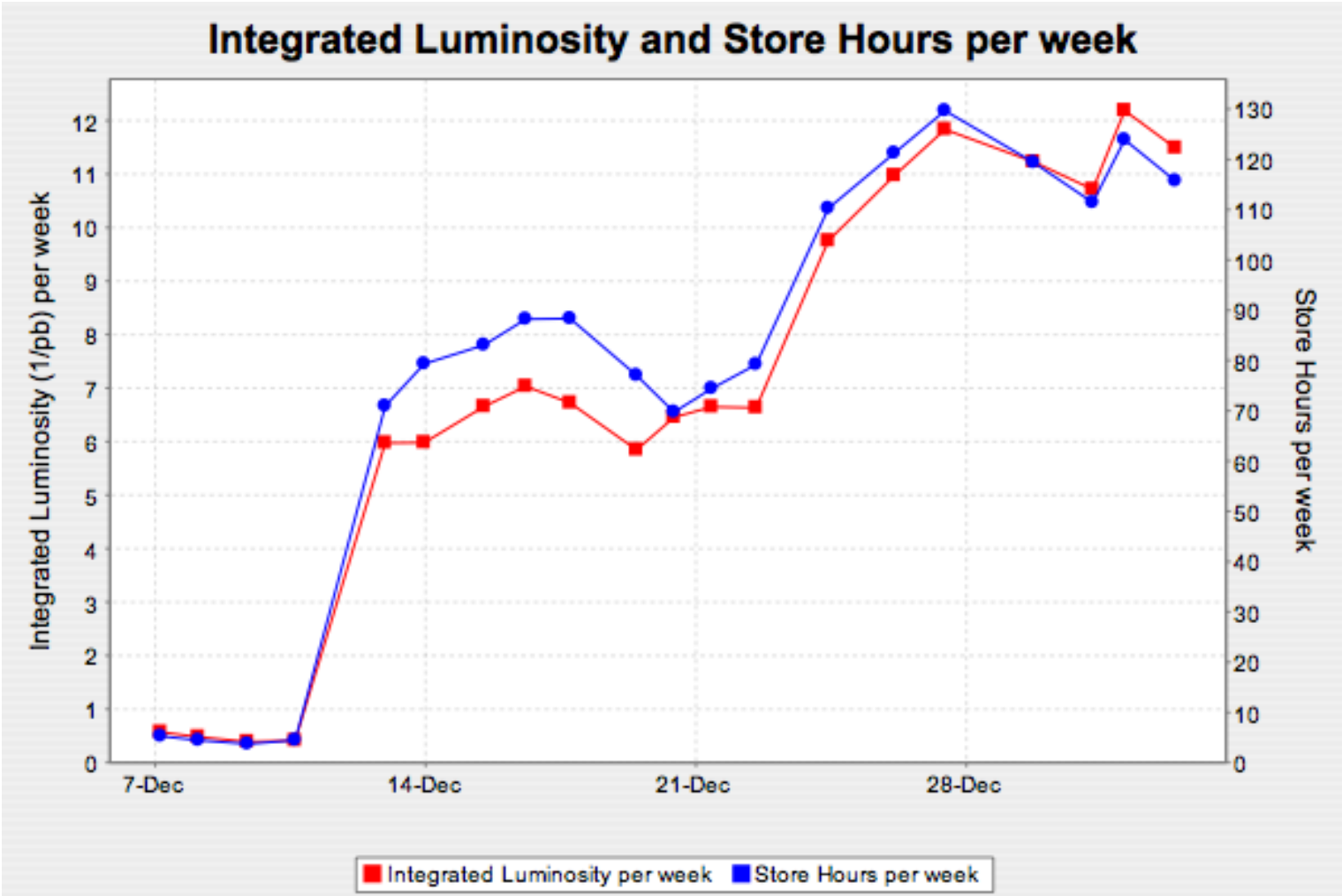
FY05 Peak Luminosity



Integrated Luminosity

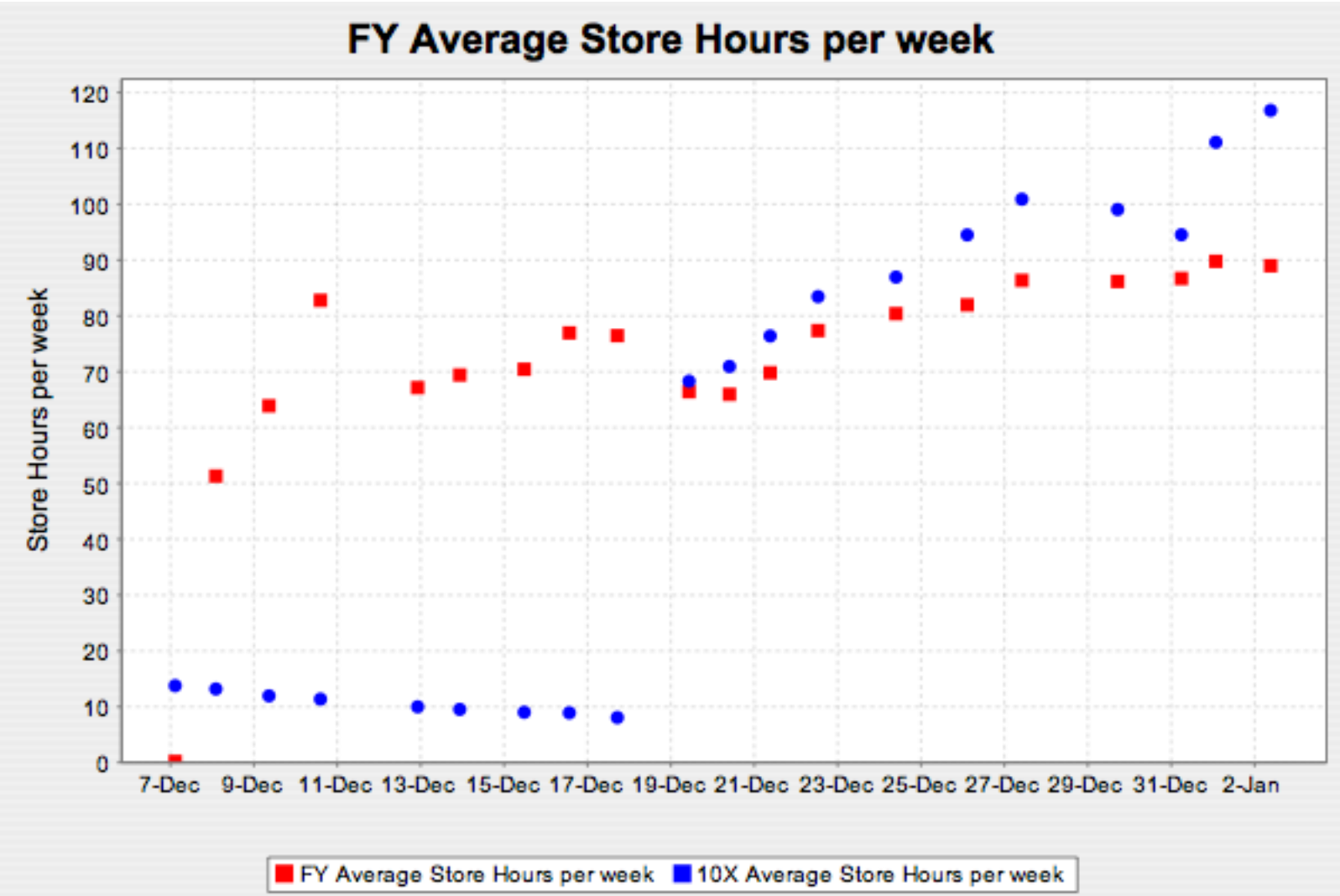


Integrated Luminosity and Store Hours per Week

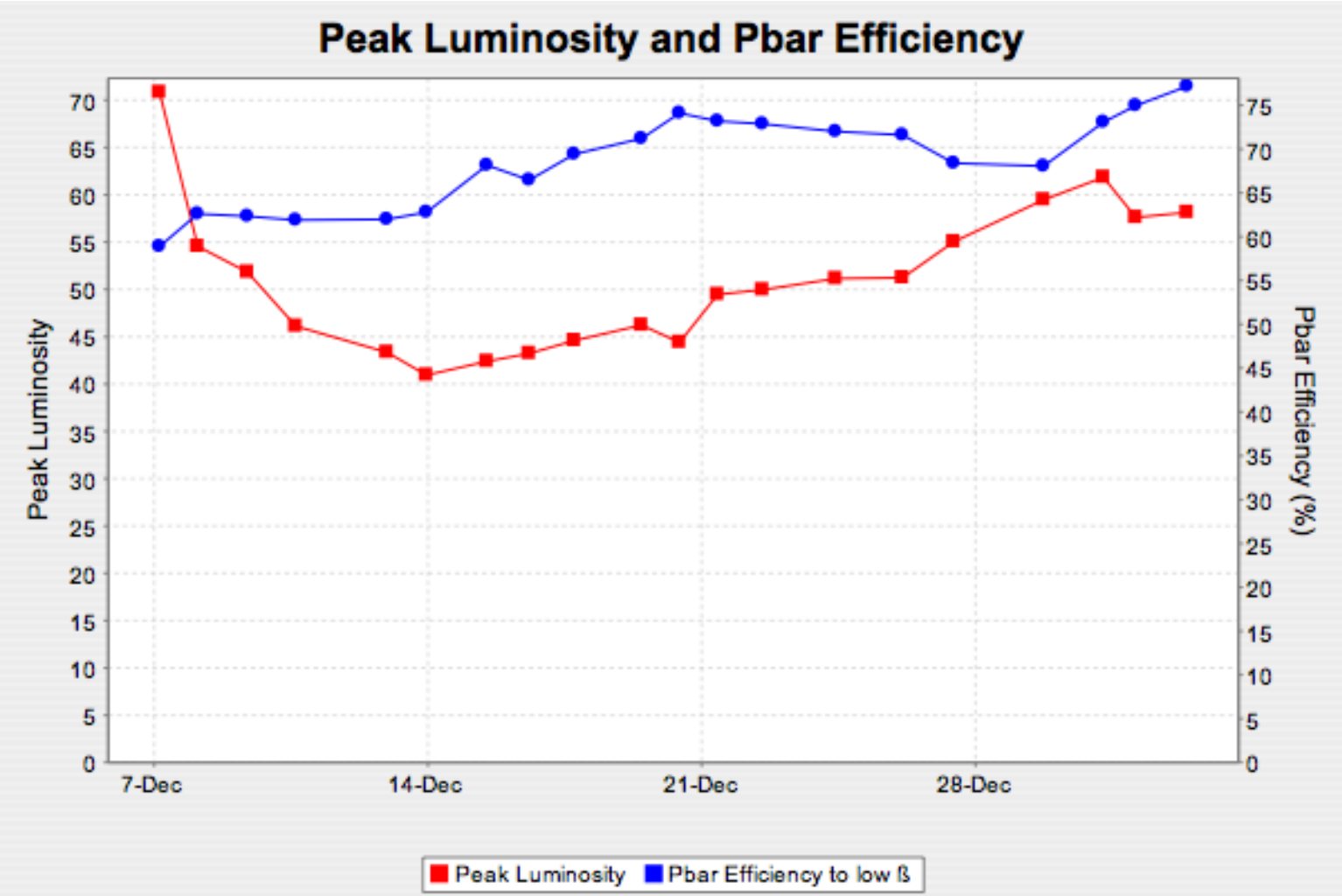


5 Store Running Average

FY05 Average Store Hours per Week

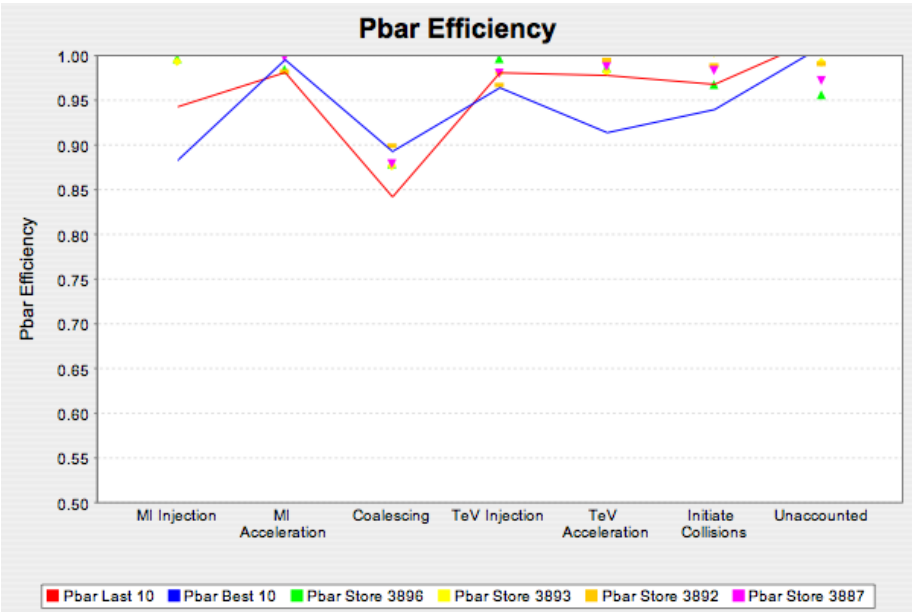


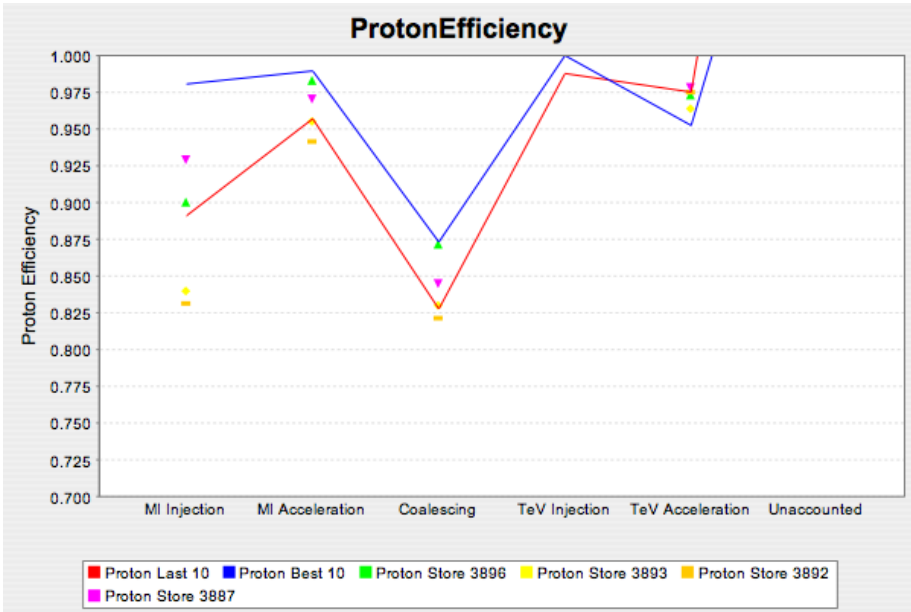
Peak Luminosity and Pbar Efficiency



5 Store Running Average

Collider Transmission Efficiency

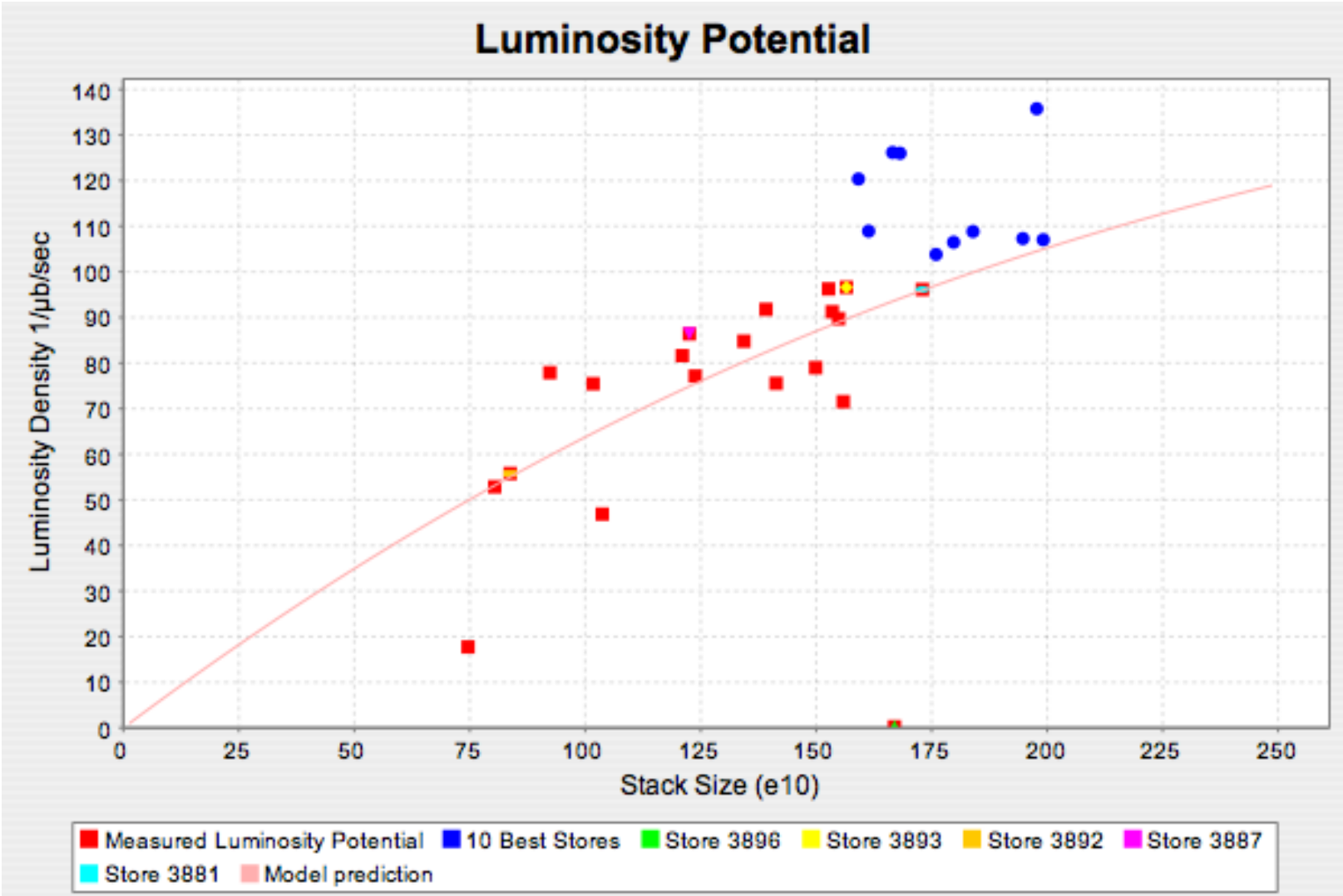




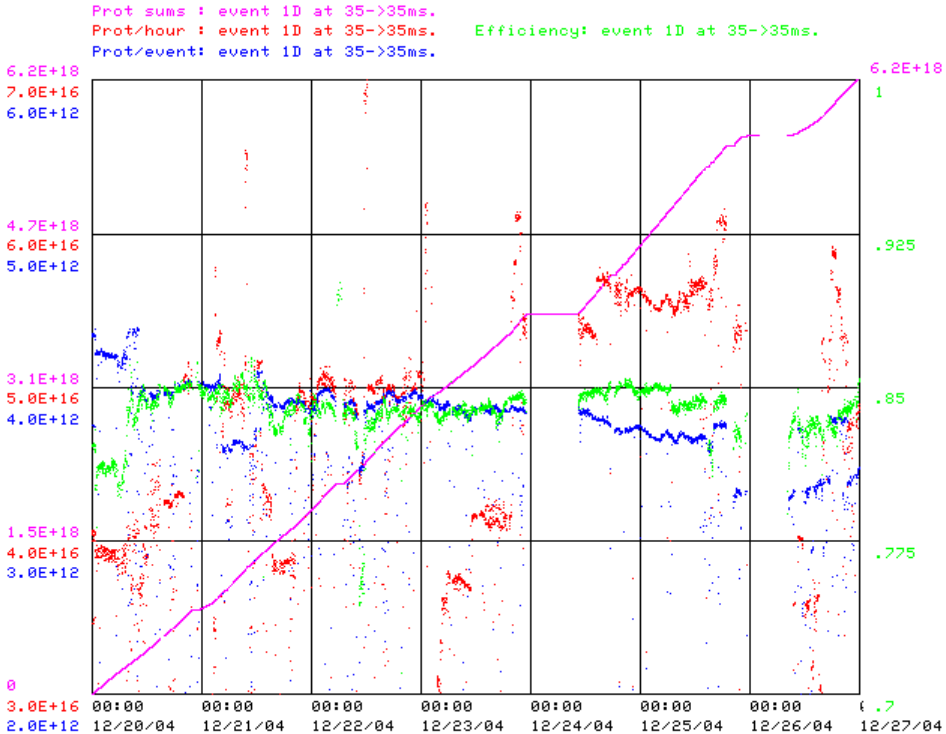
Data Summary Table

		Luminosity Parameters							
Parameter	Last Store	Best Store	Last 10 Stores (Ave)	Best 10 Stores (Ave)	FY Average	Previous FY	FY End Goal (Design)	FY End Goal (Base)	
Initial Luminosity (Average)	79.7	102.8	54.7	87.6	49.1	71.1	96.1	80.7	$x10^{30} cm^{-2} sec^{-1}$
Integrated Luminosity per Store (Avera	0	4240.9	2042.8	3296.4	1576.6	2660	3369	3190	nb^{-1}
Luminosity per week (Averaged)	-	-	11	-	8.3	11.8	16.8	12.7	pb^{-1}
Store Length	0	32.4	21.6	26.9	17.5	24.5	20	25	Hours
Store Hours per week	-	-	116.6	-	92.2	108.3	100	100	Hours
Shot Setup Time	2.2	2.4	2.9	2.6	3.1	2.6	2.6	2.6	Hours
		TEVATRON Parameters							
Parameter	Last Store	Best Store	Last 10 Stores (Ave)	Best 10 Stores (Ave)	FY Average	Previous FY	FY End Goal (Design)	FY End Goal (Base)	
Protons per bunch	223	245.8	216.6	251.2	204.8	247.3	260	260	$x10^{9}$
Antiprotons per bunch	33.7	43.2	25.8	35.9	23.8	30.1	42	34	$x10^{9}$
Proton Efficiency to Low Beta	66.7	85	57.5	76.9	56.5	72.7	-	-	%
Pbar Transfer efficiency to Low Beta	77.9	-213.5	74.4	157.3	70.7	83.3	76	74	%
HourGlass Factor	0.9	0.7	0.7	0.7	0.7	0.7	0.6	0.6	
Initial Luminosity Lifetime	0	0	0	0	0	0	0	0	hours
Asymptotic Luminosity Lifetime	0	0	0	0	0	0	0	0	hours
Effective Emittance	21.5	16.9	18.8	17.1	18	18.1	18.5	17	π-mm-mrad
		Antiproton Parameters							
Parameter	Last Store	Best Store	Last 10 Stores (Ave)	Best 10 Stores (Ave)	FY Average	Previous FY	FY End Goal (Design)	FY End Goal (Base)	
Zero Stack Stack Rate	11.9	13	11.9	12.5	10.8	16.2	24.5	14	$x10^{10}$/hour
Normalized Zero Stack Stack Rate	2	2.4	2.2	2.4	2.1	2.3	3.1	2.3	$x10^{-2}$/hour
Average Stacking Rate	7.7	6.8	6.7	6.3	6.3	6.2	10.1	6.6	$x10^{10}$/hour
Stacking Time Line Factor	97.5	92.6	81.4	80.3	80.1	77.9	75	75	%
Stack Size at Zero Stack Rate	303.5	284.4	300.6	299.8	346.7	325.8	300	300	$x10^{10}$
Protons on Target	6	5.4	5.6	5.2	5.1	5.3	8	6.2	$x10^{12}$
Start Stack	167.2	237.2	141.4	189.5	132.9	165.7	216	181	$x10^{10}$
End Stack	11.4	33.6	10.6	24.4	9.3	16	15	15	$x10^{10}$
Unstacked Pbars	155.8	203.6	130.8	165.1	123.6	149.7	201	166	$x10^{10}$

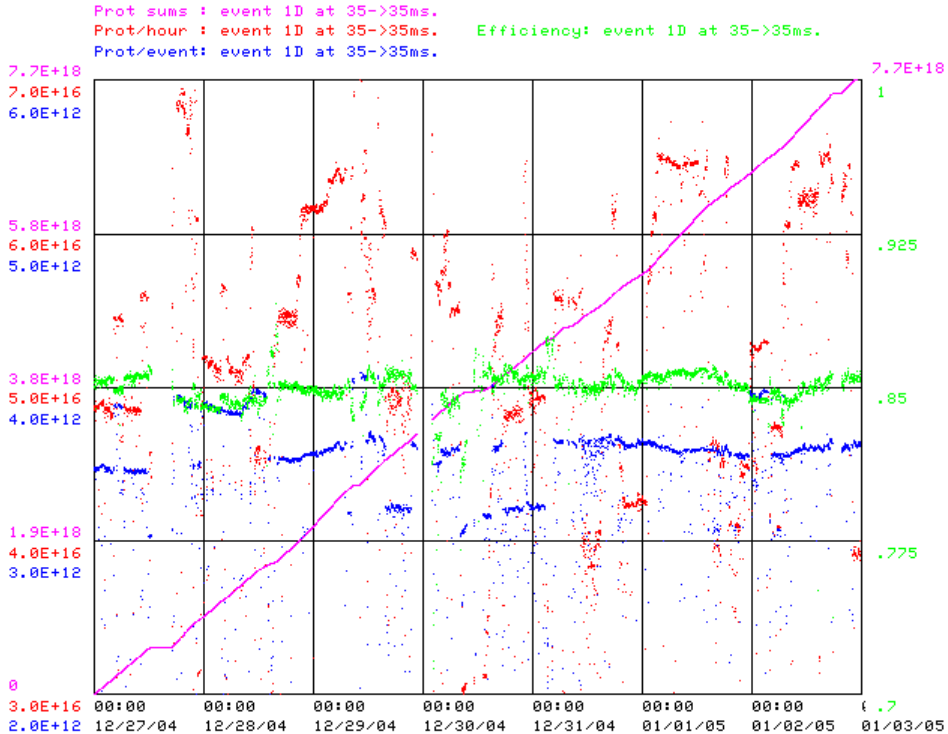
Stack Size Potential



MiniBoone

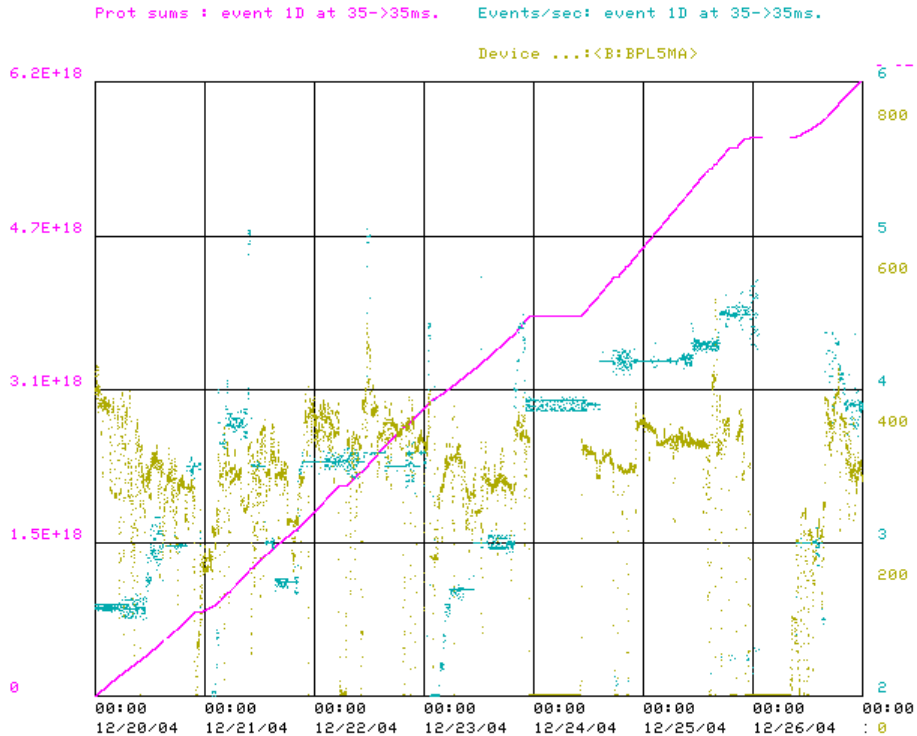


12/20/04 - 12/27/04

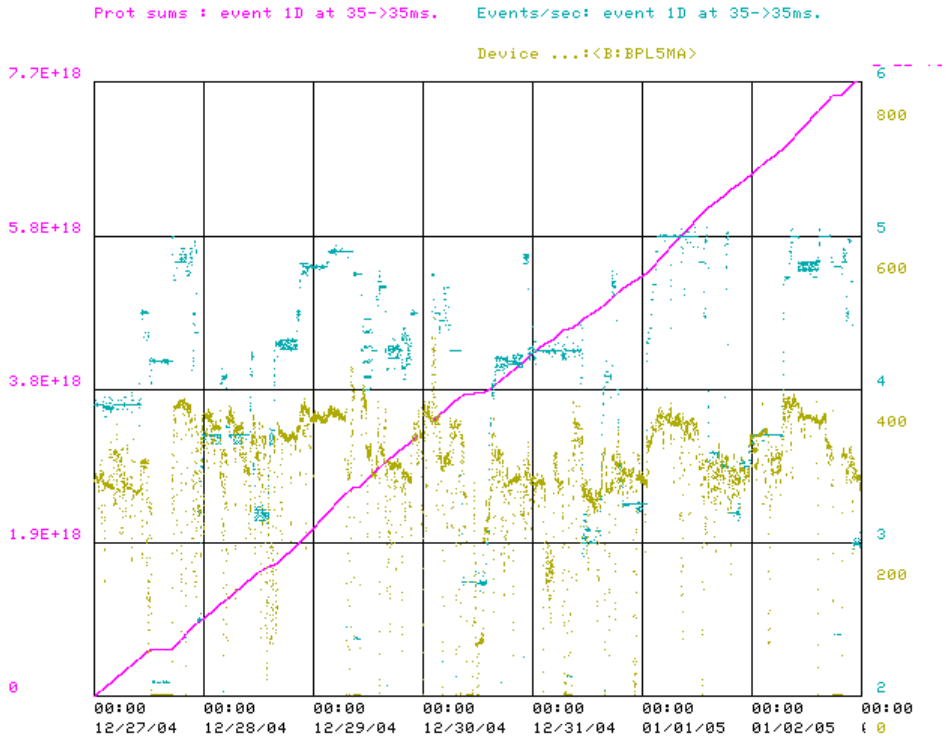


12/27/04 - 12/3/05

MiniBoone



12/20/04 - 12/27/04



12/27/04 - 12/3/05

Studies

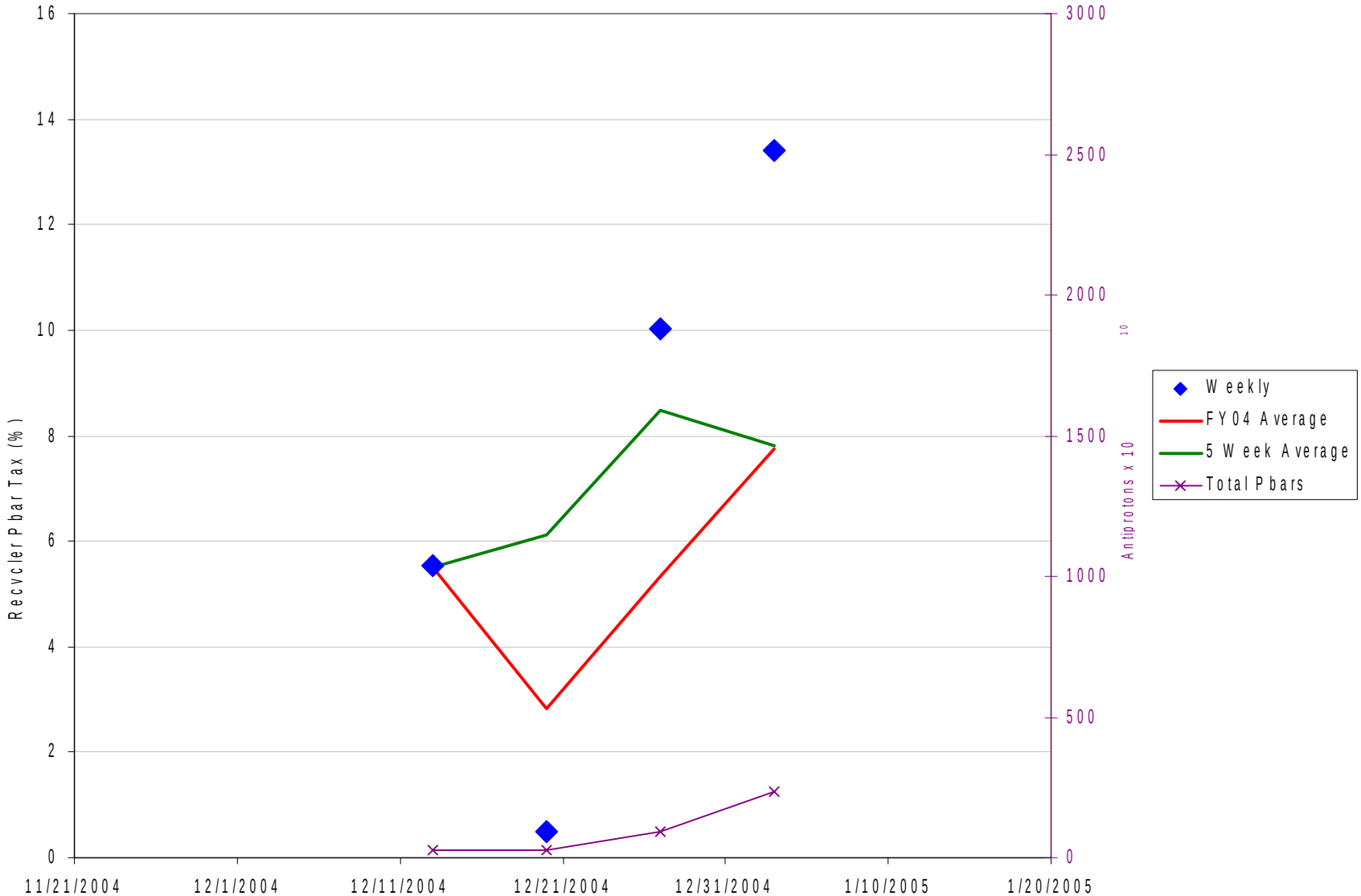
Pbar Studies

Date	Duration (Hr)	Description
12/8/2004	1.0	D/A adjustments during shot setup
12/8/2004	0.8	Flying wires
12/13/2004	0.3	Flying wires
12/13/2004	9.0	Revese protons, Debuncher aperture
12/14/2004	2.3	Debuncher cooling
12/15/2004	0.5	Debuncher cooling
12/16/2004	4.8	Reverse protons, Debuncher aperture
12/21/2004	0.5	AP-2 optics/aperture
	0.0	Sum for week
	19.2	Sum for year
	5.2	Average per week

TEV Studies

Date	Duration (Hr)	Description
12/20/2004	7.0	Octupole/stability
12/20/2004	1.0	Decoupling
12/21/2004	2.5	Decoupling/150 GeV lifetime
12/22/2004	1.0	Abort gap monitor check-out
12/29/2004	6.0	Octupole/stability
12/31/2004	4.0	Parse of squeeze
1/2/2005	1.1	Moist squeeze for beam measurements
	11.1	Sum for Week
	62.6	Sum for Year
	16.9	Average per week

Recycler


16
14
12
10
8
6
4
2
0
Recycler Pbar Tax (%)
3000
2500
2000
1500
1000
500
0
Antiprotons x 10
11/21/2004
12/1/2004
12/11/2004
12/21/2004
12/31/2004
1/10/2005
1/20/2005
Weekly
FY04 Average
5 Week Average
Total Pbars

Plan for the Week

- Recover from the power outage!
  - Resume integrating luminosity by Wednesday night at the earliest.
- Move the IP at CDF
  - 2.3 mm horizontally
  - Low beta quad moves
    - 2 shifts of alignment work
    - 1-2 shifts or orbit studies
- Transition into daily Mixed Pbar Source Operations

Mixed Pbar Source Operations

- With the exception of the number of store hours, our present performance is about where it was when we shut down in August.
- Also, we have demonstrated a successful mixed pbar shot.
- This week we will start running mixed pbar shots to the Tevatron EVERY store.
- Even though with our present pbar stacking rates, this is probably not the optimal way to integrate luminosity, the reasons for pushing this mode of operation now are:
  - Focus our efforts at increasing the stacking rate at small stacks.
  - Optimize rapid transfers between the Accumulator and Recycler.
  - Push the Recycler into operations.

Mixed Pbar Source Operations

- After every shot to the Tevatron, stack the Accumulator core back up to 60e10.
- Transfer as much of the 60e10 to the Recycler as possible.
  - To keep the longitudinal emittance within reason, the transfers can be done in a number of "mini-transfers" with barrier bucket manipulations in the Recycler between each mini-transfer.
  - If the store is lost before the Accumulator reaches 60e10, skip the transfer to the Recycler and stack in the Accumulator until the stack reaches 80-100e10.
    - During this time, the Tevatron is recovering from the lost store followed by studies if time permits.
    - Pbars for the next shot would come only from the Accumulator.
- After the 60e10 pbars are transferred to the Recycler:
  - Re-start stacking to the Accumulator.
  - Continue stacking until the store has stayed in the Tevatron for a total of about 20-25 hours.
    - This should get about 120e10 pbars back into the Accumulator.
  - If the store is lost before this, then
    - we will stack until the Accumulator has reached 60-80e10 pbars.
    - During this time, the Tevatron is recovering from the lost store followed by studies if time permits.
- The shot will probably be 2-3 transfers from the Recycler and 7-6 transfers from the Accumulator.