C-AD STATE OF THE DEPARTMENT

D.I.LOWENSTEIN

FEBRUARY 15, 2006

BROOKHAVEN NATIONAL LABORATORY

Office of Science
U.S. DEPARTMENT OF ENERGY

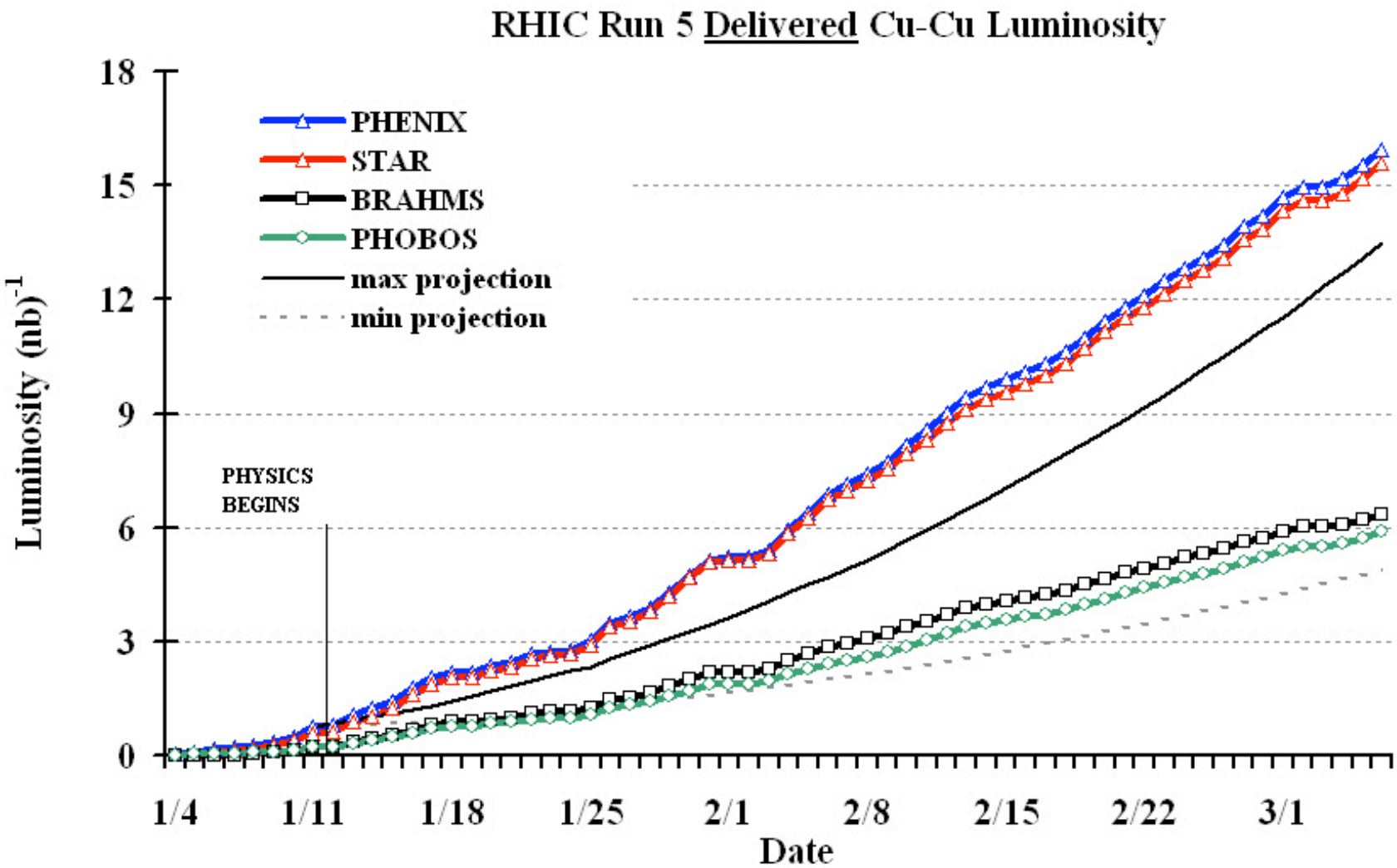
Outline

- FY2005 Recap
- FY2006 Program
- FY2007 and beyond

Run-5

- Beam: 11/23/04 to 06/24/05
- Cu-Cu
  - 100 GeV/n (8 weeks for physics)
  - 31.2 GeV/n (1.5 weeks for physics)
  - 11.2 GeV/n (1.5 days for physics)
- p↑-p↑
  - 100 GeV (9.5 weeks for physics)
  - 205 GeV (2 stores for physics)

Run-5 Cu-Cu Summary



Run-5 p↑-p↑ summary

Major accomplishments at 100 GeV:

- polarized source upgraded with sc solenoid
- 60% polarization at AGS extraction
- operation with up to 111 bunches per ring
- increased store polarization by 5%

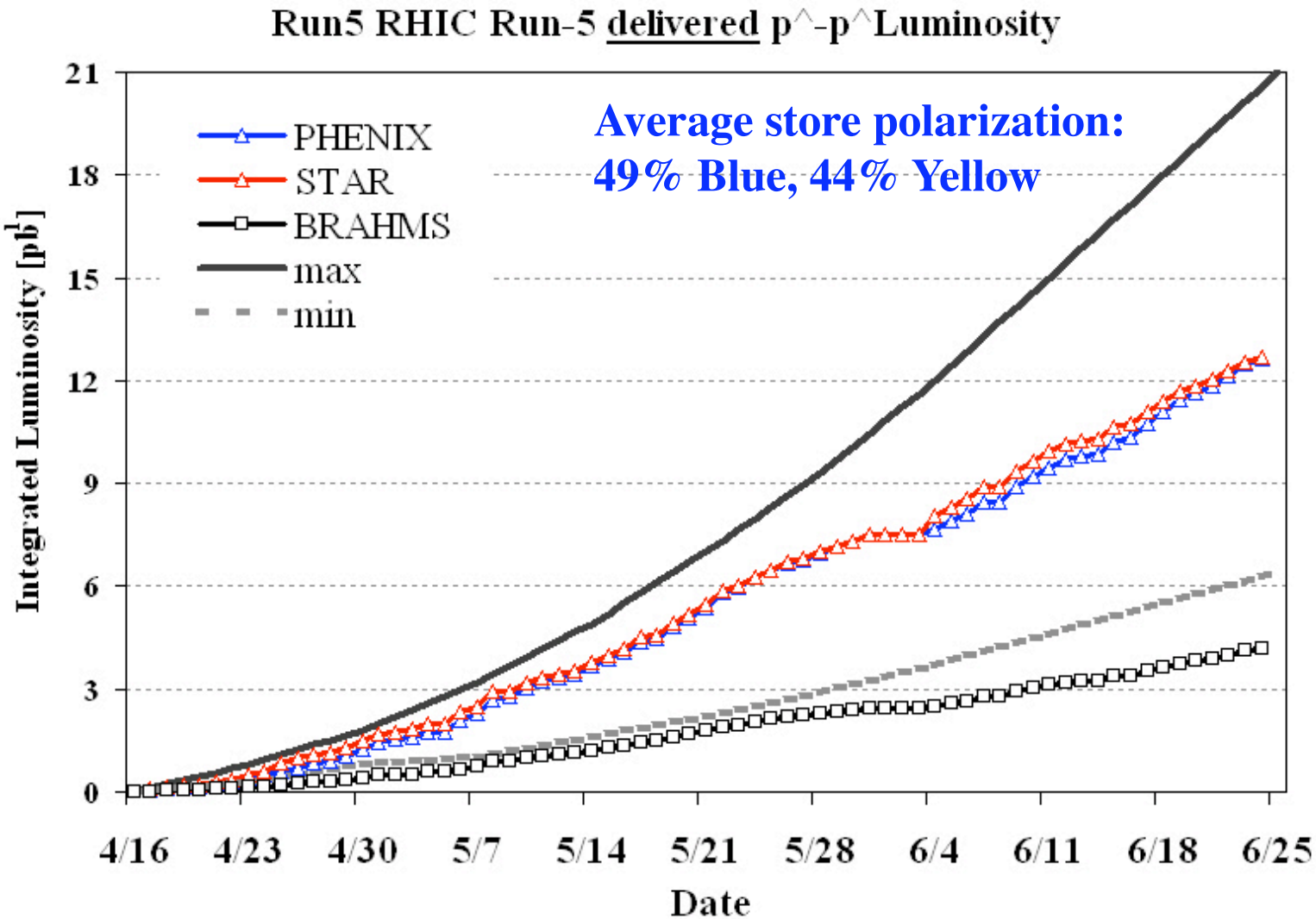
Major accomplishment at 205 GeV:

- ramp setup for higher energy in 3 days
- first acceleration and storage of polarized protons >100 GeV
- 30% polarization at higher energy

Initial AGS cold snake commissioning

- extraction with 10^{11}protons/bunch and 50% polarization

Run-5 p↑-p↑ summary



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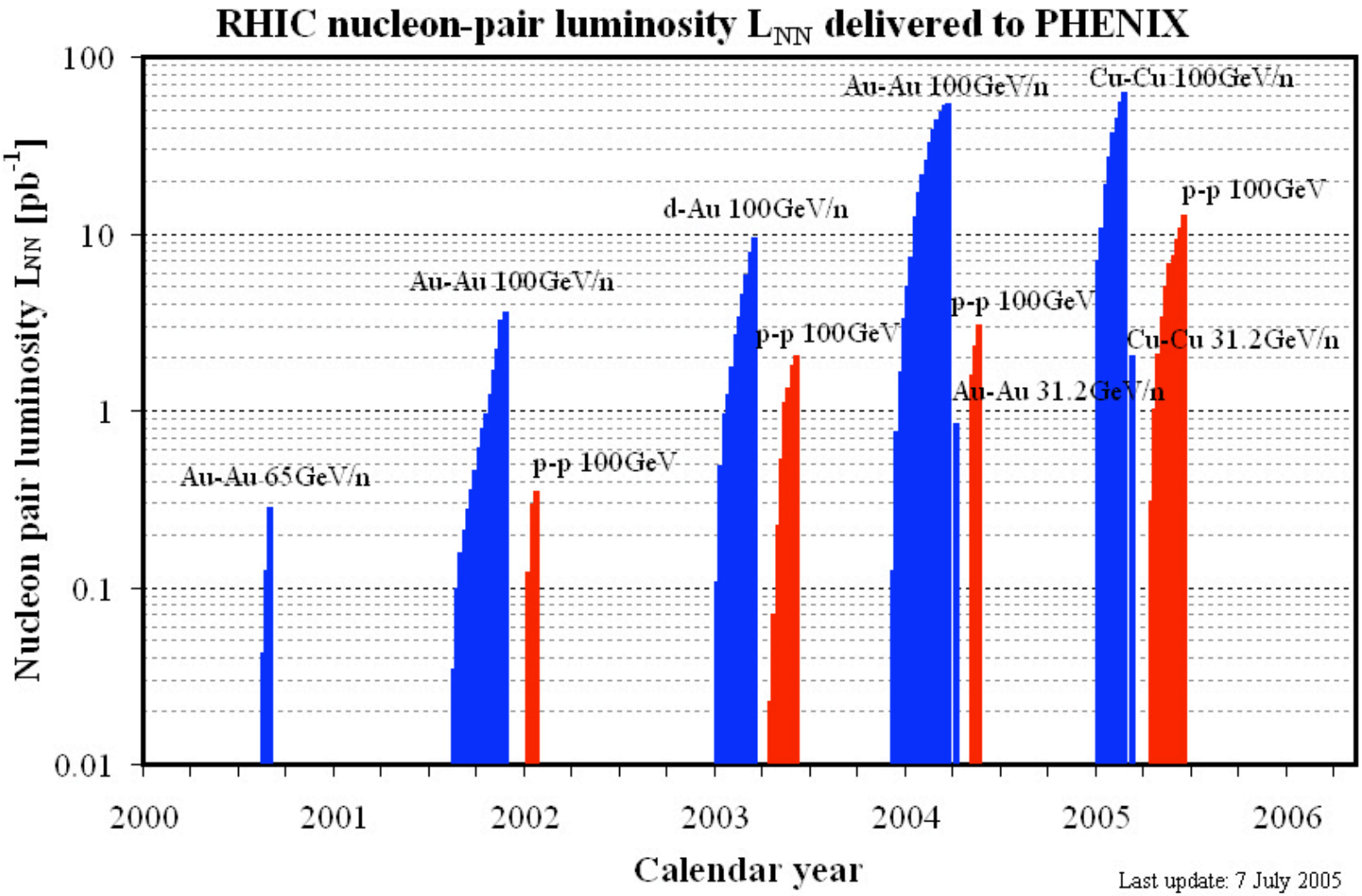
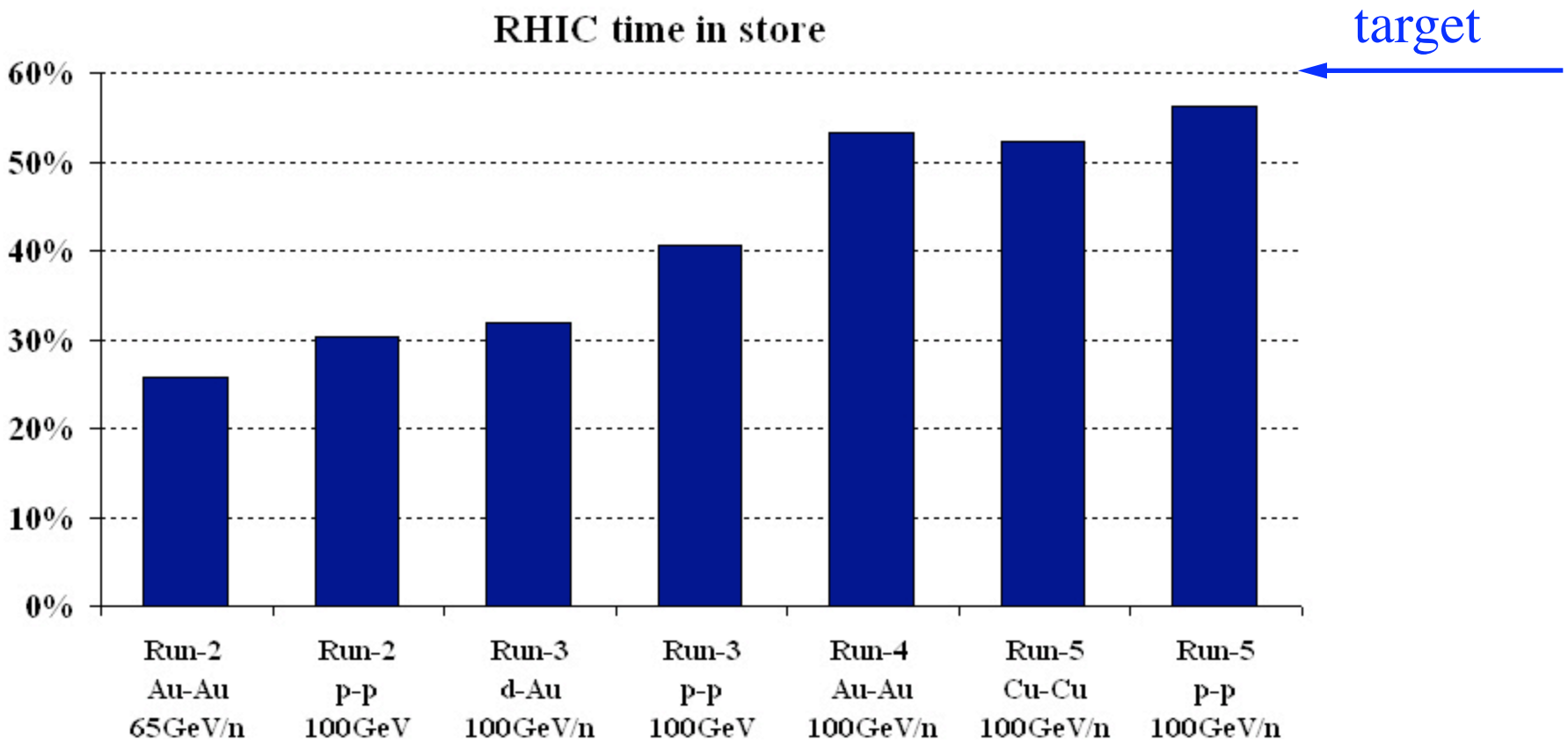
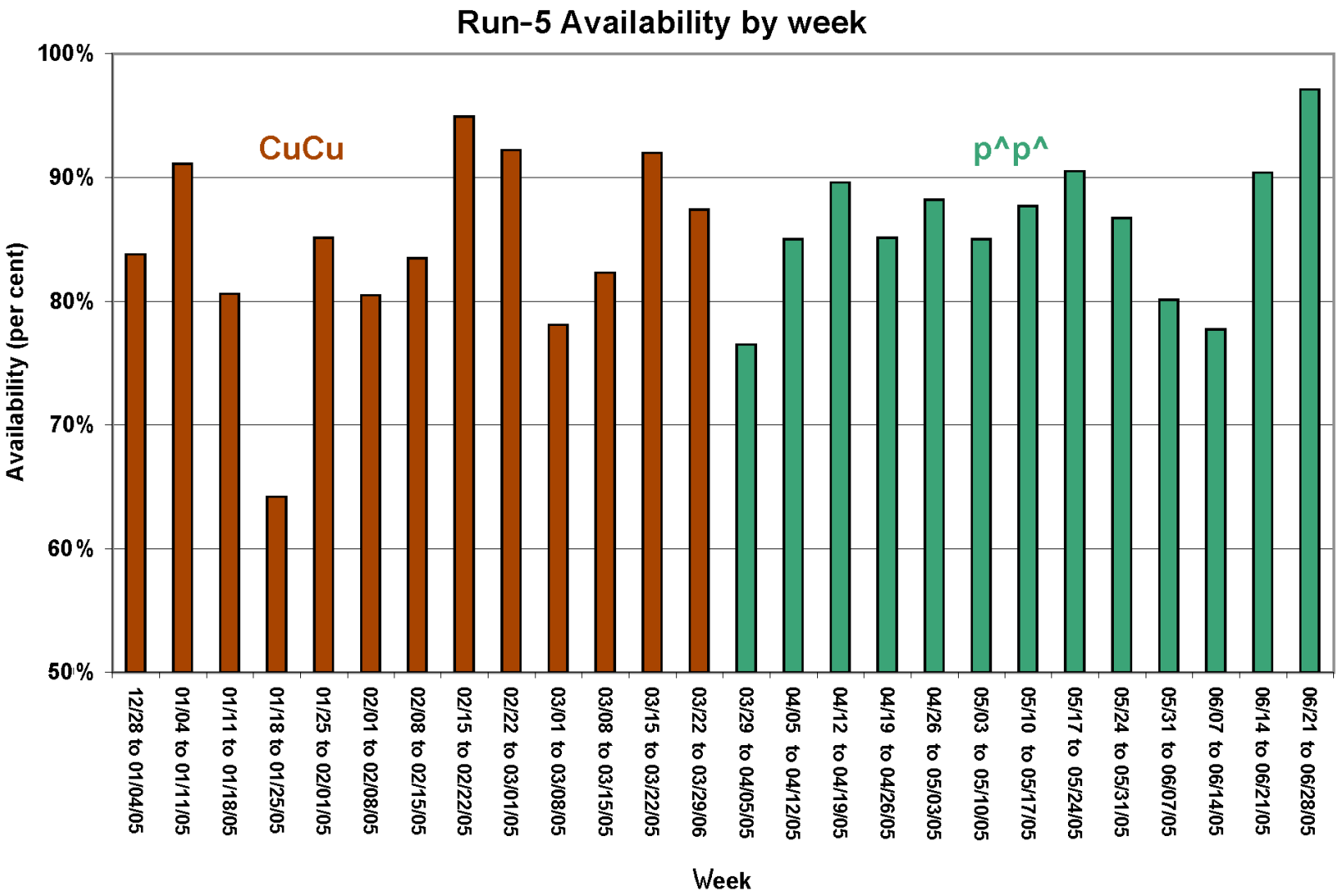
RHIC delivered luminosity



RHIC calendar time in store



Run-5 availability (DOE definition)

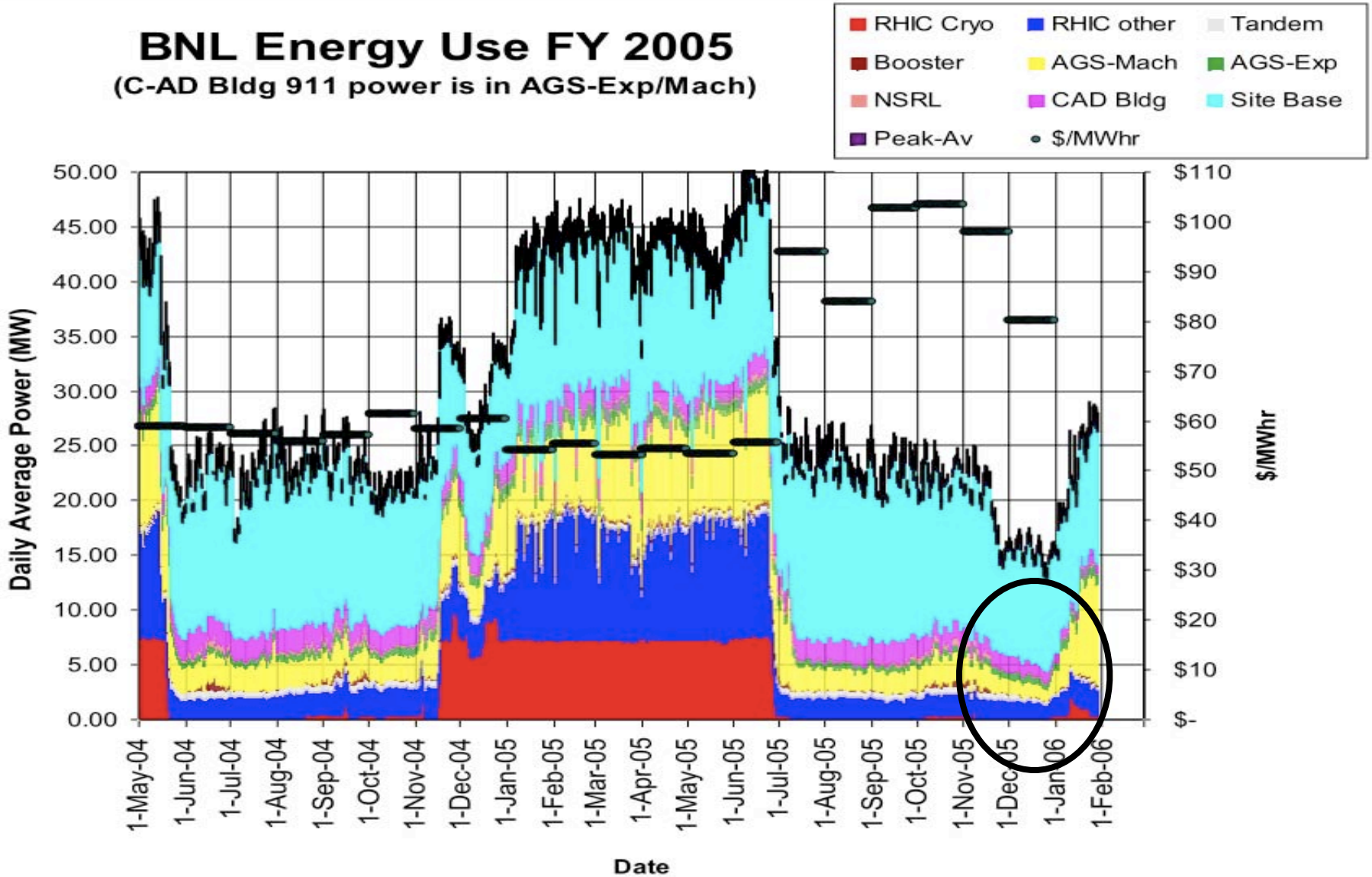


FY2006

- Safety
  - ~400 days and >10^6 working hours without a DART case
- Received the President's Budget
  - 9.3% reduction from FY2005
  - 14 person reduction of RHIC personnel
  - Reduced operations from 12 -> 0 weeks
    - Power costs increased from $55 -> $100/MWH
    - Intensive power reduction effort, buildings as well as machines
      - Reduced background power of 7 MW by 1 MW, saving $.8M per year
      - FY2007 cryogenics operations power reduction (AIP) of 1.5 MW out of 7 MW, saving $25K / week

BNL Energy Use FY 2005

(C-AD Bldg 911 power is in AGS-Exp/Mach)



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FY2006

- Incremental private funding of $12M (C-AD) enables a 20 week FY2006 run
  - Dr. James Simons and his Renaissance Technology Corporation partners and BSA
- New York State is subsidizing our power costs to minimize the impact
  - Homeowner rates are ~$200/MWH
- EBIS construction continues as planned
- Electron cooling R&D continues as planned
- eRHIC development continues as planned

- FY2006 Spin Run
  - 200 GeV cm (11 weeks)
  - 62 GeV cm (2 weeks)
  - 500 GeV cm development (1 week)

C-AD Budget History ($M)

	FY05	FY06	FY07
RHIC Operating	100.6	91.4	115.7
Additional Operating		12.0	
RHIC AIP	3.1	1.5	2.1
RHIC Capital	1.5	0.7	1.0
EBIS (DOE+NASA)	1.2	3.6	9.0
NSRL	4.8	3.9	4.6
OTHER	7.5	2.0	1.0
RCMS	0	0.2 (5.2*)	10.0*
*Planned but not confirmed	**118.7**	**115.3**	**133.4**

FY2007 Presidential

- Supports ~34 weeks of RHIC cryogenic operations
  - Power costs are volatile and uncertain in NYS
  - Cooldown, beam setup and warmup will need ~5 weeks
    - Continue to be more efficient, FY2005 AIP improves cooling capacity and reduces cooldown time and power consumption in FY2007.
  - Increase staffing, postdocs and students

- EBIS construction funding at its peak
  - NASA support at $1.5M as planned

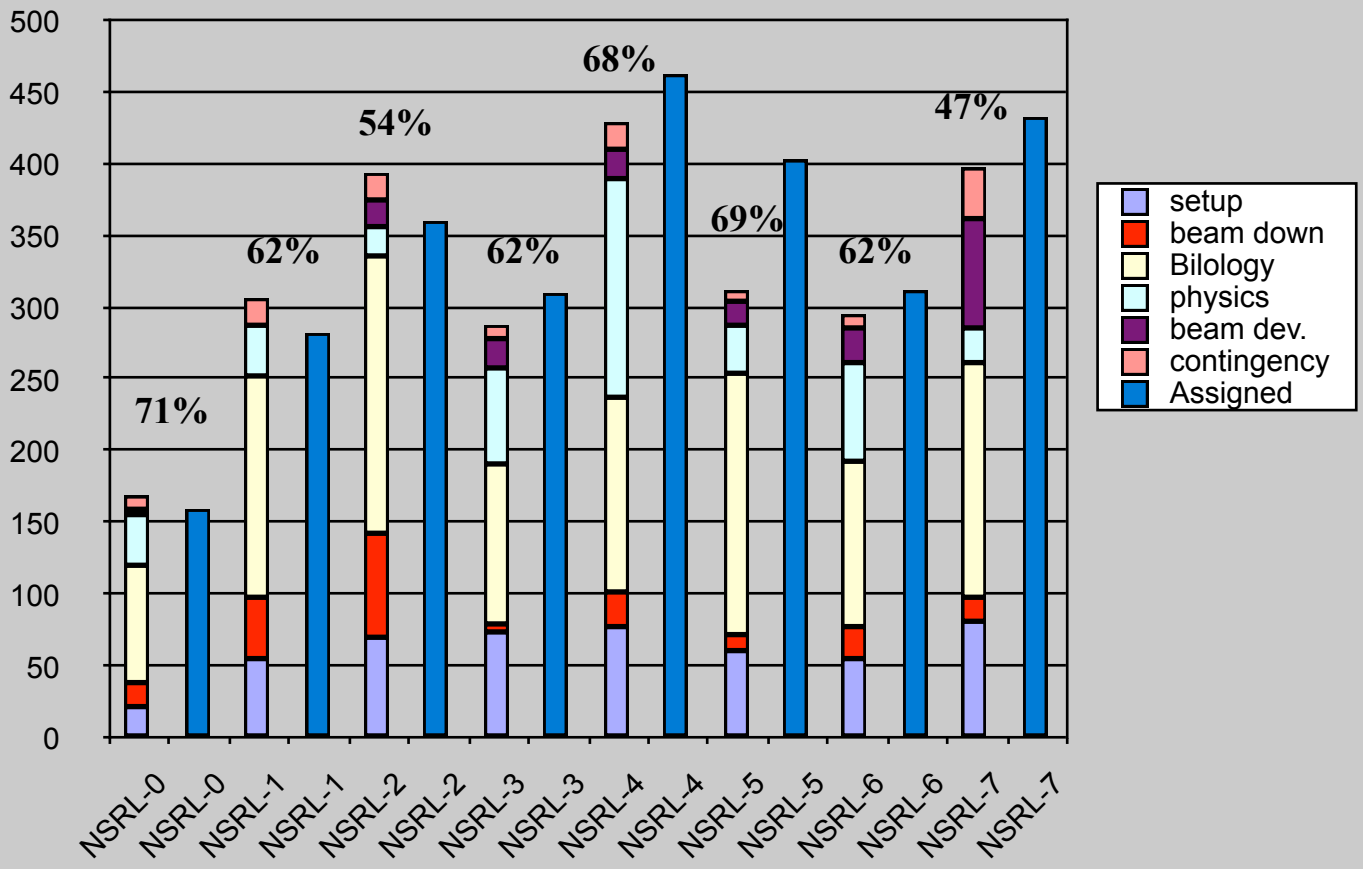
- AIP increase of ~$1M to $2M from FY2006

- ERL R&D is nearing completion.

FY2008 BNL Proposed

- 30 week runs each year
  - Physics program includes ions and polarized protons to 500 GeV cm.
- EBIS project completed in FY2009
- RHICII (eCool) nears construction start
  - ERL R&D enters linac commissioning phase
- eRHIC R&D increased
- AIP support grows to continue to replace aging machine components and improve performance, eg. RHIC cryogenic system is ~30 years old, would be accomplished in an orderly manner

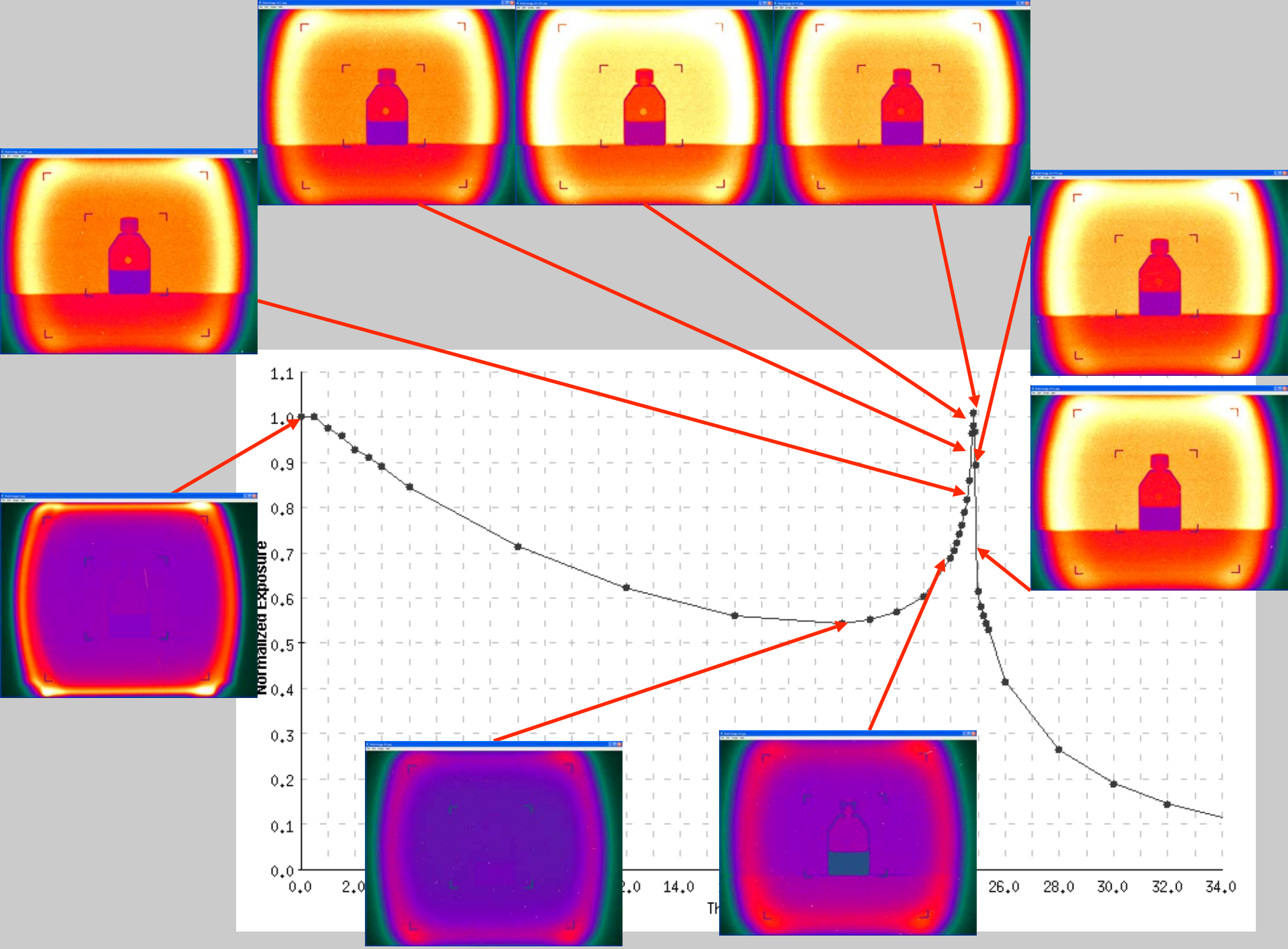
Operations
NSRL Time Usage



% science shown

Beams delivered to experiments

Ion	Energy (MeV/n)	Intensity
p	1000	3.4×10^{10}
C	290	1.2×10^{10}
O	1000, 600	4.0×10^{9}
Si	600, 300	3.0×10^{9}
Cl	500	2.0×10^{9}
Ti	1100	8.0×10^{8}
Fe	1000, 600, 300	2.0×10^{9}


Normalized Exposure
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
2.0
14.0
26.0
28.0
30.0
32.0
34.0

ACCELERATOR R&D EFFORTS

- Cooling
  - Electron cooling
  - Stochastic cooling
- eRHIC, an electron proton and ion collider using the existing RHIC rings
  - ring-ring version
  - linac-ring version
  - choice expected in 2007
- NSLSII design
- ILC, propose to use e-cooling superconducting electron gun to eliminate or simplify the electron damping ring
- LHC, symbiotic RHIC and LHC accelerator (ions) physics experiments
- Neutrino facility for a long baseline beam to DUSEL
  - AGS based
  - Proton-driver jointly with Fermilab, ANL, LBNL
  - Generic
- Hadron therapy synchrotron, protons and carbon

- IT HAS BEEN AN UNCERTAIN 12 MONTHS
- FORTUNATELY WE HAD PRAVEEN CHAUDHARI AND JIM SIMONS BAIL US OUT
- NEXT YEAR LOOKS WONDERFUL, BUT CONGRESS HAS TO CONFIRM IT
- THE C-AD, SMD AND BNL SUPPORT STAFFS CONTINUE TO PERFORM ADMIRABLY, BOTH TECHNICALLY AND SAFELY

OUR FUTURE LOOKS BRIGHT