CDF
Detector Operations

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Since we last met….

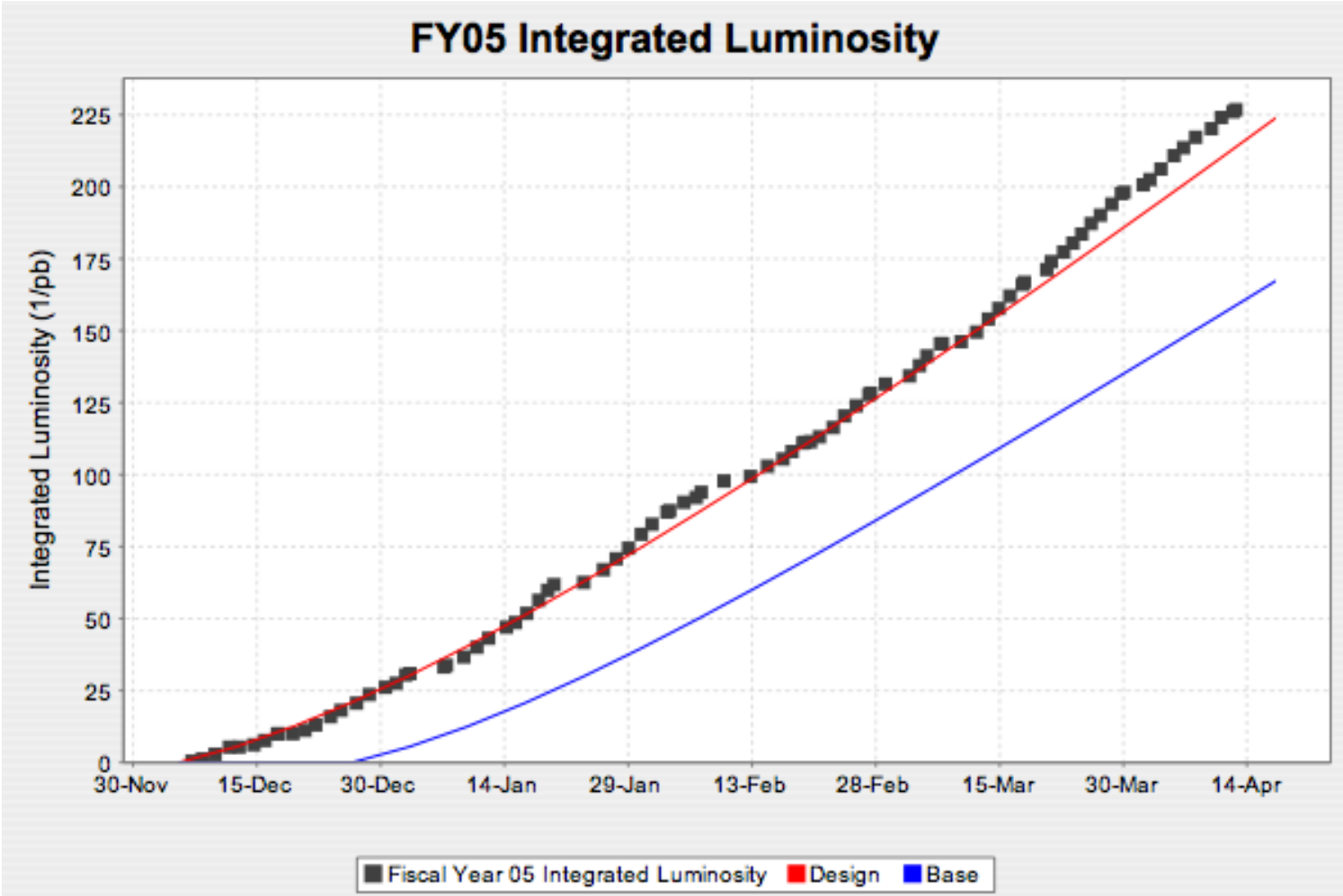
- Survived Lengthy Shutdown
  - Installed new Preradiator system
  - Completed EM Timing installation on central calorimeter
  - Performed lots of detector maintenance
  - Isolated SVX and COT inert regions such that the silicon can be kept cold during COT work
  - Reworked the support structure of low beta quad magnets in our collision hall
- Commissioned new Level 2 decision system and it is now the default for data taking
- Replaced 25% of COT TDC's with modified ones (fast clear)

Since we last met….

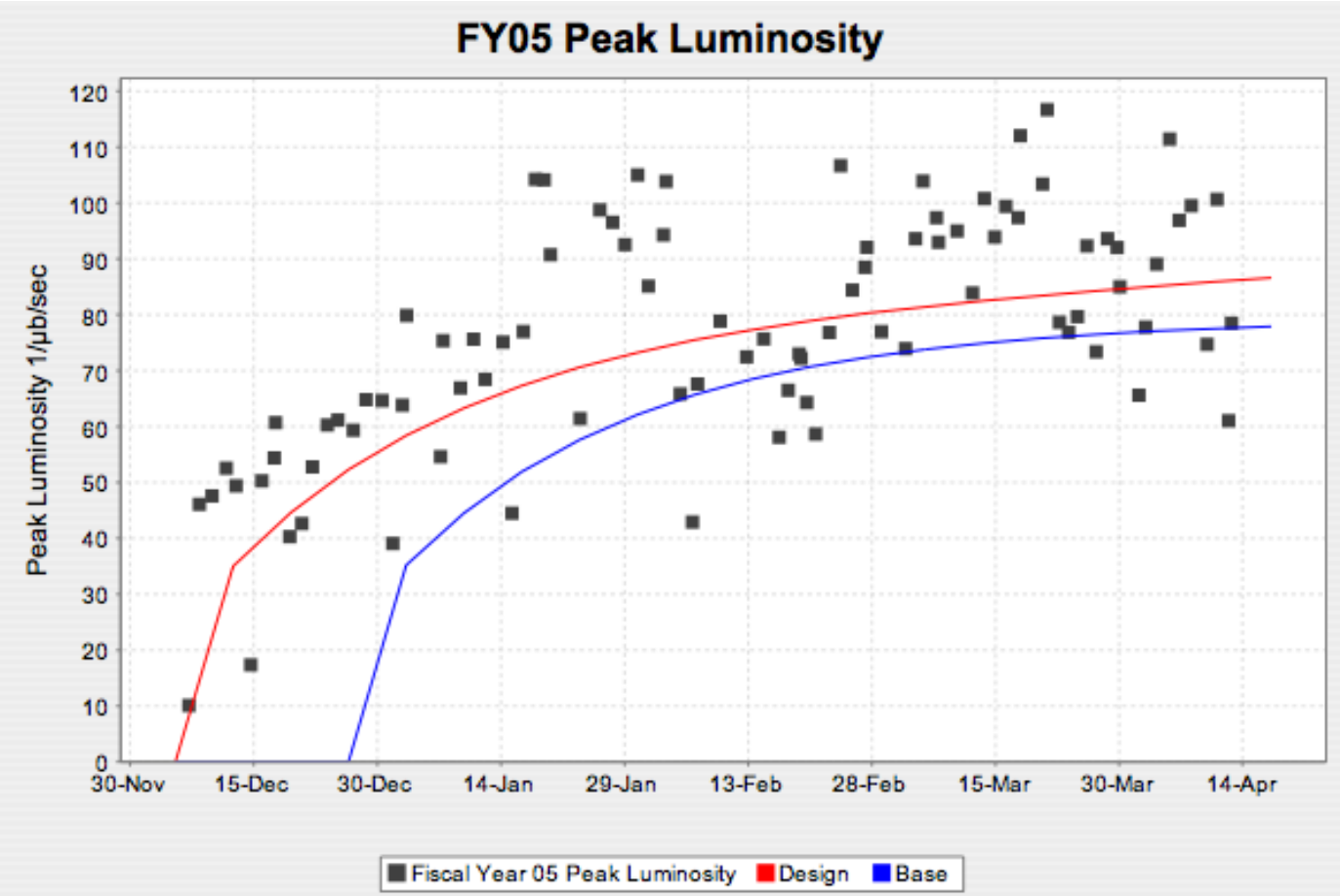
- Sped up TDC readout time dramatically
- Survived 4 kicker prefires
- Operating the detector smoothly now with average efficiency of ~85%
- Lowered silicon operating temperature to -10C
- Accelerator is performing well!
- CDF is still an exciting and vibrant place to work at! We are having fun!

Accelerator Performance

Integrated Lum to Date (FY05)

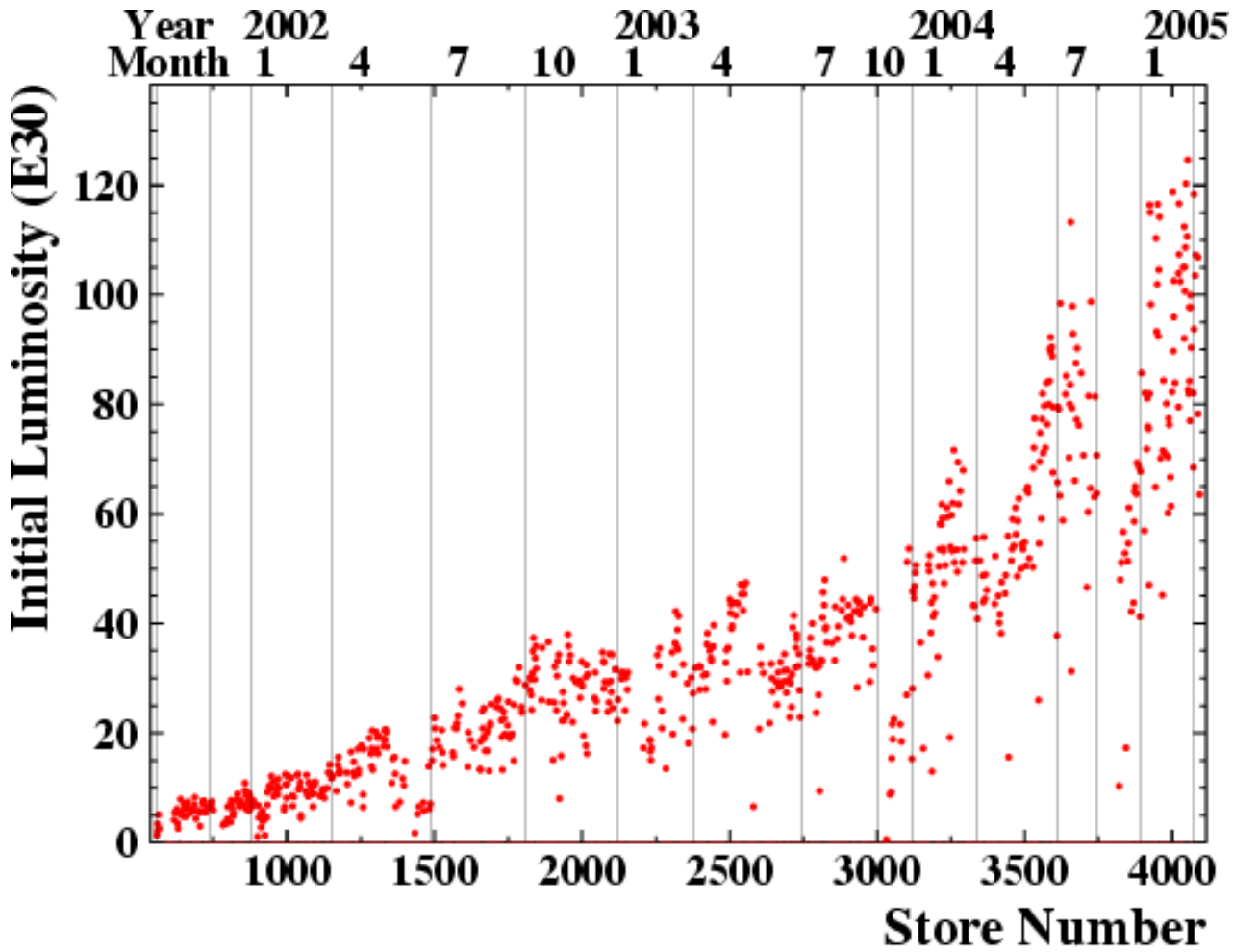


Peak Luminosity



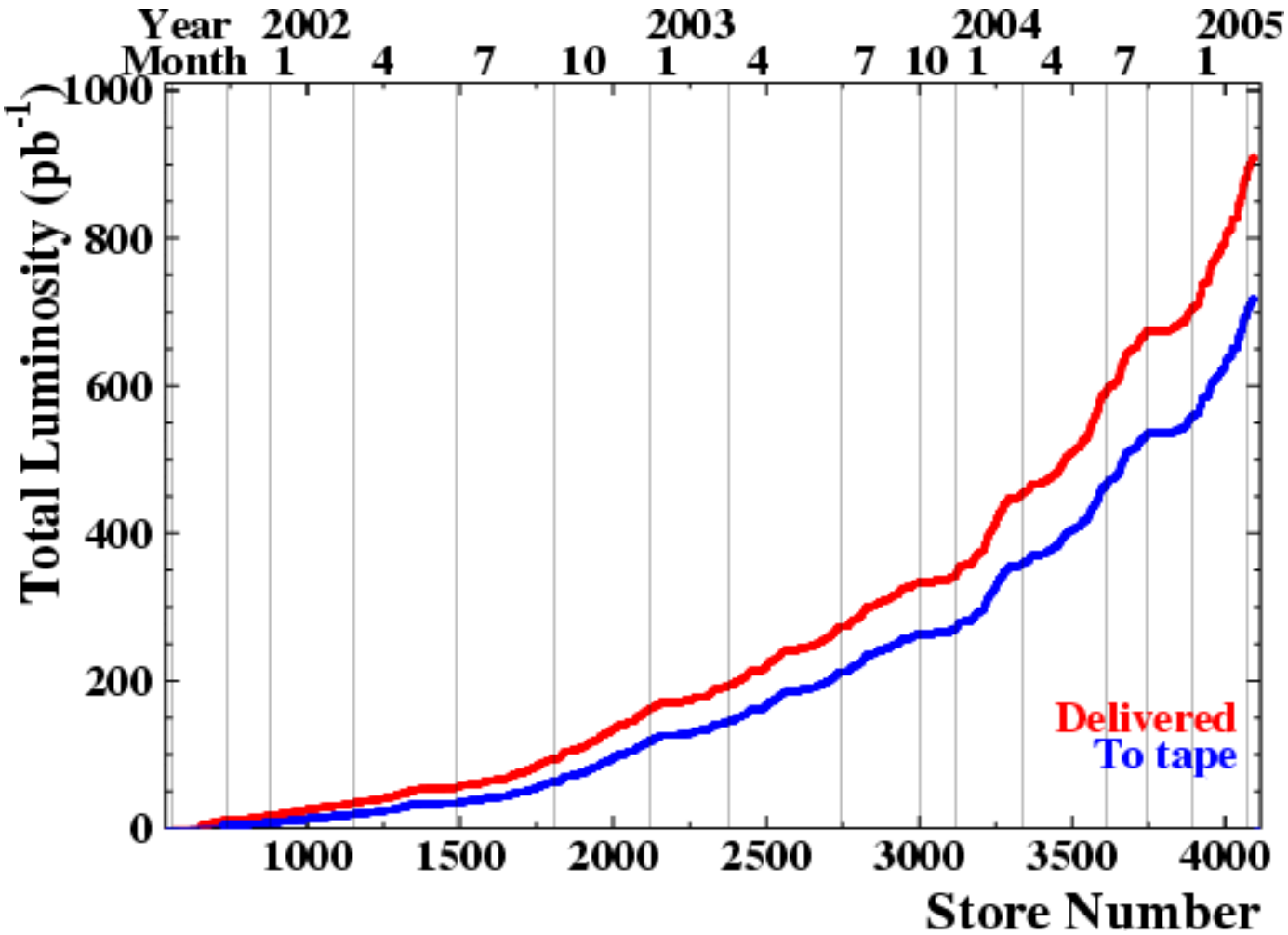
Recycler is already having a significant impact!

Accelerator Performance



CDF Performance

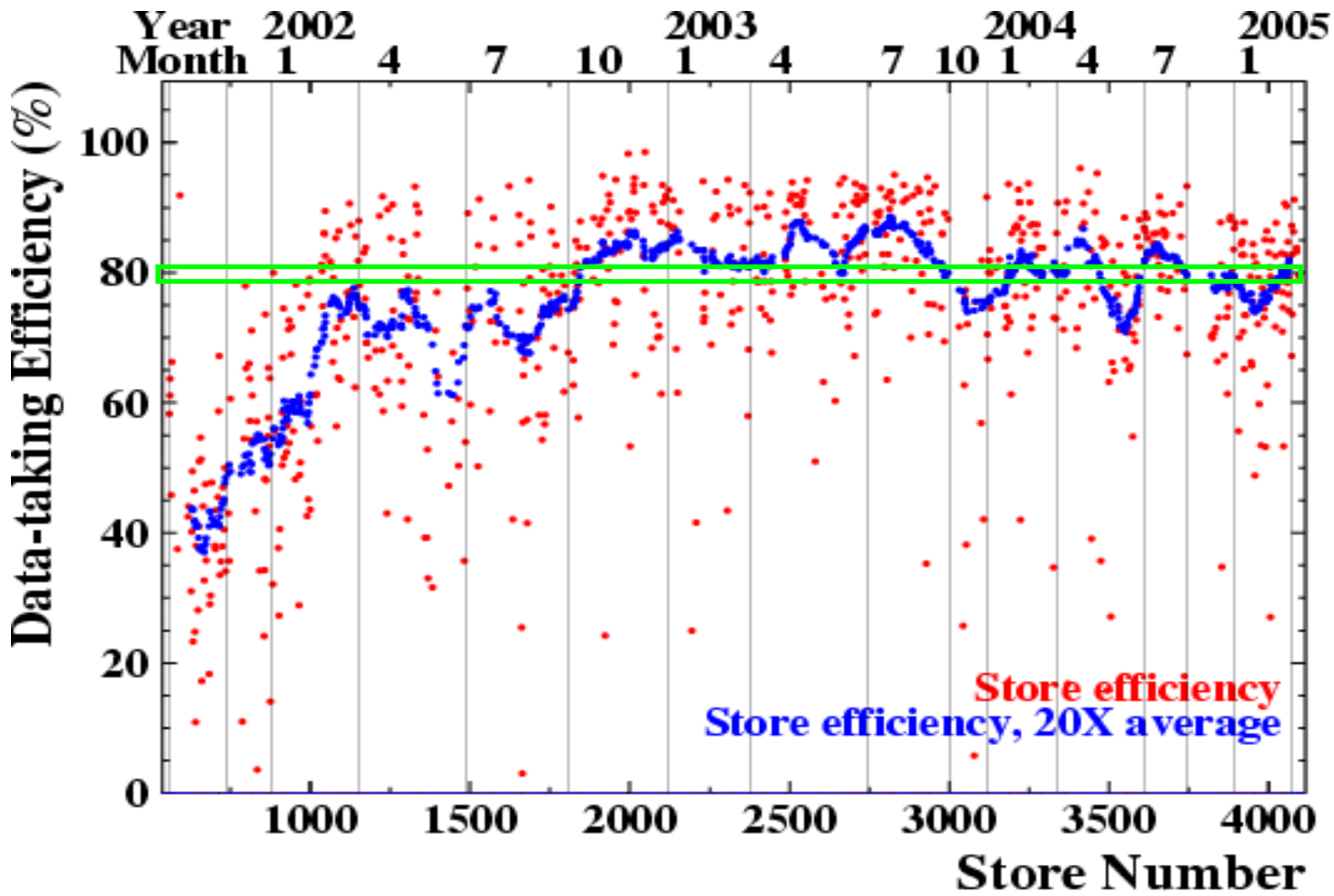
Luminosity Delivered/Recorded



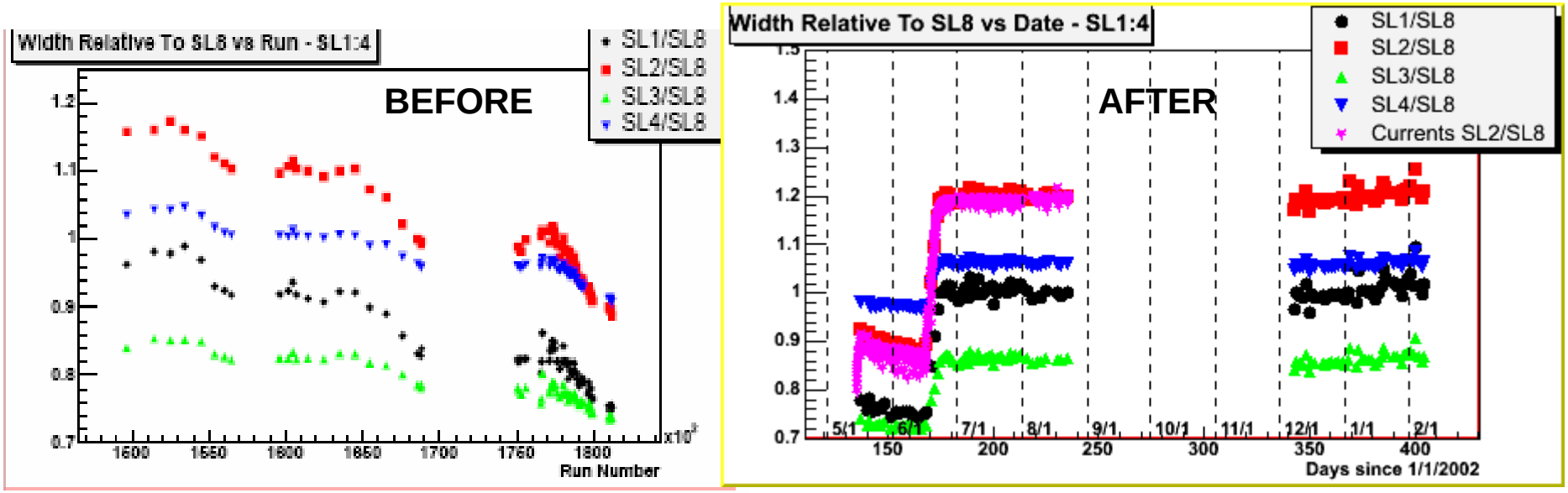
Data Taking Efficiency

- A good measure of how well the CDF experiment is operating
- Goal is to operate consistently at high data taking efficiency
- Sources of inefficiency include:
  - Trigger dead time and readout; this is an explicit choice each experiment makes (average ~5% over the duration of a store)
  - Start/End Stores (4%)
  - Beam conditions (high losses, etc)
  - Problems (detector, DAQ, or trigger, ~5%/store typ)

Data Taking Efficiency



CDF Central Tracker Aging



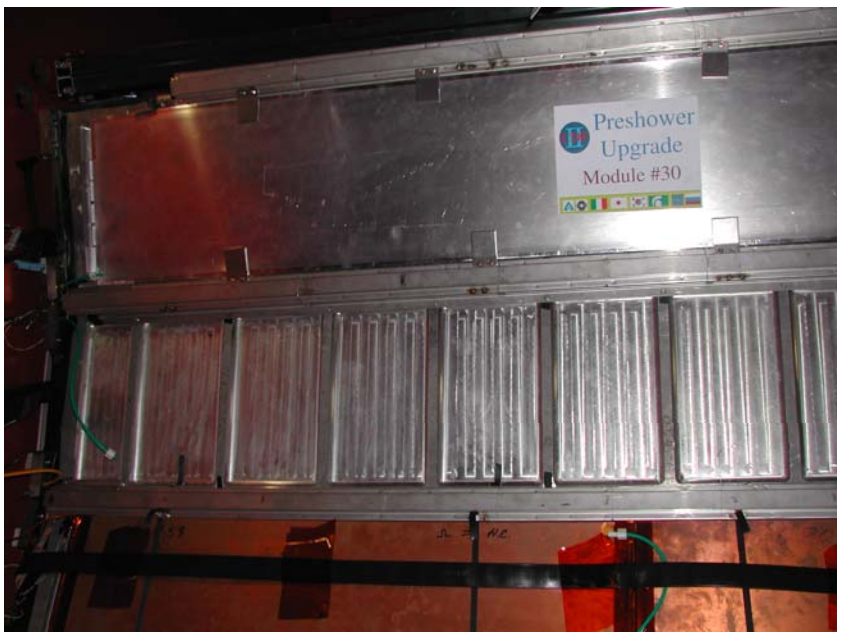
- CDF was experiencing aging (significant (25%) reduction in gain) in its central outer tracker during FY04
- Addition of a gas recirculation system and the addition of ~100ppm of oxygen to the 50/50 Ar-Eth mixture has solved the problem. COT back to “as new” condition

CDF Central Tracker Aging (2)

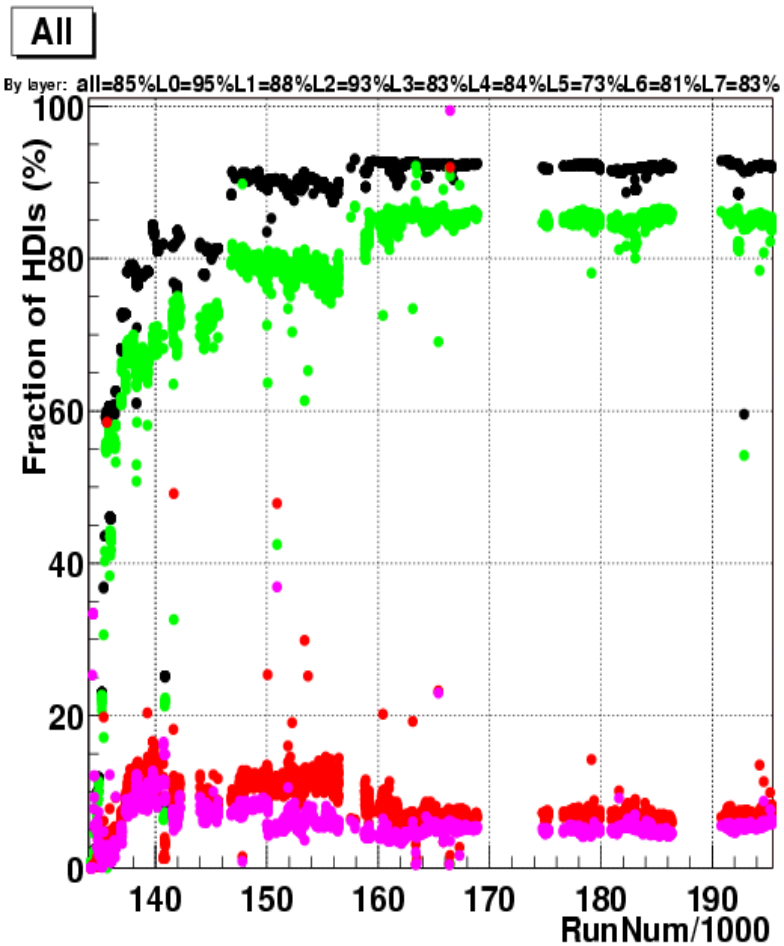
- What was the impact of this aging experience on CDF and CDF data?
  - Until we understood the problem, we ran the COT in a compromised mode to protect it from further damage.
  - SL1 and 2 (those closest to the beam) were turned off
  - The gain in SL 3,4,5 was reduced by 40-50%
  - We operated that way from Friday February 13 2004 until May 6 2004 and accumulated ~100pb of data in that condition
  - This data is analyzable. Some groups have used it already. Others are now incorporating it into their analyses as well.
- In times of crisis – the collaboration really pulls together and works on the problem

CDF Preradiator Installation

- Replaced existing system in order to get finer segmentation – required for higher luminosities
- Completed during the FY04 shutdown
- New system is fully operational



CDF Silicon -- Current Status



- Powered
- Good (Errors < 1%)
- Bad (not used)
- With Errors(> 1 %)

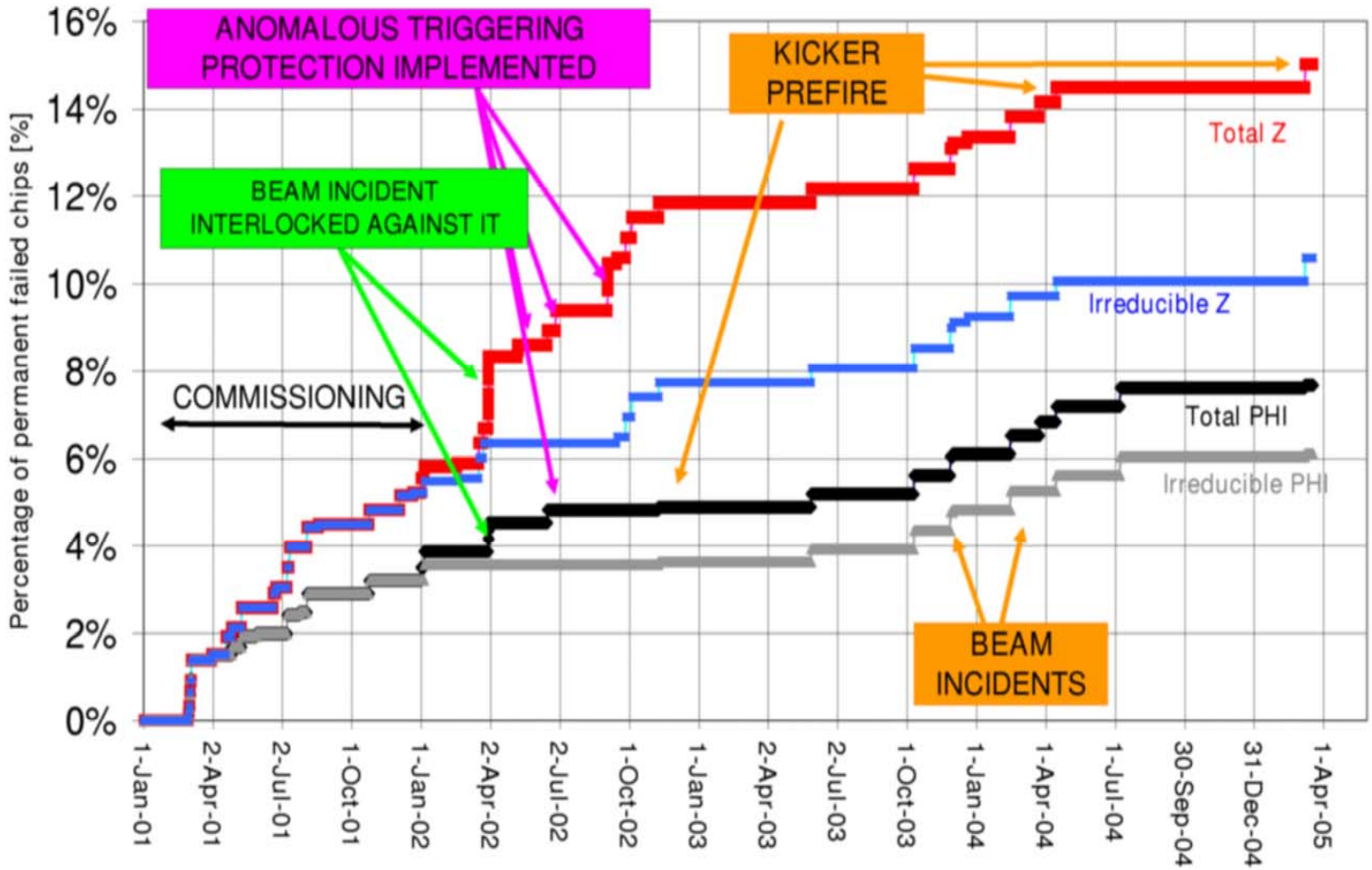
Detector	Total	Powered	Good
L00	48	98%	96%
SVX	360	92%	84%
ISL	148	91%	82%

Kicker Prefires

- Random discharge of one of 10 kicker thyratrons while beam is in the machine.
  - CDF silicon has received in excess of 150 rad per incident and has suffered permanent damage to the silicon.
  - Electronics damage sometimes observed in other systems can be fixed
- Mitigation -- Trying to minimize the risk, but it will never be zero.
  - Installed additional collimators to shield experiment
  - Monitor accelerator conditions closely

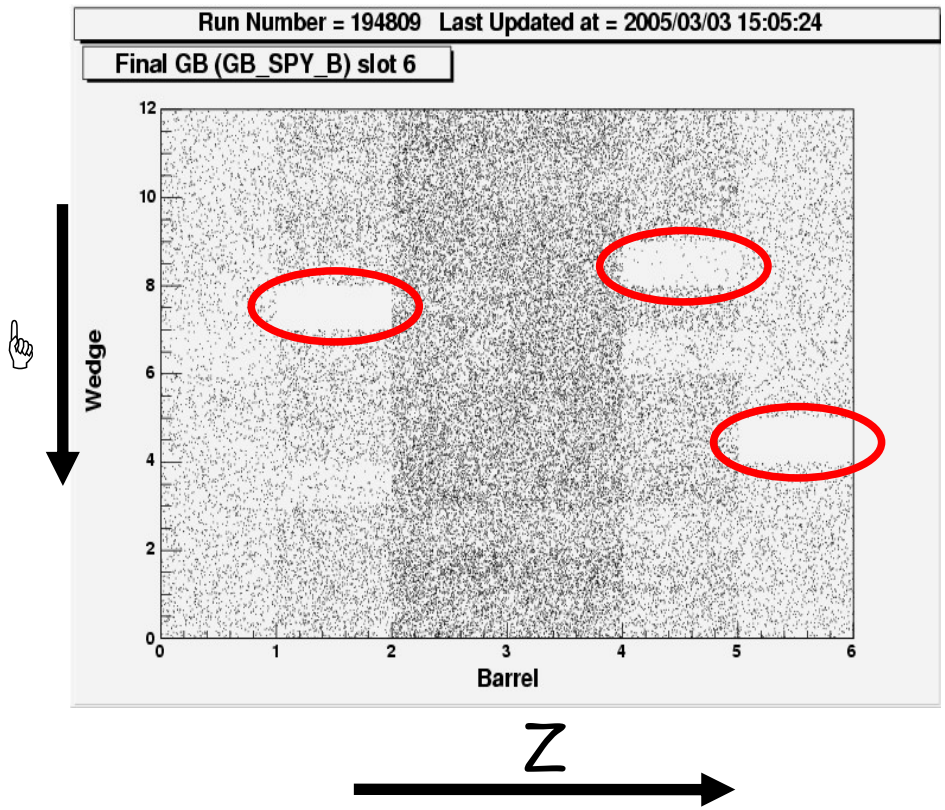
Calendar Year	# of Prefires
2001	2
2002	5
2003	3
2004	3
2005	4+?

Damage to SVX3D Chips



SVX and SVT

- SVX detector is crucial for CDF Secondary Vertex Trigger (SVT) for Level2
- SVT uses r-phi information only
- SVT requires 4/5 working ladders in a wedge
- At the moment 3 dead wedges for SVT, 16 wedges are 4/5



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Budgets

(the exciting stuff!)

Budgets – M&S + G&V

		FY04 ACTUAL BASE	FY05 BUDGET	FY06 PBR	FY07 FLAT TO PBR	FY08 FLAT	FY09 FLAT
1.1	Accelerators	0.0	0.0	0.0	0.0	0.0	0.0
1.2	Collider Experimental Program	9,189.3	7,928.5	6,812.2	6,782.2	5,316.4	5,351.6
1.2.1	CDF	2,347.8	1,838.2	1,746.1	1,731.1	1,486.6	1,492.3
1.2.1.1	CDF Operations	1,370.1	1,778.2	1,746.1	1,731.1	1,486.6	1,492.3
1.2.1.4	CDF Run IIb	977.7	60.0	0.0	0.0	0.0	0.0
1.2.2	DZero	3,245.2	2,625.0	1,600.8	1,585.8	1,335.8	1,335.8
1.2.2.1	Dzero Operations	1,719.1	1,576.0	1,600.8	1,585.8	1,335.8	1,335.8
1.2.2.4	Dzero Run IIb	1,526.1	1,049.0	0.0	0.0	0.0	0.0

In the out years (FY08, FY09) , less monies available for spares

In FY05, ~1.2M of CDF's budget is required to buy cryogens, gas, maintenance, computer licensing… Only $500k is discretionary

FNAL's contribution to 2005 M&S Budget

Category	Explanation		FY05 Actual
Computing	On-line DAQ, Level 3, Licensing maintenance, slow controls…		$400k
Consumables	Argon, Ethane, LN2, He, Alcohol		$400k
T&M	Electrical, Rigging, HVAC Personnel		$15k
Infrastructure Maint	HVAC, Compressors, Engines, Pumps…		$135k
General Operating	Office Supplies, phones, pagers, vehicles, misc. catch-all		$100k
Mech Support	Pipes, Fittings, bolts, tools, safety		$100k
Run IIB	L2 Trigger, Scaffolding, etc.		$150k
Total			$1,300k

$1300k is not sufficient to operate CDF – Counting on foreign contributions

Foreign Contributions to M&S

- At the last IFC, we agreed upon a $$$ amount per FTE.
- I have begun to invoice funding agencies based upon this agreement
- These invoices are for FY04 effort.
- Thus far I expect
  - Japan ~50,000k yen
  - Helsinki, UK, Spain have contributed via the above tax
  - Others should still expect to be invoiced – delays typically from not knowing the proper FTE count

- Any comments complaints from the way this is being handled?

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Staffing CDF for the Duration…

Collaboration Support

- Universities provide the lion's share of the manpower needed to operate the experiment
  - 16 physicists on shift every day
  - 60 experts on call daily via pagers
- MOU's have been written between each member institution and the experiment to clarify the commitment of each.
  - Initial set expiring 2001-2005
  - Current set in place through FY07

MOU's (1)

- Original MOU's were established in 2001
- These MOU's detail each institution's commitment to
  - Personnel Commitments (Names and FTE's)
  - Experiment Operations
  - Detector sub system / electronics Maintenance
  - Run II Upgrade work
  - Offline Responsibilities
  - MOU's do not discuss physics analysis / related topics
- MOU's are currently being renegotiated for the period FY05-FY07
  - Arranging for longer term commitments at this time has been difficult due to funding uncertainties

MOU's (2)

- CDF has had preliminary MOU discussions with 53 of its 58 institutions
  - Next step will be to redistribute tasks that have been dropped by some institutions
- Process is expected to take 6 months
- Will start 07-09 negotiations in Jan. 06
- Finding strong support from most to stay involved through at least FY07

Lab Support (Engineering and Technical)

- Technical team consists of a project engineer, a process systems engineer, and 13 mechanical/electrical technicians
  - We are running “lean” with this size crew.
  - We are not doing everything we want to do
- Resources are assigned via a matrix organization – not in the line management of CDF Operations Dept.
- 4 technicians provide professional 24x7 coverage of the process systems and insure the safe operation of the detector and provide rapid response to problems
- Because we are such a small group, we are not 100% self-sufficient. We require additional lab resources during times of detector access

Resource Availability

- Direct (though not necessarily linear) correlation between resources and data taking efficiency.
- CDF can operate with less resources, but at the cost of reduced efficiency
- We have been operating for almost 5 years now and have been pushed hard to be lean and efficient
  - M&S and Staffing Levels are not what they were even a few years ago much less what they were in Run I
- We can operate better and more efficiently but it takes more $$$.
  - We know what to do – we just can't afford to do it and so we do the best we can…

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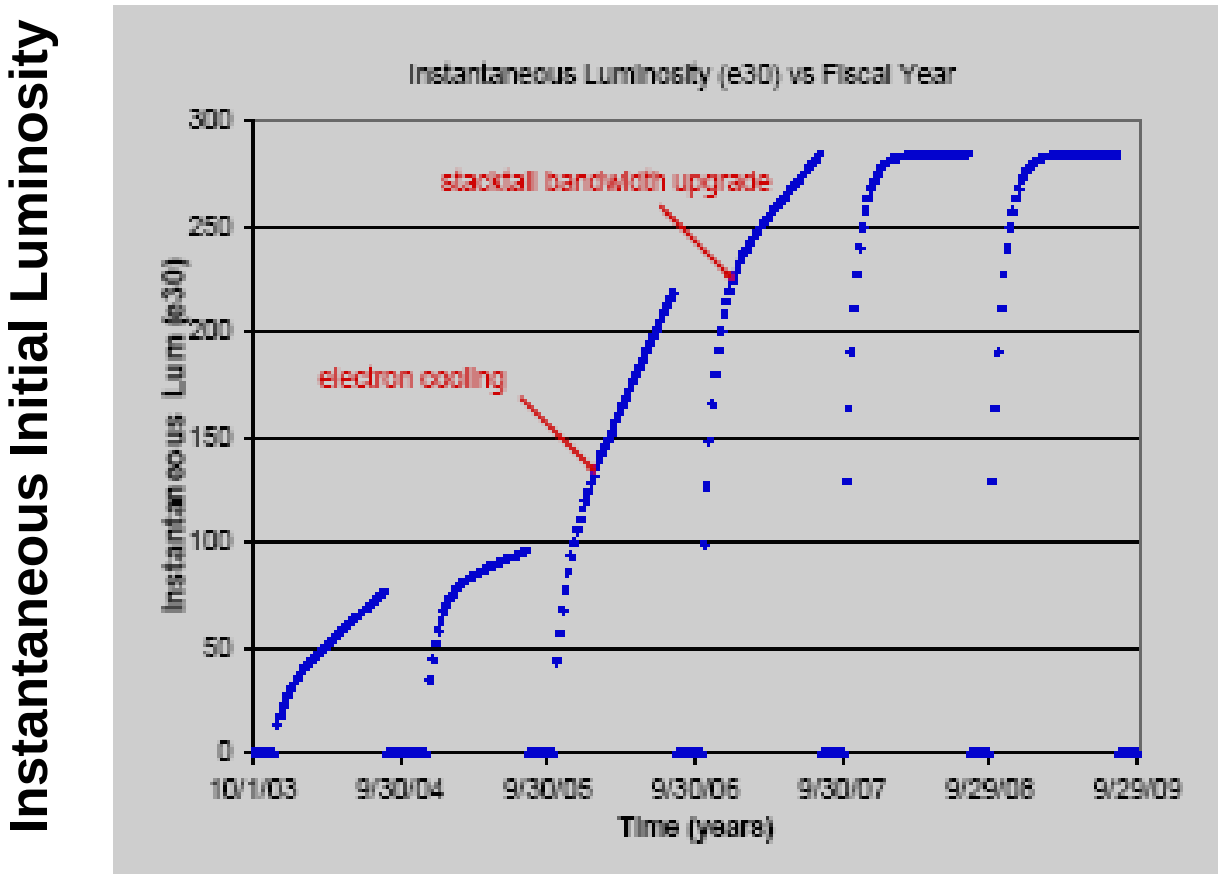
Challenge Ahead…

Operations Challenge



FY05 – 1e32 **FY06 – 2.2e32** **FY07 – 2.8e32**

Challenge Ahead…

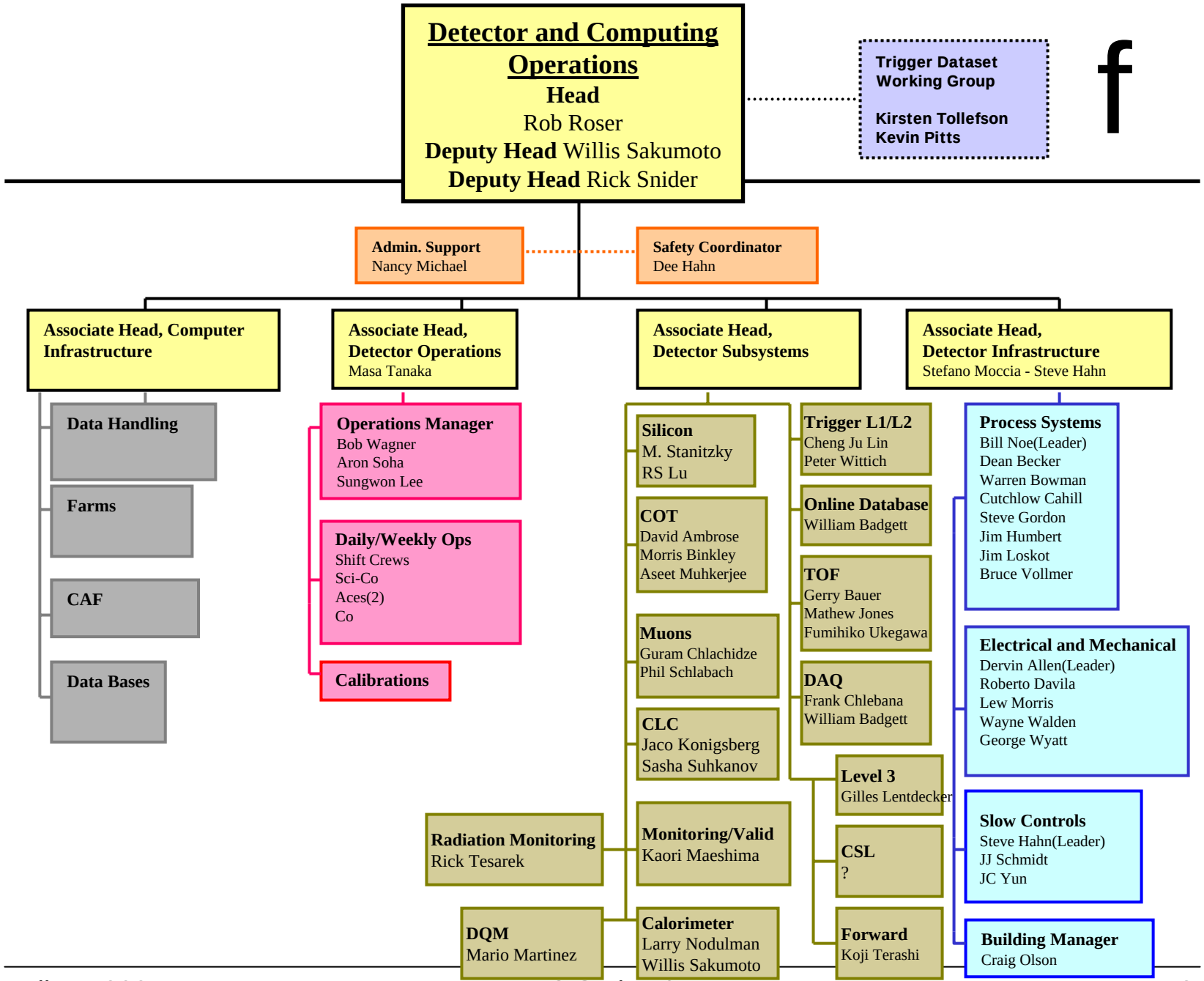
- Dealing with the factor of >2 increase in luminosity still expected
  - Our current trigger table can be made to work with “reasonable” dead time up to 1.5e32.
  - Beyond that, we can no longer have an all inclusive trigger – we have to make some physics decisions
  - Established a committee to prioritize the physics
  - Building new trigger hardware (ready this summer)
    - adding Stereo track information into both L1 and L2 triggers, new L2 decision crate, new TDC readout….
    - new event builder and Consumer server logger

Maintaining Staff

- CDF is dependent upon manpower for two specific needs
  - Maintain detailed understanding of each of the systems
  - Warm bodies to play an operational role
- I would like an increased presence in operations from the foreign institutions
- Silicon will always be labor intensive!

Summary

- CDF is operating well.
  - Typical data taking efficiencies in the mid 80%'s.
  - All detectors are still in excellent condition
- We can operate better – but it takes more $$$.
  - Engineering to address cumbersome interfaces
  - Additional professional help on shift
  - Upgrading equipment that continues to be a source of downtime
- The upcoming years will be an exciting time – with increasing statistical precision, we are anxious to analyze the data.
- CDF is committed to operating well through 2009


Detector and Computing Operations
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Deputy Head Willis Sakumoto
Deputy Head Rick Snider
Trigger Dataset Working Group
Kirsten Tollefson
Kevin Pitts
Admin. Support
Nancy Michael
Safety Coordinator
Dee Hahn
Associate Head, Computer Infrastructure
Associate Head, Detector Operations
Masa Tanaka
Associate Head, Detector Subsystems
Associate Head, Detector Infrastructure
Stefano Moccia - Steve Hahn
Data Handling
Farms
CAF
Data Bases
Operations Manager
Bob Wagner
Aron Soha
Sungwon Lee
Daily/Weekly Ops
Shift Crews
Sci-Co
Aces(2)
Co
Calibrations
Silicon
M. Stanitzky
RS Lu
COT
David Ambrose
Morris Binkley
Aseet Muhkerjee
Muons
Guram Chlachidze
Phil Schlabach
CLC
Jaco Konigsberg
Sasha Suhkanov
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Rick Tesarek
Monitoring/Valid
Kaori Maeshima
DQM
Mario Martinez
Calorimeter
Larry Nodulman
Willis Sakumoto
Trigger L1/L2
Cheng Ju Lin
Peter Wittich
Online Database
William Badgett
TOF
Gerry Bauer
Mathew Jones
Fumihiko Ukegawa
DAQ
Frank Chlebana
William Badgett
Level 3
Gilles Lentdecker
CSL
?
Forward
Koji Terashi
Process Systems
Bill Noe(Leader)
Dean Becker
Warren Bowman
Cutchlow Cahill
Steve Gordon
Jim Humbert
Jim Loskot
Bruce Vollmer
Electrical and Mechanical
Dervin Allen(Leader)
Roberto Davila
Lew Morris
Wayne Walden
George Wyatt
Slow Controls
Steve Hahn(Leader)
JJ Schmidt
JC Yun
Building Manager
Craig Olson