Stato di CDF

12 Settembre 2005

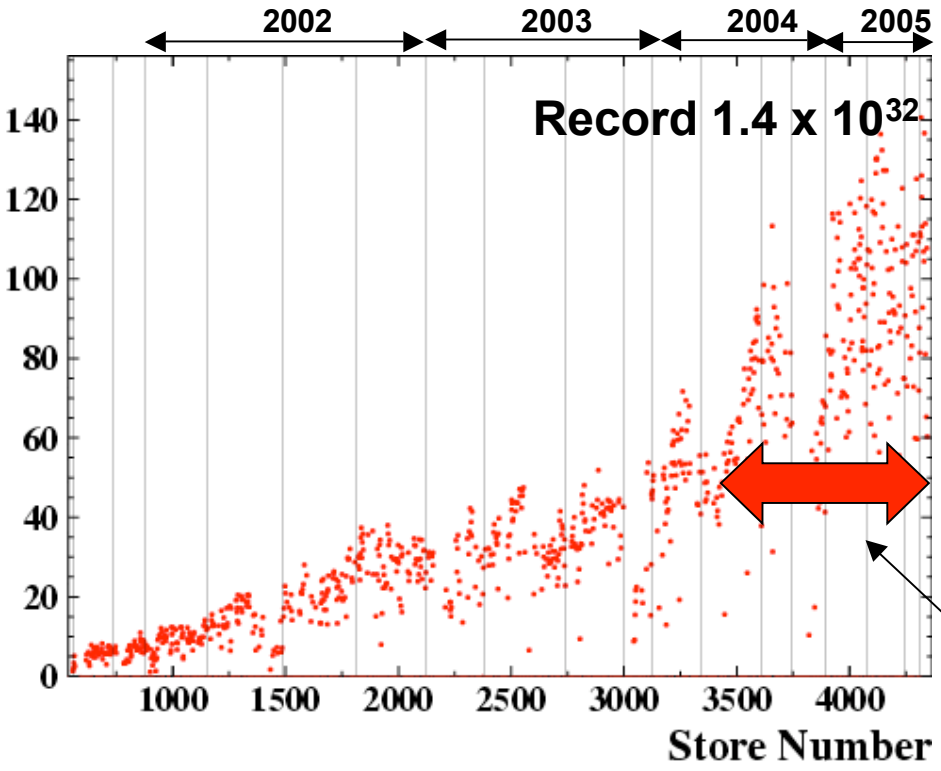
Luciano Ristori

Highlights

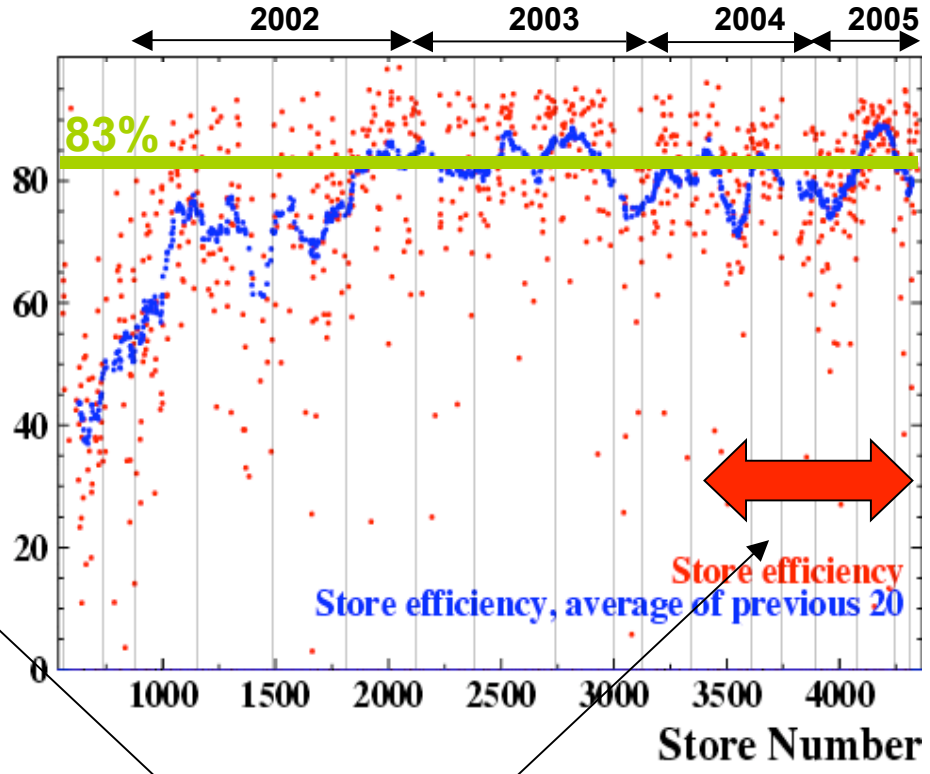
- Run IIb upgrades completi all'85%
  - Completamento previsto nella prima parte del 2006
  - SVT Upgrade 2/3 completo e operativo
- Nuovo record di luminosita': 1.4 E32 (4 Agosto)
- 1 fb-1 su nastro (10 Settembre)
- Il rivelatore e' stabile e funziona bene
- Software di ricostruzione e' stabile
- La latenza tra la presa dati e la disponibilita' dei dati processati per l'analisi e' stata ridotta a ~ 6 settimane
- Shutdown rimandato al 2006 (date ancora incerte)
- Gli istogrammi accumulano statistica…

Data Taking Efficiencies

Initial Luminosity (10^{30} $cm^{-1}s^{-1}$)

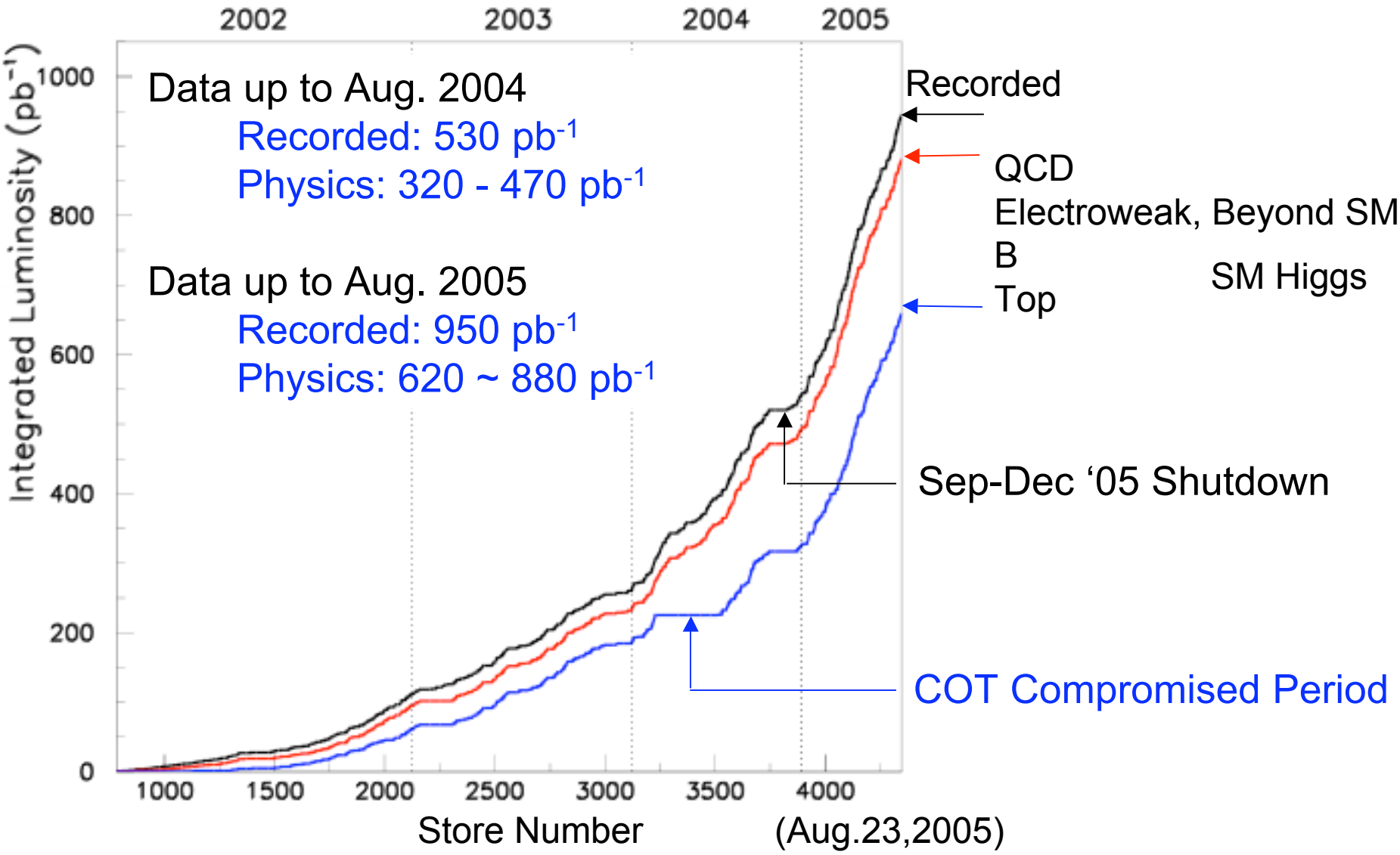


Data Taking Efficiency



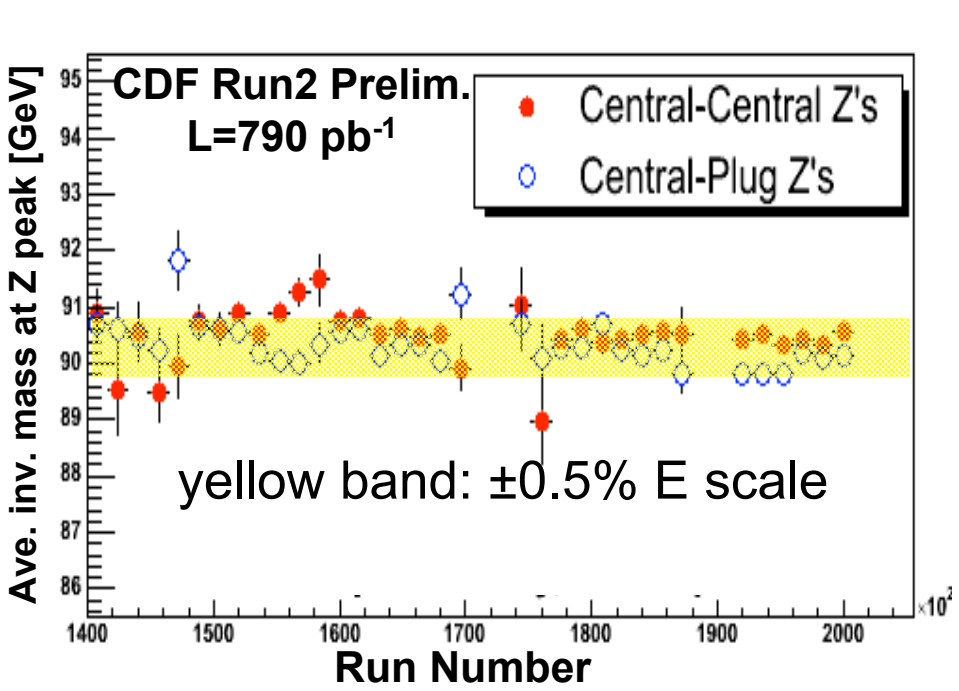
~85% of Run IIb Upgrade Projects were commissioned with beam during this period.

Data for Physics

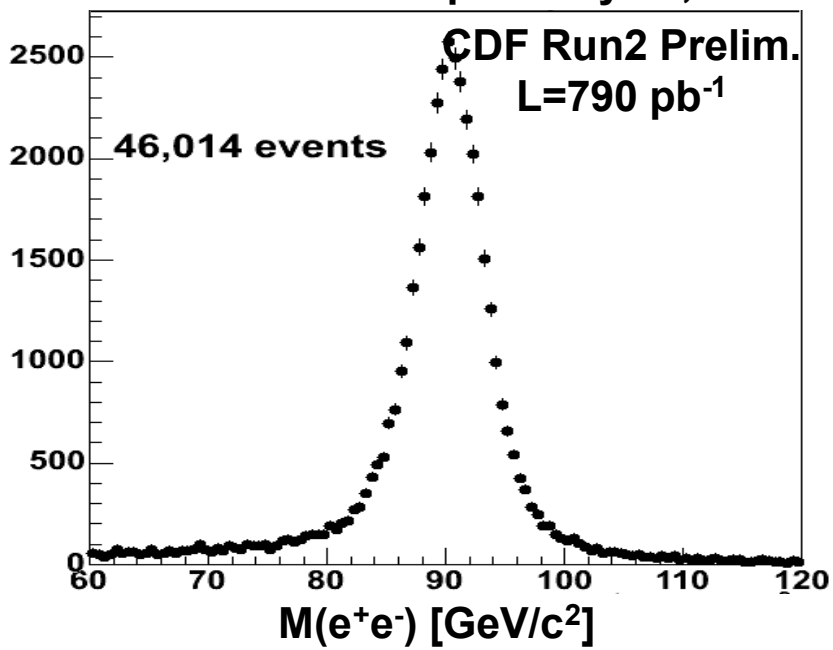


Data Reconstruction

- Recently achieved 6 week turn-around time between data taking and availability of physics-quality data with final calibrations.
  - This reduced resource needs (person and computing).

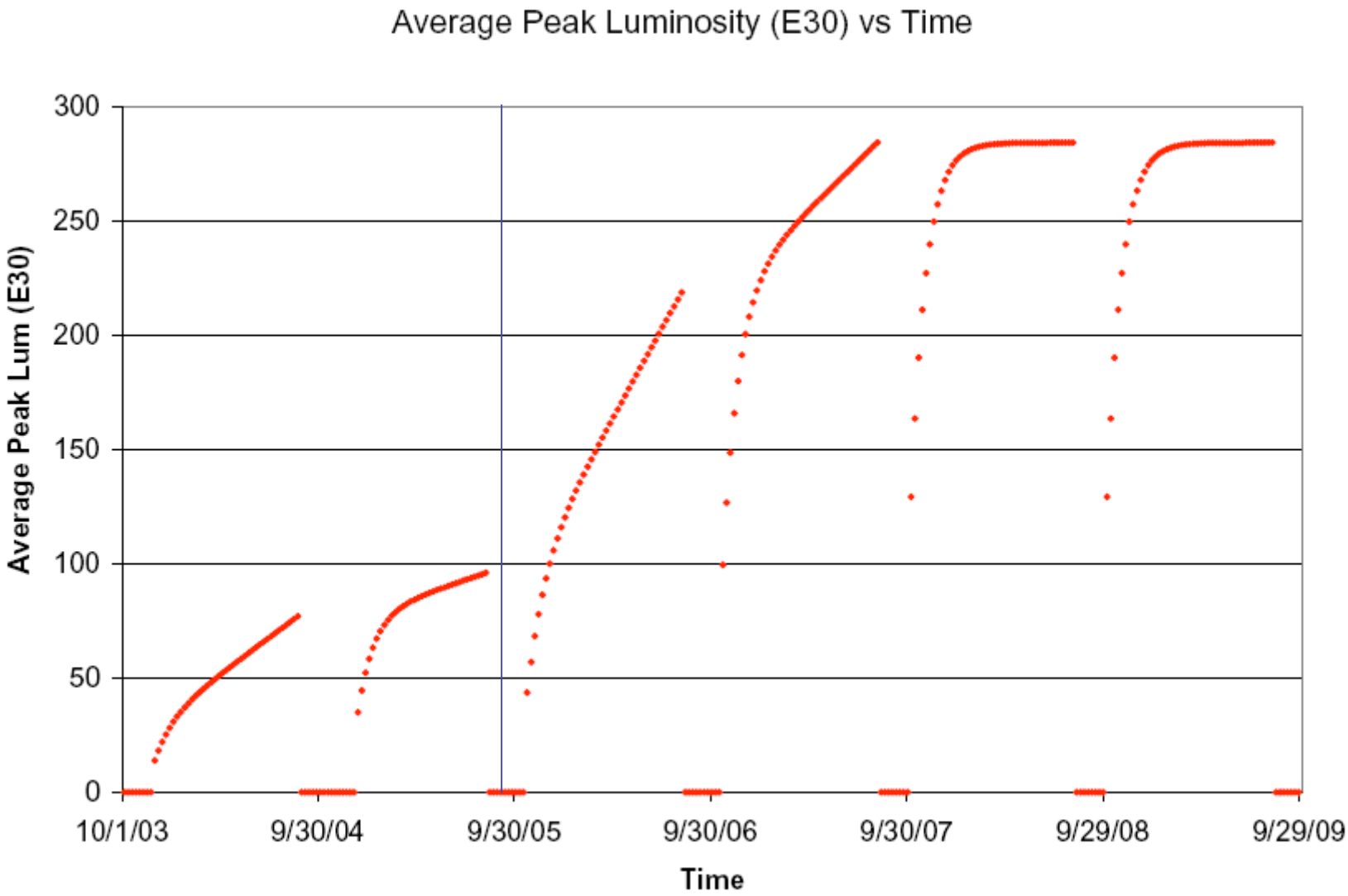


Data up to July 20, 2005



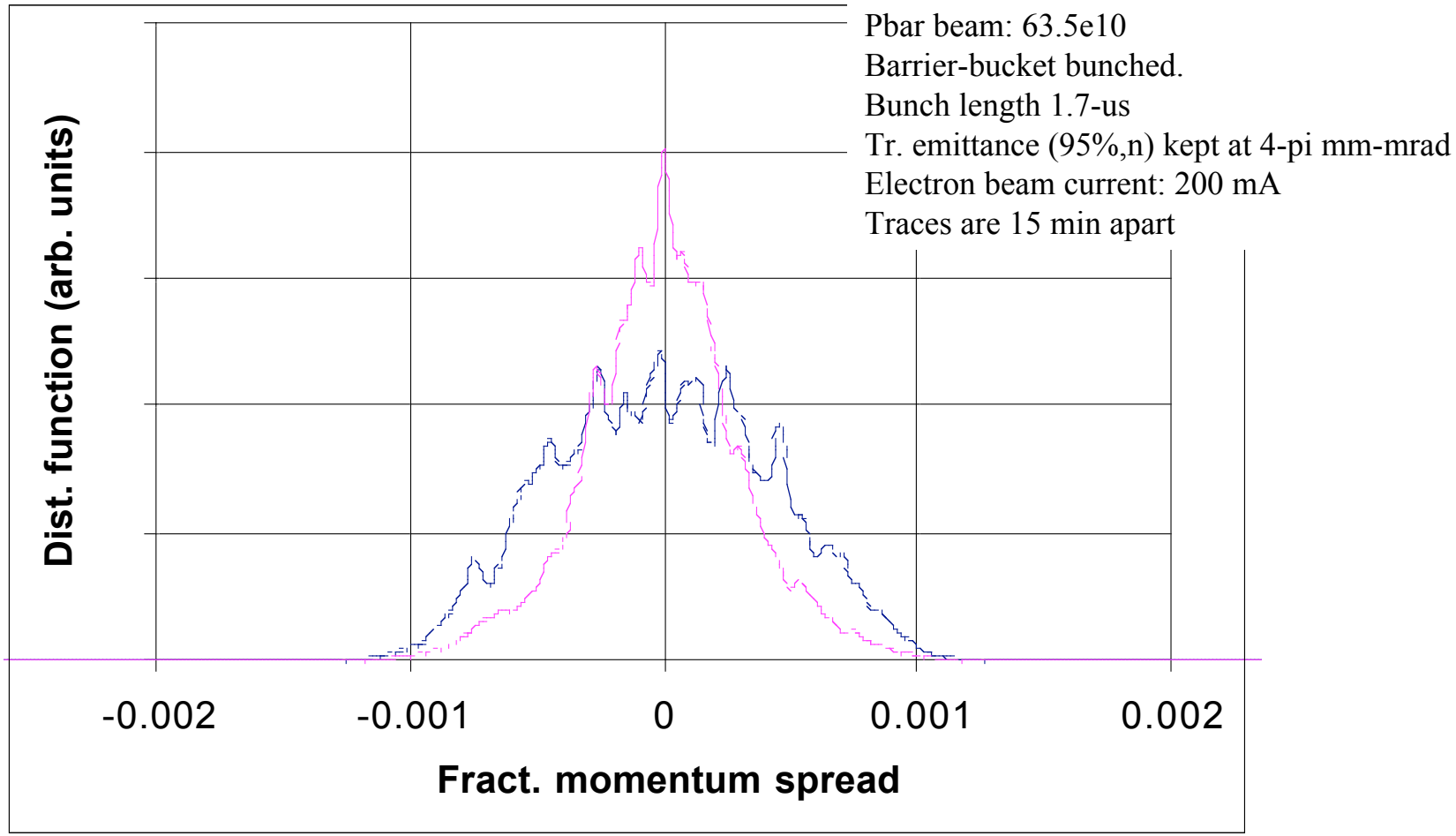
- Reconstruction algorithms are stable since January 2005.
  - Incorporated Run II detector upgrades.
  - No major changes anticipated in the future.

Projected Peak Luminosity



On the path to 8 fb-1 integrated luminosity in 2009

First e-cooling demonstration – 07/15/05



La Sfida di CDF

Continuare la presa dati fino al 2009

- Sopravvivere alla alta luminosita'
- Sopravvivere all'esodo verso LHC

Run IIb Project Status

- Trigger and DAQ Upgrades
  - Level-1 Track Trigger (XFT):
    - Add *z* (stereo) info for 3D tracking - In production
  - COT TDC modification to achieve L2 rate of 1000 Hz (readout time)
    - 12 out of 20 crates are operational.
  - Level 2 decision system: faster,flexible - operational since April 2005
  - Level 2 Silicon Vertex Trigger (SVT)
    - Faster - 3 step upgrade: the first 2 steps are operational.
  - Event Builder: operational since August 2005
  - Level-3 Computer
    - 1st procurement placed(64 PCs) - replace current system in Nov'05
    - 2nd procurement ready(64 PCs) - complete ~Jan.06
  - Data Logging (20 MB/s → 60 MB/s)
    - 1st step operational (~35MB/s), complete by end of 2005

Installation & commissioning parasitically without interrupting operations.

Run IIb Project Status

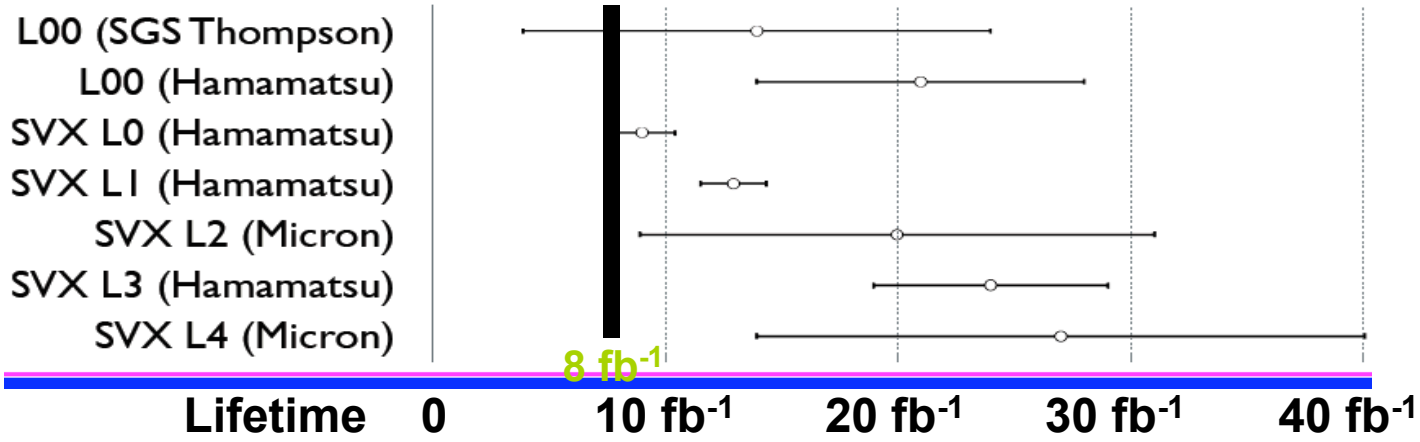
- Detector (Calorimeter) Upgrades
  - Central Preshower upgrade
    - Replacing with a finer segmentation system for higher lum.
    - operational since early 2005
  - Electromagnetic Timing
    - New system for cosmic ray rejection
    - operational since early 2005

- Run IIb Status
  - The project is ~85% complete and operational.
  - 100% by early 2006.
  - commissioned without interrupting operations.

Silicon Detectors

- Radiation damage
  - > 90% of total radiation is due to collisions: NIM A514, 188-193 (2003)
  - Bias voltage scans as luminosity accumulates
    - Study collected charge (hits on tracks) and mean noise
    - Measurements agree with predictions up to 1 fb^{-1}.

Predicted Silicon Lifetime (note the large uncertainties)



- Efforts to increase the Silicon lifetime
  - Lowered Silicon operating temp. gradually from -6°C to -10°C.
  - Thermally isolated SVX from COT inert regions such that the silicon can be kept cold during COT work.

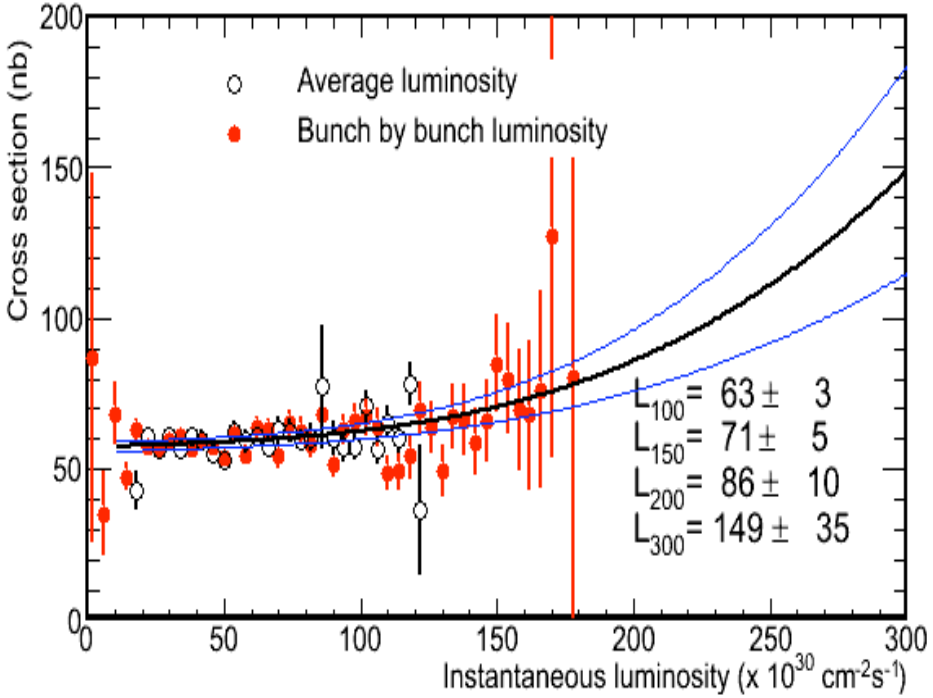
DAQ / Trigger Specifications

	Run IIa Specification	Run IIa Achieved (typical)	Run IIb Specification
Peak Luminosity	0.9×10^{32}	0.9×10^{32}	3.0×10^{32}
L1 Accept	45 kHz	25 kHz	30 kHz
L2 Accept	300 Hz	350 Hz	1000 Hz
L3 Accept	75 Hz	80 Hz	100 Hz
Data Logging	20 MB/s	20 MB/s	60 MB/s
Deadtime Trigger	5%	5%	10%

Extrapolation of Trigger Rates

Bunch-by-bunch luminosity gives a better lever arm for the extrapolation.

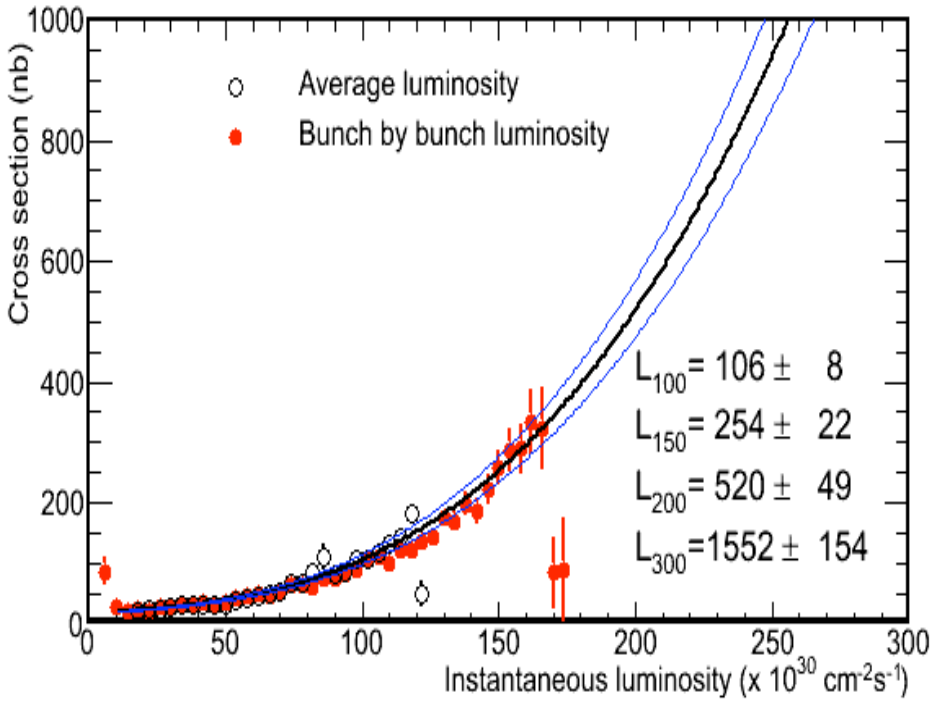
Level-2 high p_T electron



~1% bandwidth at 3 x 10^{32} $cm^{-2}s^{-1}$

Level-2 high p_T muon

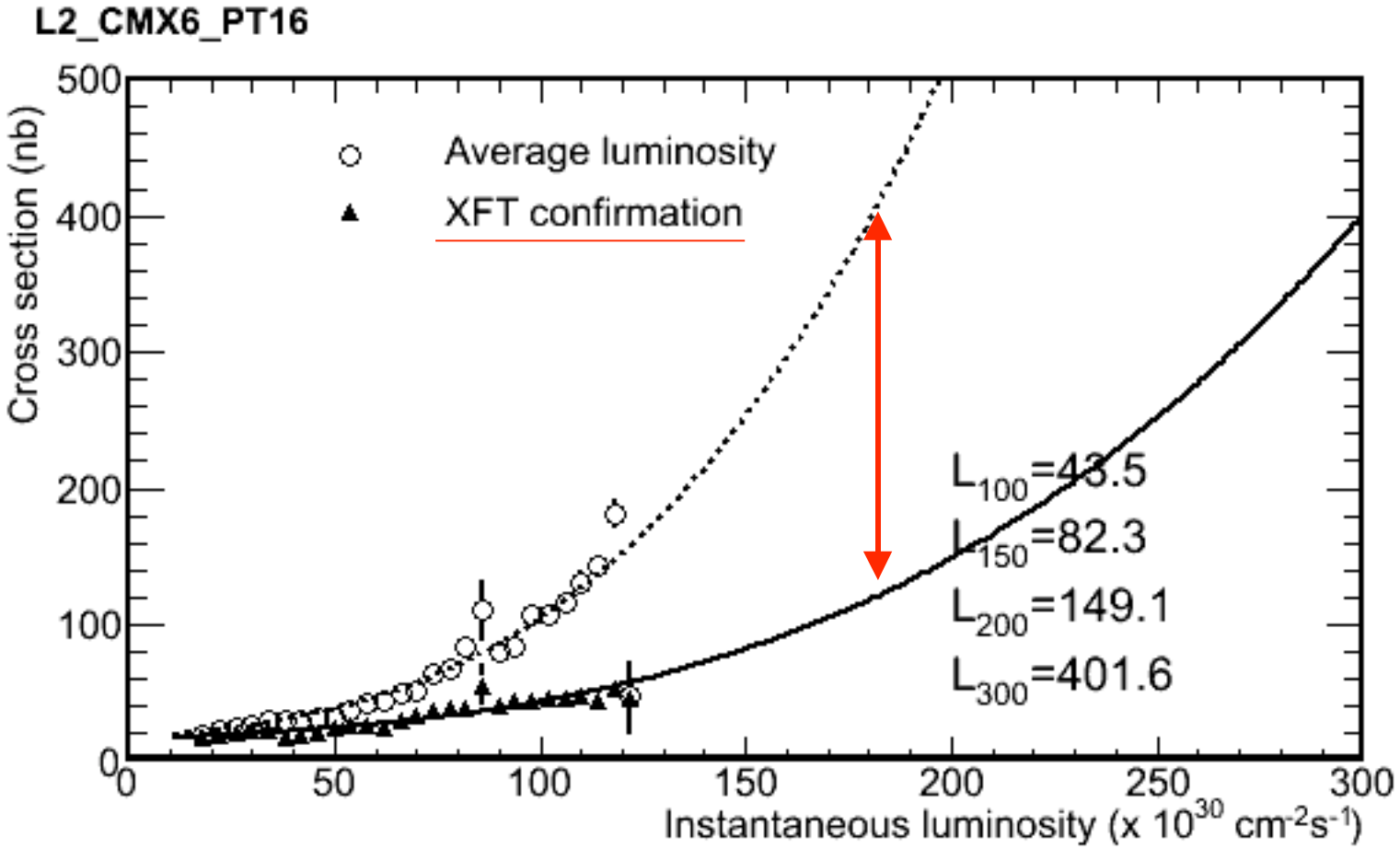
($0.6 < |\eta| < 1.1$)



a highly non-linear behavior

~50% bandwidth at 3 x 10^{32} $cm^{-2}s^{-1}$

Example of planned improvements: XFT upgrade



Confirmation of XFT tracks by stereo layers is expected to yield a substantial reduction of fakes

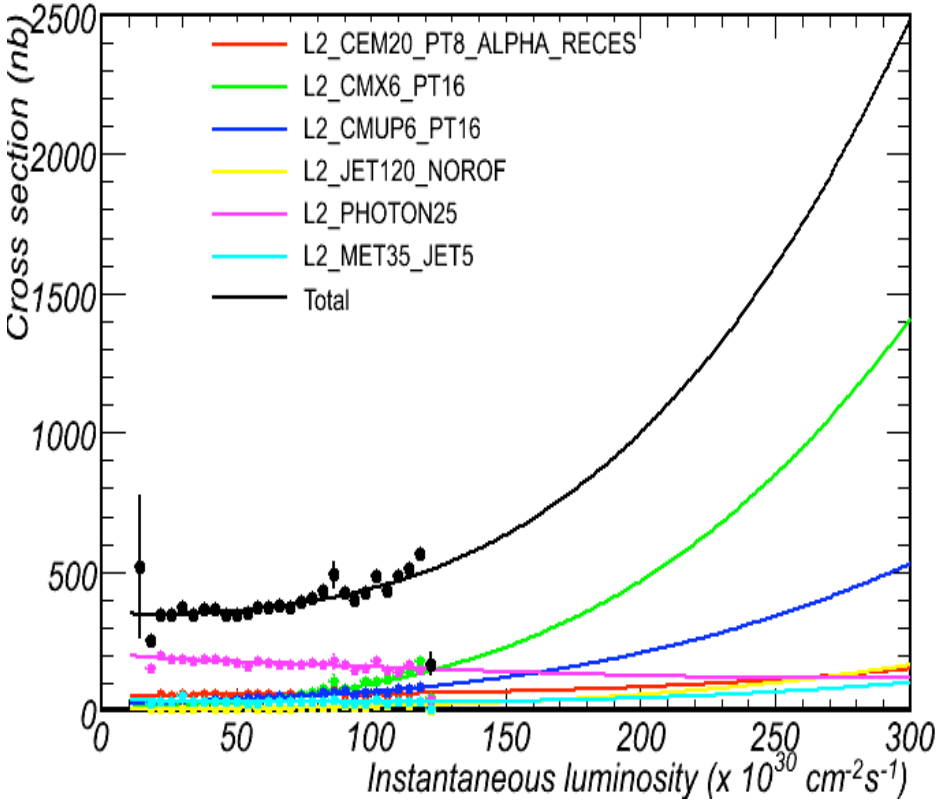
Straw Trigger Table - Projected L2 Rates

Luminosity	100	150	200	300
L2_CEM20_PT8_A_R	60	63	66	86
L2_CMUP6_PT15	47	76	122	285
L2_CMX6_PT15_CSX	43	82	149	402
L2_JET120_NOROF	18	34	60	159
L2_PHOTON25	159	142	128	123
L2_MET35	34	39	49	98
Total(nb)	361	436	574	1153
Rate(Hz)	36.1	65.4	114.8	345.9

Straw Trigger Table - Projected L2 Rates

Triggers for W, Z, Top, WH, ZH, H→WW, SUSY (partial), LED, Z'

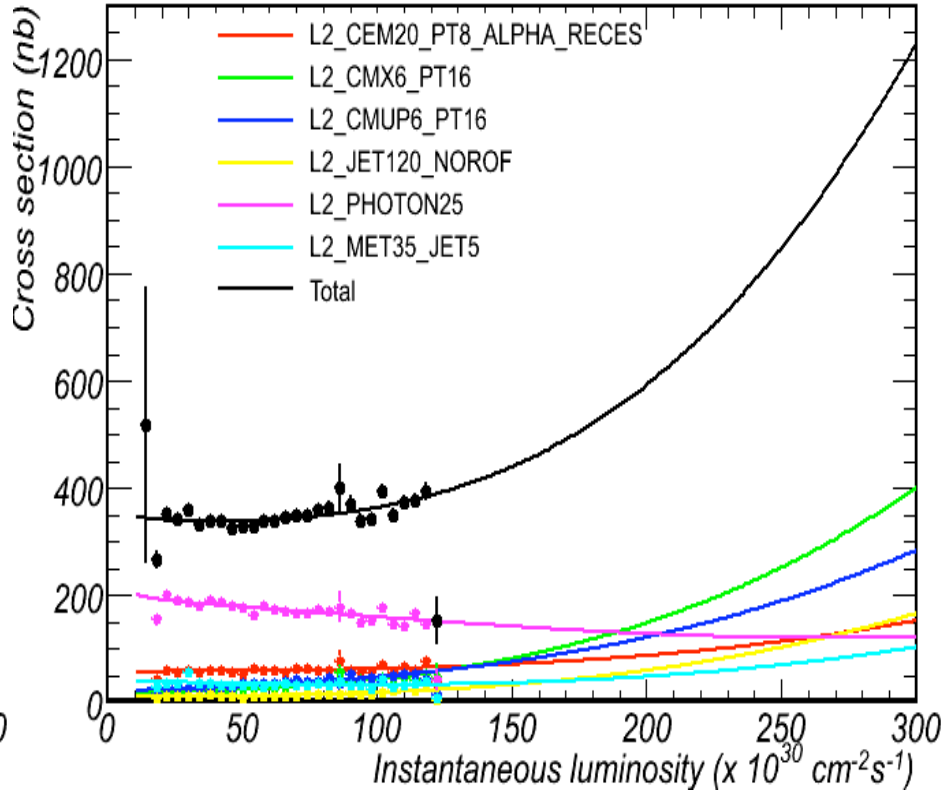
without XFT upgrade



~75% of bandwidth at $3x10^{32}$ $cm^{-2}s^{-1}$

No room for B & some of new phenomena

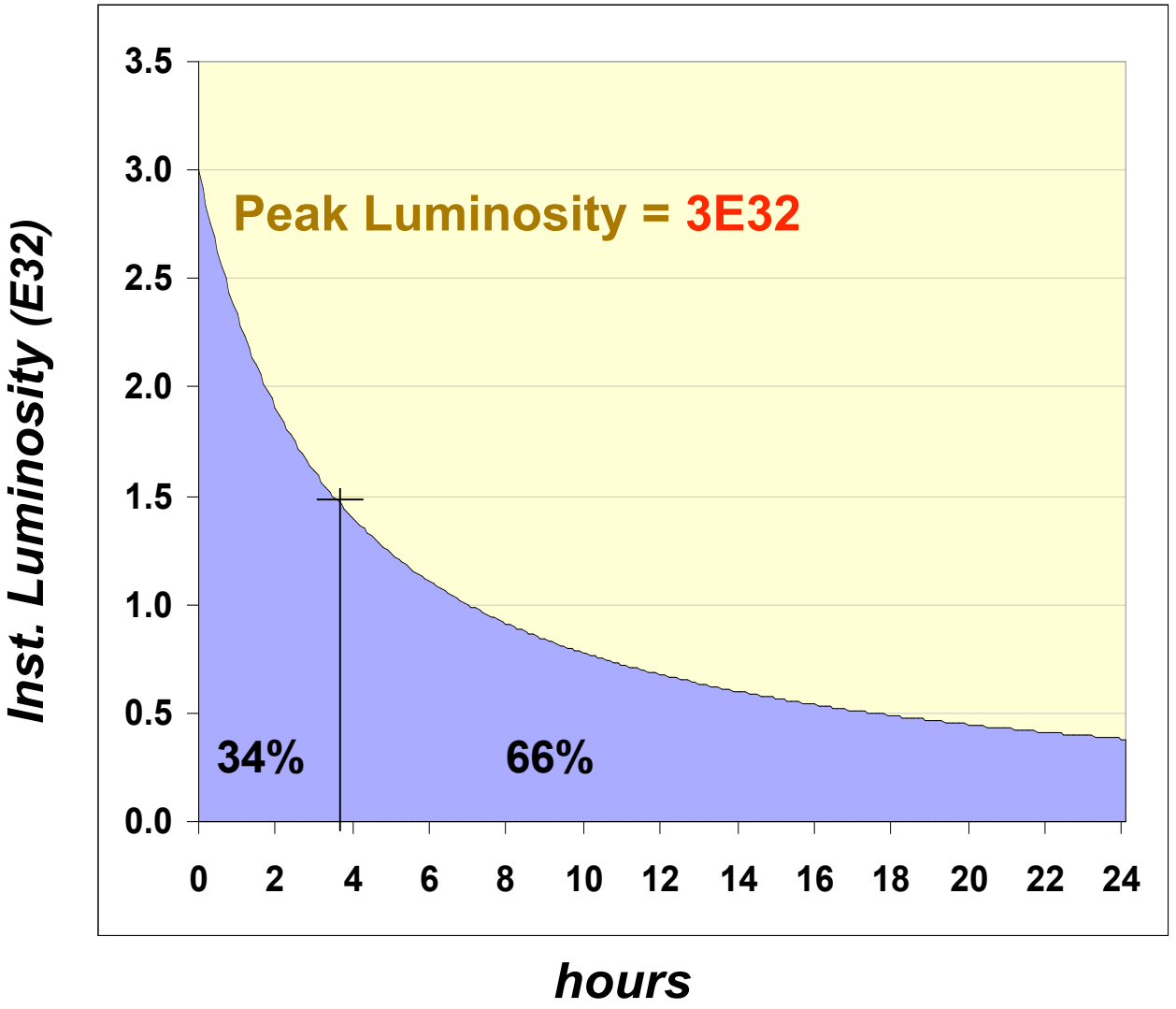
with XFT upgrade



~30% of bandwidth at $3x10^{32}$ $cm^{-2}s^{-1}$

Studying further improvement

Typical Projected Store Evolution



CDF FTEs (the Exodus)

Results from a recent survey among CDF institutions

	2005	*2006*	*2007*	*2008*	*2009*
US	195 100%	178 91%	145 74%	102 52%	77 40%
Foreign	112 100%	96 85%	76 68%	48 42%	35 31%
Total	307 100%	274 89%	221 72%	150 49%	112 36%