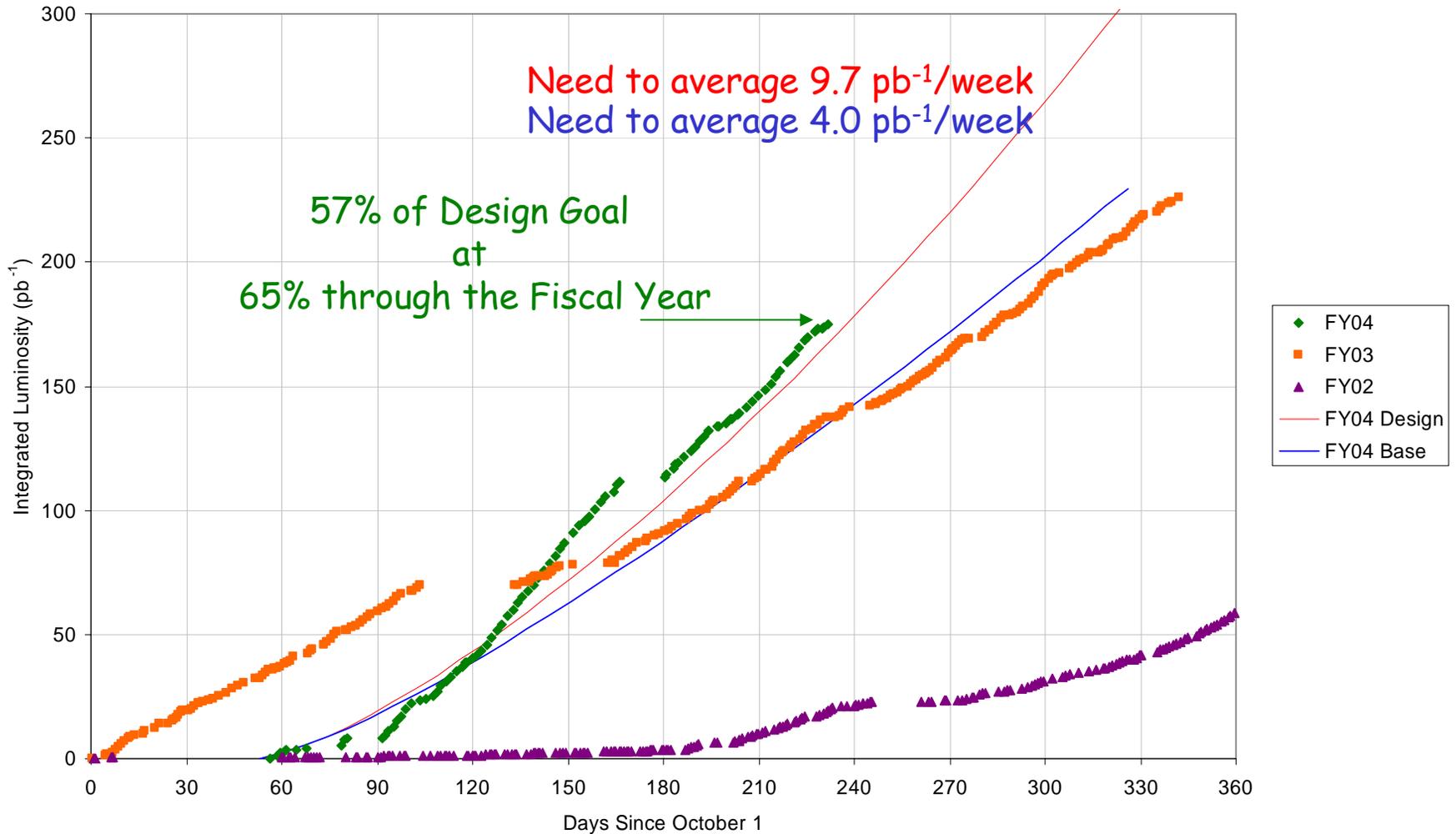
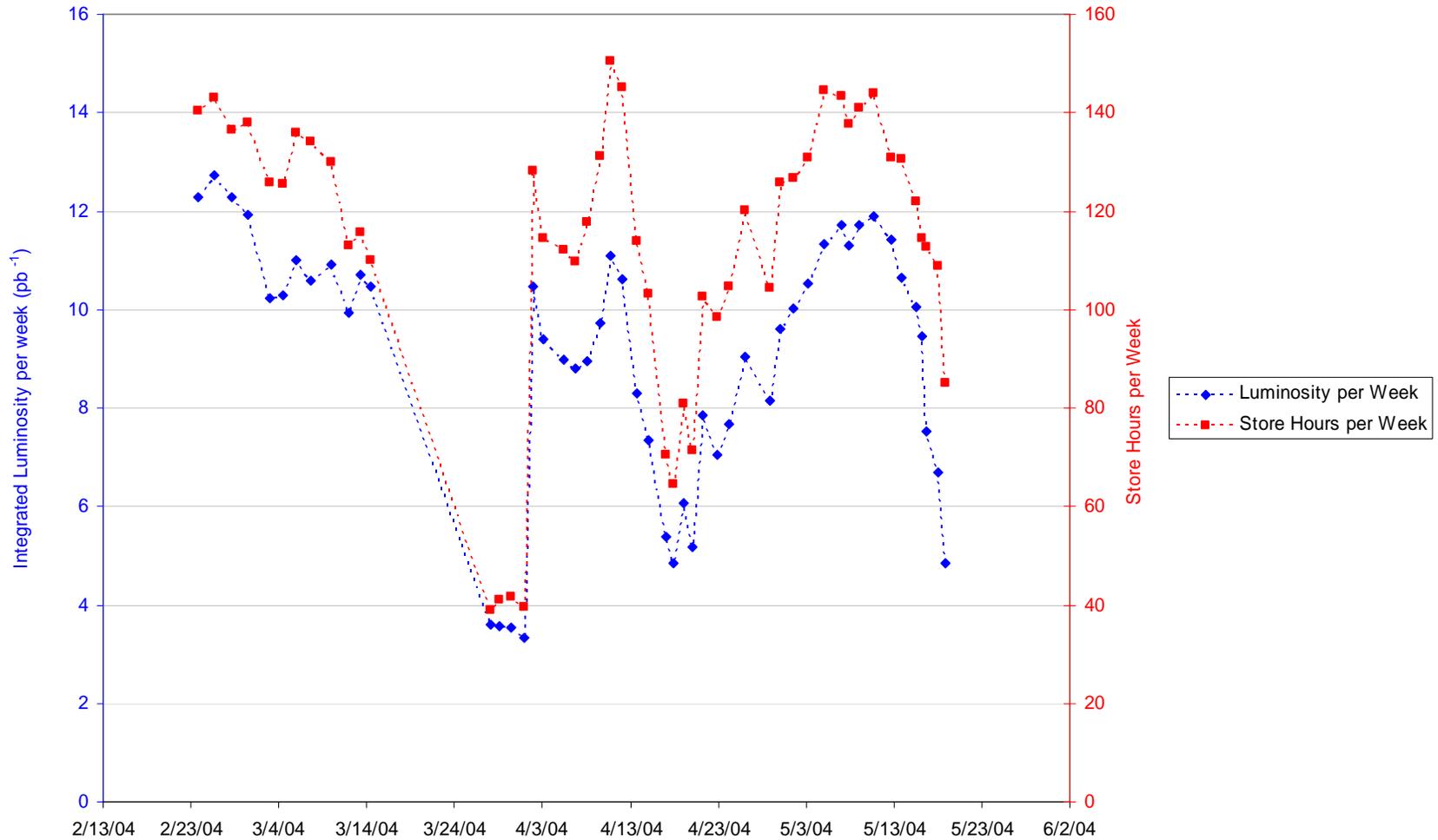

Run II PMG

Dave McGinnis
May 19, 2004

Integrated Luminosity

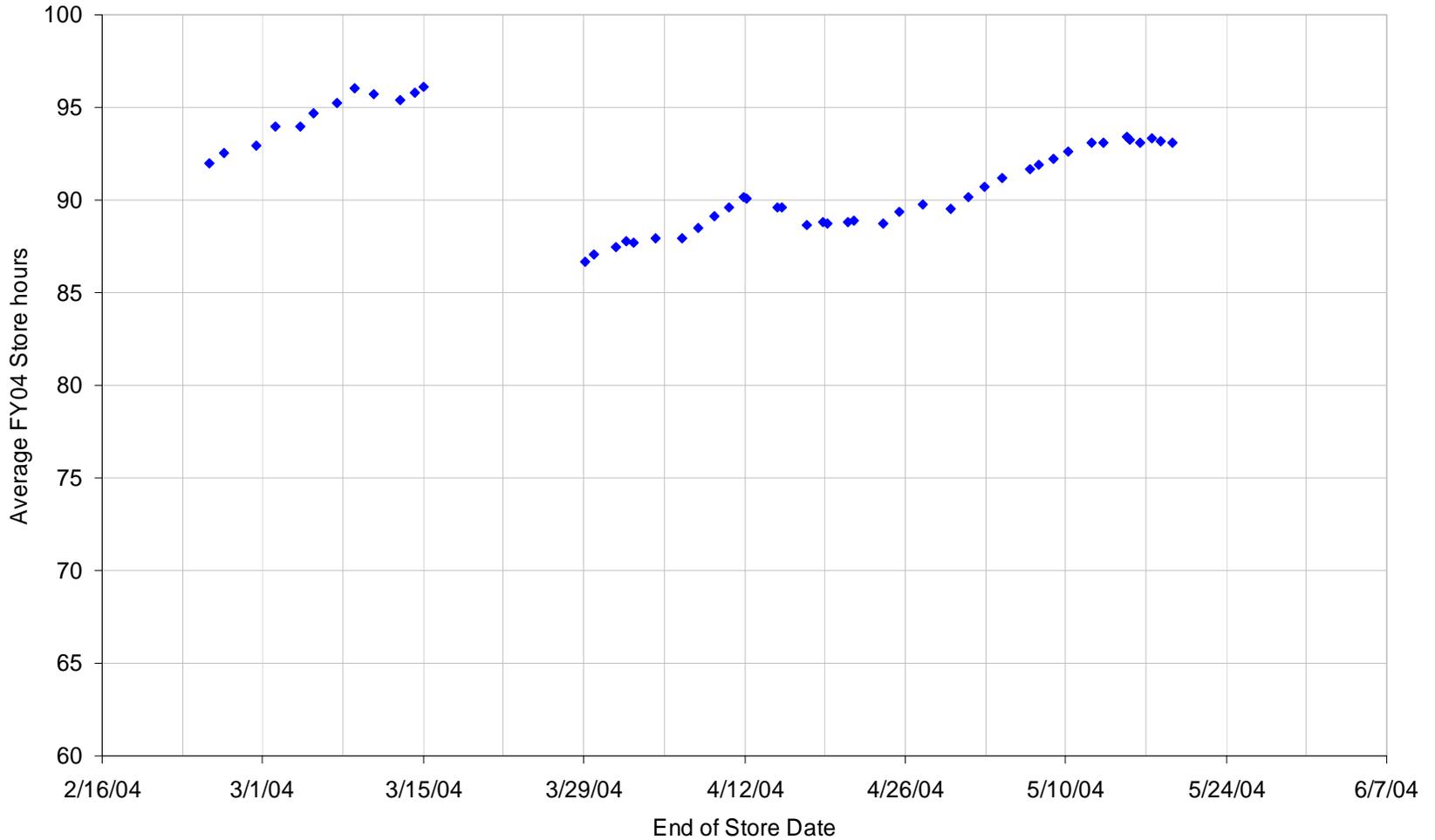


Integrated Luminosity and Store Hours per Week

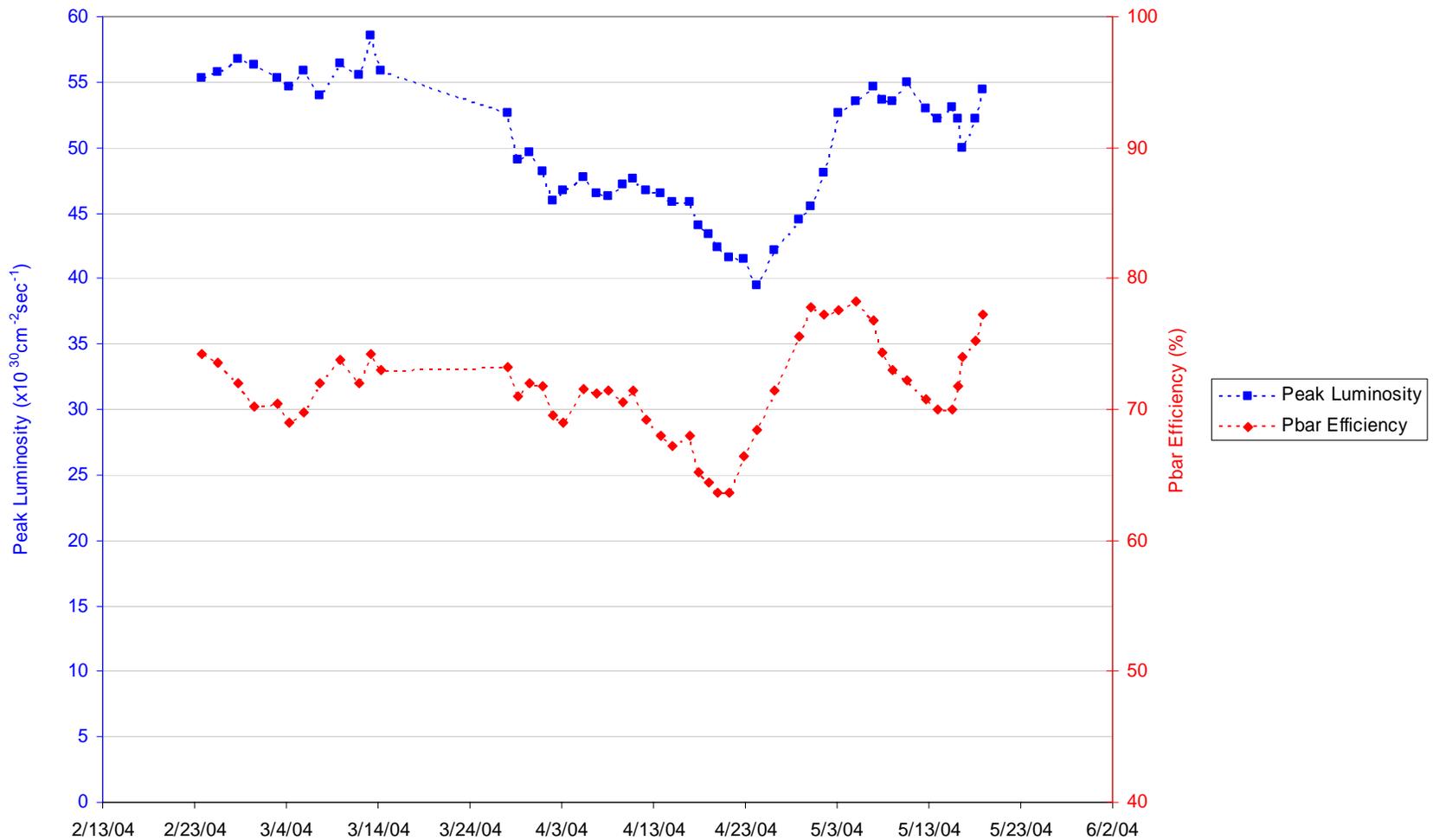


5 Store Running Average

FY04 Average Store Hours per Week



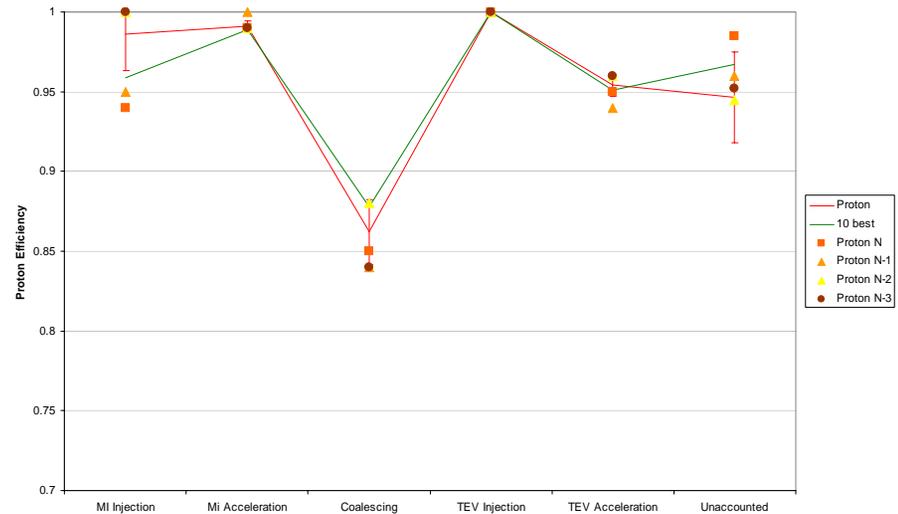
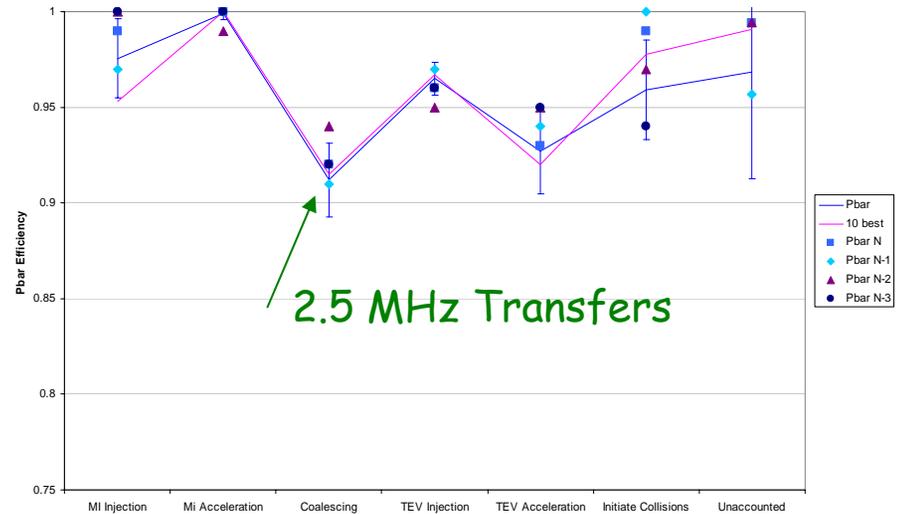
Peak Luminosity and Pbar Efficiency



5 Store Running Average

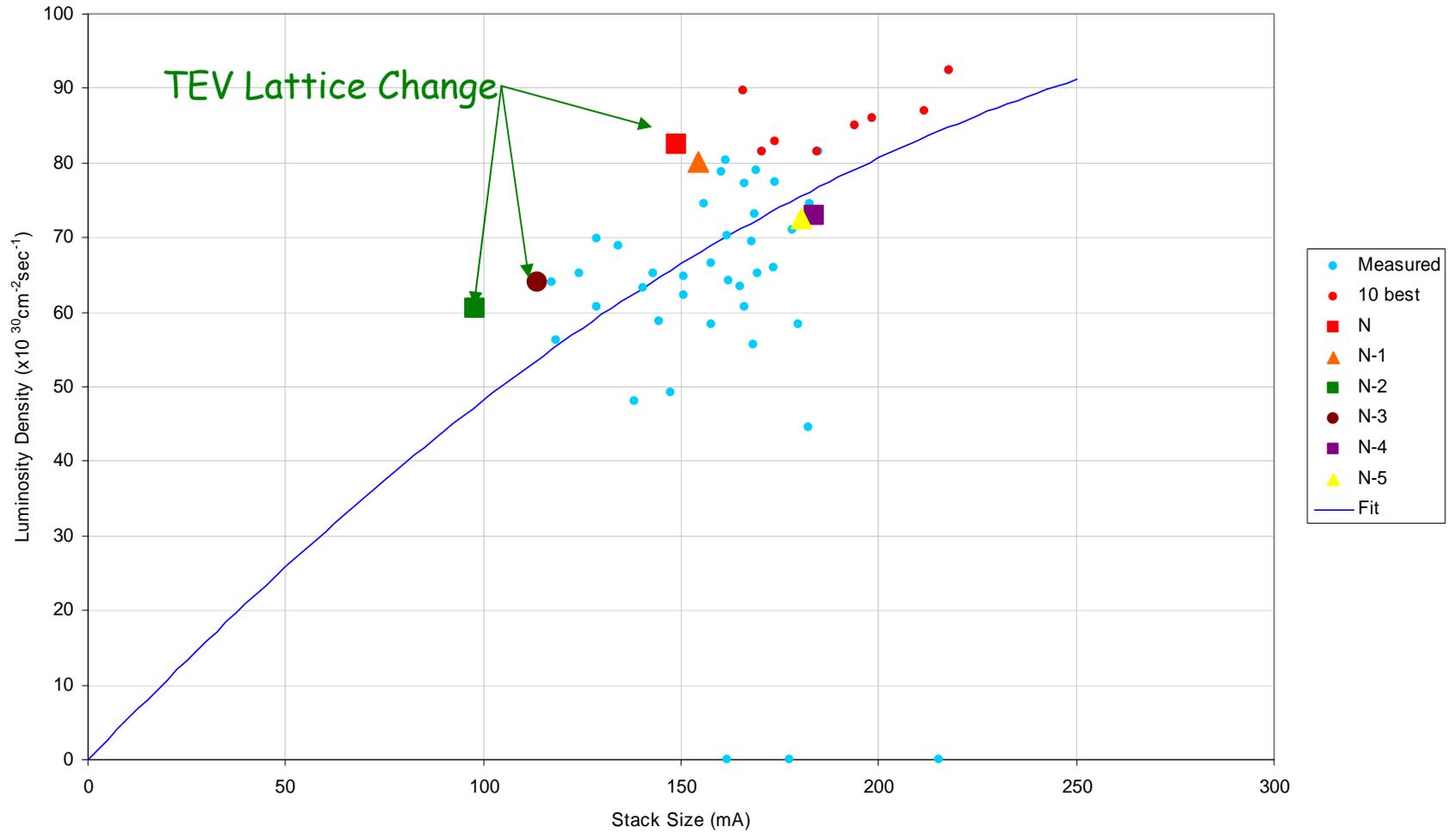
Collider Transmission Efficiency*

- Peak Luminosity down by 13% (last week was at 15%)
 - Unstacked Pbars down by 15% (last week was at 13%)
 - Store Length down by 27% (last week was at 0%)
 - Pbar Transfer efficiency down by 3% (last week was at 3%)
 - Accumulator - MI transfer down by 0% (last week was at 0%)
 - Coalescing down by 0% (last week was at 0%)
 - Low beta squeeze down by 2% (last week was at 2%)
 - Lifetime down by 1% (last week was at 1%)
 - Protons per bunch is up by 1% (last week was up at 1%)
 - Proton transfer efficiency down by 3% (last week was at 6%)
 - Main Injector Injection down by 0% (last week was at 0%)
 - Lifetime down by 2% (last week was at 4%)
 - Effective Emittance DOWN by 3% (last week was at up 6%) - last store was down 11%



*Of the past 10 stores w.r.t the 10 best stores

Stack Size Potential



Data Summary Table

Store Parameters									
Parameter	Last Store	Best Store	Last 10 stores Average	Best 10 stores Average	FY04 Average	End of FY03	FY04 (End) Design	FY04 (End) Base	
Initial Luminosity (Average)	62.0	67.5	53.3	61.5	50.2	36.1	61.9	43.3	$\times 10^{30} \text{cm}^{-2} \text{sec}^{-1}$
Integrated Luminosity per Store (Averaged)	979	3937	1450	2336	1884	1089	2000	1300	nb^{-1}
Luminosity per week (Averaged)	-	-	8.8	-	7.6	6.4	11.3	7.4	pb^{-1}
Store Length	12.4	41.0	18.6	25.5	23.6	14.9	15.0	15.0	Hours
Store Hours per week	-	-	112	-	96	88	85	84	Hours
Shot Setup Time	2.0	2.1	2.1	2.5	2.4	2.3	2.2	2.2	Hours
TEVATRON Parameters									
Parameter	Last Store	Best Store	Last 10 stores Average	Best 10 stores Average	FY04 Average	End of FY03	FY04 (End) Design	FY04 (End) Base	
Protons per bunch	243	238	241	239	239	237	260	260	$\times 10^9$
Antiprotons per bunch	29	40	27	33	28	22	31	25	$\times 10^9$
Proton Efficiency to Low Beta	74	82	76	78	75	58	-	-	%
Pbar Transfer efficiency to Low Beta	80	72	74	76	72	63	80	77	%
HourGlass Factor	0.72	0.70	0.72	0.71	0.71	0.70	0.65	0.65	
Initial Luminosity Lifetime	7.3	8.9	6.3	7.8	7.6	9.5	8.3	7.0	hours
Asymptotic Luminosity Lifetime	23.7	26.0	24.5	24.6	24.0	25.1	25.0	25.0	hours
Effective Emittance	17.5	21.1	19.1	19.7	20.5	21.6	21.0	23.0	$\pi\text{-mm-mrad}$
Antiproton Parameters									
Parameter	Last Store	Best Store	Last 10 stores Average	Best 10 stores Average	FY04 Average	End of FY03	FY04 (End) Design	FY04 (End) Base	
Zero Stack Stack Rate	13.6	12.0	12.0	11.8	11.5	11.5	18.0	13.7	$\times 10^{10}/\text{hour}$
Normalized Zero Stack Stack Rate	2.5	2.3	2.3	2.3	2.3	2.3	3.6	2.7	$\times 10^{-2}/\text{hour}$
Average Stacking Rate	7.8	6.2	6.3	6.0	5.7	7.1	9.3	7.6	$\times 10^{10}/\text{hour}$
Stacking Time Line Factor	91	85	80	81	80	88	75	75	%
Stack Size at Zero Stack Rate	263	304	308	294	281	300	300	300	$\times 10^{10}$
Protons on Target	5.2	5.3	5.2	5.2	5.0	5.0	5.0	5.0	$\times 10^{12}$
Start Stack	149	218	155	182	161	144	155	130	$\times 10^{10}$
End Stack	21	18	21	24	21	16	15	15	$\times 10^{10}$
Unstacked Pbars	128	200	134	158	140	128	140	115	$\times 10^{10}$

TEV Lattice Change

Major Accomplishments over the past month

- Booster Collimators operational
 - Lower activation in Booster Tunnel but not as much as expected
 - Major improvements in beam to Mini-Boone has been higher efficiency due to tuning the Booster
- 2.5 MHz Transfers between the Accumulator to the Main Injector
 - Coalescing efficiency for pbars is routinely over 90%
- Stack of $>150 \times 10^{10}$ pbars in the Recycler
- Tevatron low beta optics change
 - Looks to have a 10-20% effect on effective emittance

Goals for Next Month

- Make Cogging in the Booster operational
- Demonstrate Slip Stacking 6×10^{12} protons on the pbar target.
- Develop Mixed Source ramps in the Main Injector
 - We have decided not to align the 8 GeV energy in the complex
- Implement new Accumulator RF Curves and the Stacktail Phase Crossover.
- Finish the B2 compensation work in the TEV

Pbar Cooling Plan Outside the Run II Upgrades

- Minimized the Momentum Spread in the Debuncher
 - Increase the bandwidth of the Debuncher Momentum cooling system (~20%) with equalizers
 - ~3 months - underway
 - Optimize gain and gain ramping in the Debuncher momentum cooling
 - gain ramping finished
 - awaiting parasitic study time for gain optimization - followed by 4 hours of tunnel time
 - Investigate a static change in gamma-t in the Debuncher
 - Trade-off of bunch rotation bucket are vs good mixing for the accumulator
 - ~1 month - studies start this week
 - Investigate the feasibility of ramping gamma-t in the Debuncher
 - ~6 months

Pbar Cooling Plan Outside the Run II Upgrades

- Optimize the flux through the Stacktail
 - Implement momentum selective ARF1 curves
 - Software and curves done
 - awaiting parasitic study time
 - Increase bandwidth of the Stacktail system by about 10-20% by extending bandwidth of the Stacktail notch filters
 - DONE
 - Install controllable phase shifters in both legs of the Accumulator Stacktail
 - DONE
 - Implement a phase crossover in the Stacktail system using phase shifters
 - design done
 - awaiting dedicated ZERO stack study time
 - Characterize known configuration of stacktail
 - » Beam transfer function measurements with beam under L2 pickup of L1, L2, L3 - Small stack \sim 1 mA
 - Stack in various configurations
 - » change E_d by varying gains/phases of L1,L2,L3
 - » stacking, clean machine (will stack and scrape)
- Increase the flux handling capability from the StackTail into the core
 - Implement 4-8 GHz momentum core cooling during stacking
 - System in place
 - Operational configuration design not started