RHIC Five-year planning summaries
9/24/2003

Appended below are the following tables:

A. **Summary of requested run modes for Constant Effort Scenario, for all experiments**

B. **Overall budget summary for Constant Effort Scenario**

C. **Detailed tables from C-A**

D. **Detailed tables from PHENIX**

E. **Detailed tables from STAR**

F. **Detailed tables from PHOBOS**

G. **Detailed tables from RCF**

RHIC 5 Year Planning – Constant Effort
Summary 9/15/03
Running Modes

Fiscal Year	2003	2004	2005	2006	2007	2008
PHENIX	d+Au 200 GeV 16 weeks, 2.7 nb-1 p+p 200 GeV 10 weeks, 0.35 pb-1, 27%	Au+Au 200 GeV 5+14 weeks, 123 ub-1 p+p 200 GeV 5+0 weeks beam development	Si+Si 200 GeV 5+9 weeks, 2.2 nb-1 p+p 200 GeV 5+5 weeks, 1.2 pb-1 50%	Au+Au 62.4 GeV 5+19 weeks, 45 ub-1	p+p 200 GeV 5+19 weeks, 62 pb-1 60%	Au+Au 200 GeV 5+19 weeks, 840 ub-1
STAR	d + Au 38.2M 5+11 weeks ; pp 10 weeks : T 0.39 pb^{-1} L 0.37 pb^{-1}	AuAu 5+14 pp 200 GeV 5 wk	Au or Fe 5+9 Energy scan pp 200 GeV 5+5 wk	d + Au 5+9 pp 200 GeV 5+5 wk	AuAu 5+5 pp 200 GeV 5+9wk	AuAu 5+10 pp 500 GeV 5+5wk
PHOBOS		AuAu@200 5+10(18) FeFe@200 5+4(6)	pp@200 5+7(12) AuAu@63 5+7(12)	pp@500 8+4 Add. Species Add. Energy	Possible additional running to make up shortfalls	----------
BRAHMS		Au-Au 200 5+19	Fe-Fe 200 5+5 pp 200 5+4	Au-Au 63 2+6 Au-Au 200 2+5 pp 200 5+4	----------	----------

Budget Summary for Constant Effort Scenario

Fiscal Year	2003	2004	2005	2006	2007	2008
PHENIX						
Ops Costs	$6.0M (24K/wk)	6.3M (27K/wk)	6.6M (42K/wk)	6.8M (42K/wk)	7.1M (42K/wk)	7.4M (42K/wk)
R&D	$0.12M	1.15M	0.95M	0.6M	---	---
Ops Equip.	$0.5M	0.5M	0.5M	0.5M	0.5M	0.5M
Res. Equ.			2.85M VTXb, HBD, DAQ	2.95M VTXb, HBD, DAQ	4.2M VTXb/e, TPC, DAQ	4.5M VTXe, TPC
STAR						
Ops Costs	$5.9M (38K/wk)	6.4M (40K/wd)	6.7M (41K/wk)	7.0M (43K/wk)	7.3M (45K/wk)	7.6M (47K/wl)
R&D	$0.12M	1.14M	1.73M	1.28M	0.3M	---
Ops Equip.	$0.49M	0.6M	0.45M	0.45M	0.25M	0.25M
Res. Equ.	$3.0M BEMC [$1.5M EEMC]	2.7M BEMC, EEMC	2.0M TOF	5.0M TOF, MVTX, FTU	8.5M MVTX, DAQ, FEE, FTU	4.5M MVTX, DAQ, FEE, TPC
PHOBOS						
Ops Costs	$0.75M (10K/wk)	0.89M (10K/wk)	0.92M (10K/wk)	0.96M (11K/wk)	1.0M (11K/wk)	----------
Ops Equ.		0.1M	0.1M	0.1M	----	
BRAHMS						
Ops Costs	$0.78M (10K/wk)	0.8M (10K/wk)	0.8M (10K/wk)	0.8M (10K/wk)	----------	----------
Ops Equ.		0.11M	0.1M	0.075M		
RCF						
Ops Costs	$5.18M	5.78M	6.45M	6.71M	6.98M	7.26M
Ops Equ.	$2.0M	2.0M	3.4M	2.0M	2.0M	2.0M
C-AD						
Ops Costs	$89.7M (580K/w)	90.3 (600K/wk)	93.6M (620K/wk)	101.1M (800K/w)	104.6M (820K)	105.9M (850K)
R&D	$0.9M	2.0M	3.0M	2.0M	2.1M	2.2M
Ops Equip.	$4.4M	4.5M	4.9M	5.1M	5.4M	5.6M
Res. Equ.	---	---	2.5M EBIS	2.6M EBIS	2.7M EBIS	---
ALD/Users	$0.86M	0.90M	0.93M	0.97M	1.00M	1.05M
Totals						
Ops costs	$109.2M (662K)	$111.4M (687K)	$116.0M (723K)	$124.3M (906K)	$128.0M (920K)	$129.2M (939K)
R&D	$1.1M	$4.3M	$5.7M	$3.9M	$2.4M	$2.2M
Ops Equip.	$7.4M	$7.8M	$9.45M	$8.2M	$8.15M	$8.35M
Ops Total	**$117.7M**	**$123.5M**	**$131.2M**	**$136.4M**	**$138.5M**	**$139.8M**
	Actual: $118.0M	Pres: $121.1M				
Res. Equ.	$3.0M	$2.7M	$7.35M	$10.55M	$15.4M	$9.0M

RHIC 5-year planning

Info provided by the Collider-Accelerator Department

27 weeks

Fiscal Year	2003[1]	2004	2005	2006	2007	2008
Run Plan[2]						
Weeks	**31**	**27**	**27**	**27**	**27**	**27**
Ops cost[3]						
Base cost[7]	**90.3**	**90.9**	**94.2**	**101.7**+3.3[4]	**105.3**+3.3[4]	**106.6**[5]+3.3[4]
Incr. Cost/week running	**0.58**	**0.60**	**0.62**	**0.80**+0.12[4]	**0.82**+0.12[4]	**0.85**+0.12[4]
R&D Plan						
R&D Projects	**e-cooling**	**e-cooling**	**e-cooling**	**e-cooling**	**e-cooling**	**e-cooling**
Annual funding required[3]	**0.9**	**2.0**	**3.0**	**2.0**	**2.1**	**2.2**
Capital Equipment[5]						
Facility Operations	**1.1**	**1.2**	**1.2**	**1.3**	**1.3**	**1.4**
Experimental Support	**0.4**	**0.4**	**0.4**	**0.4**	**0.5**	**0.5**
AIP	**2.9**	**2.9**	**1.2**	**1.3**	**1.4**	**3.7**
AIP for EBIS			**2.1**	**2.1**	**2.2**	
EBIS (new NP funding)			**2.5**	**2.6**	**2.7**	
Annual funding required[3]	**4.4**	**4.5**	**7.5**	**7.7**	**8.1**	**5.6**

RHIC 5-year planning

Info provided by the Collider-Accelerator Department

37 weeks[6]

Fiscal Year	2003[1]	2004	2005	2006	2007	2008
Run Plan[2]						
Weeks	**31**	**37[6]**	**37[6]**	**37[6]**	**37[6]**	**37[6]**
Ops cost[3]						
Base cost[7]	**90.3**	**103.6**	**107.7**	**117.0**+4.5[4]	**121.1**+4.5[4]	**122.8**[5]+4.5[4]
Incr. Cost/week running	**0.58**	**0.60**	**0.62**	**0.80**+0.12[4]	**0.82**+0.12[4]	**0.85**+0.12[4]
R&D Plan						
R&D Projects	**e-cooling**	**e-cooling**	**e-cooling**	**e-cooling**	**e-cooling**	**e-cooling**
Annual funding required[3]	**0.9**	**2.0**	**3.0**	**2.0**	**2.1**	**2.2**
Capital Equipment[5]						
Facility Operations	**1.1**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**
Experimental Support	**0.4**	**0.6**	**0.6**	**0.6**	**0.7**	**0.7**
AIP	**2.9**	**2.9**	**1.2**	**1.3**	**1.4**	**3.7**
AIP for EBIS			**2.1**	**2.1**	**2.2**	
EBIS (new NP funding)			**2.5**	**2.6**	**2.7**	
Annual funding required[3]	**4.4**	**5.6**	**8.6**	**8.9**	**9.4**	**6.9**

Notes:

1. Enter the "as run" data from FY03. This gives a base point for extrapolating various budget scenarios (e.g. constant effort)
2. **For each run mode enter primary physics goals, required data sample (beam, energy, integrated luminosity), and number of cryo weeks (using C-A guidance for collider projections)**
3. **Ops cost = manpower and consumables supported by the RHIC operations budget to run the machine, detectors and RCF. The sum of Ops cost + R&D funding + Cap equip funding should equal the total RHIC budget under KB0202011 (Accelerator Operations) and KB0202012 (Experiment Support) and KB0201021 (Exp. Equipment for RHIC Research [ex-AEE])**
4. **Electricity costs until July 2005 are at a rate of $55/MWh. From then on a rate of $85/MWh is assumed. The added number shows the additional operating cost, should the rate rise to $110/MWh.**
5. **Includes $2.5m cost savings from EBIS.**
6. **37-week operation includes operations staff increases from 354 to 380.**
7. **Includes User Office support.**
8. **Outlined below are the individual costs for the main improvement projects. The machine performance evolution depends on the successful completion of these the majority projects.**

RHIC injectors

AGS cold helical snake	**$2.0m**	
New OPPIS solenoid	**$0.5m**	
2nd AGS cold helical snake	**$1.5m ?**	
Tandem refurbishment	**$6.0m needed to maintain functionality without EBIS**	
RHIC luminosity and background		
Collimation system, 2nd half	**$0.5m**	
Shielding STAR	**$0.3m**	
Shielding PHOBOS	**$0.3m**	
NEG pipes (700m)	**$1.5m**	
Solenoids	**$0.2m**	
Transverse damper system	**$0.5m**	
BPM electronics to alcoves	**$0.4m**	
Alcove equipment outside ring	**$5.0m GPP?**	
Stochastic cooling	**$3.0m**	
RHIC reliability		
Refrigerator controls upgrade	**$1.9m**	
AGS MMPS transformer	**$3.3m**	
Total from above	**$20.9m**	**(excluding Tandem refurbishment)**
Total Capital Investment 27 wks	**$17.1m**	**(FY2004-FY2008, Facility Operations+AIP, excluding EBIS)**
Total Capital Investment 37 wks	**$22.1m**	**(FY2004-FY2008, Facility Operations+AIP, excluding EBIS)**

Comments on requested running modes:

General:

1) Currently C-AD sees its main effort in developing luminosity. If frequent mode changes are essential for the physics program, efforts could be redirected towards shortening the setup time. With frequent mode changes luminosities will be greatly reduced.
2) Luminosities in the RHIC Run Projections[i] are given as a range while the experimental presentations (BRAHMS, PHENIX) assume a single numbers (PHOBOS also uses ranges, STAR has no table with expected luminosities). While the single numbers are consistent with the given range in most instances, the degree of optimism varies from mode-to-mode and experiment-to-experiment.
3) The RHIC Run Projections[i] assume that only 2 experiments run in p-p mode. To serve 4 experiments with p-p collisions, the requested p-p time needs to be doubled. This is not taken into account in the Beam Use Proposals. Alternatively, 4 experiments can be run simultaneously with luminosities reduced by at least a factor 2.

4) All experiments request at some point short p-p runs of about 4-5 weeks. Although there may be good reasons for these runs, it should be understood that it is difficult to develop the luminosity under these conditions. With the total time requested until 2008 it is not possible to accumulate an integrated luminosity of a few 100 $(pb)^{-1}$.
5) Three or more different modes during one run stretch the current C-AD resources beyond acceptable limits. The setup of a new mode requires a considerable effort of a number of people.
6) If integrated luminosity is to be maximized, energy scans in Au-Au mode should not be done repeatedly.
7) The set-up time for collisions at injection is considerably shorter than at any other energy. The time in store is significantly increased due to the increased quench resistance and the reduced overhead from ramping. The luminosity, however, is reduced by close to 2 orders of magnitude compared to collisions at top energy.

BRAHMS

1) Currently β^* at Brahms is limited to 3m, the projected luminosities[i] were stated for β^*=1m. With the current understanding of the machine, the integrated luminosities stated in Table 1 of the BUP cannot be obtained in the time stated there. This may change in the future. Brahms could be operated at a β^* smaller than 3m if additional interaction region correctors were powered. So far, no funds were made available to buy and install the needed power supplies.
2) 3 different modes are requested for Run-5 with 37 weeks of cryo operation. See General comment 5).

PHENIX

1) Generally long runs with few mode changes are requested. This will yield the highest possible integrated luminosities.
2) The integrated luminosity for Au-Au operation at 31.2 GeV beam energy in Run-6 is on the optimistic side.
3) The assumed luminosities for later runs (Run-6 and beyond) are more optimistic than those in the provided collider projections[1]. In the collider projections document 14 weeks of production are assumed for each of the modes Au-Au and p-p for each year. This is not considered in the BUP. For example, for Run-7 19 weeks of p-p operation are requested (for both 27 and 37 weeks) for which a delivered luminosity of 158 $(pb)^{-1}$ is assumed. This luminosity is consistent with the Run-7 projection in Table 6 of the collider projections, but the PHENIX BUP contains only short p-p running periods before Run-7.

PHOBOS

1) The PHOBOS experiment currently sets the loss thresholds leading to an abort on the ramp, and additional radiation limits during store. In the last run, those limits have affected the number of successful ramps, and the time in store. A careful review of these thresholds is requested (effort under way.)

STAR

1) In STAR's BUP there is no table with the expected integrated luminosities. For p-p collisions, up to 30 $(pb)^{-1}$/week are mentioned in the text, beyond even the most optimistic projections in FY2008. Note that 30 $(pb)^{-1}$/week is 50 times more than the demonstrated weekly luminosity. This cannot be achieved with the short running times for p-p in this proposal.
2) In Run-5 Au-Au operation at 20 GeV/u is requested. This is close to the transition energy and may require extra care.
3) For Run-5 (37 weeks), Run-6 (37 weeks) and Run-7 (37 weeks) 3 different species are foreseen. See General Comment 5)

[1] T. Roser and W. Fischer, "RHIC Collider Projections (FY2004-FY2008)", 9 September 2003.

DRAFT PHENIX 5-year planning template
Constant Effort (27 Weeks)

Fiscal Year	2003[1]	2004	2005	2006	2007	2008
Run Plan[2] **Run Mode 1** **Run Mode 2** **(27 Weeks)**	d+Au 200 GeV 16 weeks, 2.7 nb-1 p+p 200 GeV 10 weeks, 0.35 pb-1, 27%	Au+Au 200 GeV 5+14 weeks, 123 ub-1 p+p 200 GeV 5+0 weeks beam development	Si+Si 200 GeV 5+9 weeks, 2.2 nb-1 p+p 200 GeV 5+5 weeks, 1.2 pb-1 50%	Au+Au 62.4 GeV 5+19 weeks, 45 ub-1	p+p 200 GeV 5+19 weeks, 62 ub-1 60%	Au+Au 200 GeV 5+19 weeks, 840 ub-1
Ops cost[3] **Base cost** **Incr. Cost/week running** **Incr. Cost/week Breakdown**	**$6.0M** **$24k/wk**	**$6.3M** **$27k/wk =** $14k media $11k gas $ 2k Visitor Incre.	**$6.6M** **$42k/wk =** $31k media $11k gas $ 2k Visitor Incr.e	**$6.8M** **$42k/wk =** $31k media $11k gas $ 2k Visitor Incr.e	**$7.1M** **$42k/wk =** $31k media $11k gas $ 2k Visitor Incr.e	**$7.4M** **$42k/wk =** $31k media $11k gas $ 2k Visitor Incr.e
R&D Plan **R&D Projects** **Annual funding required[3]**	**VTX brl/endcp $85k** **HBD $50k** **TPC $45k** **DAQ $40k**	**VTX brl/endcp $400k** **HBD $250k** **TPC $300k** **DAQ $200k**	**VTX endcp $450k** **TPC $300k** **DAQ $200k**	**VTX endcp $300k** **TPC $300k**		
Capital Equipment **Capital projects/upgrades** **Annual funding required[3]**	**Operating Cap $500k**	**Operating Cap $500k**	**VTX brl $2000k** **HBD $ 750k** **DAQ $ 100k** **Operating Cap $500k**	**VTX brl $2000k** **HBD $ 750k** **DAQ $ 200k** **Operating Cap $500k**	**VTX brl/endcp $2000k** **TPC $2000k** **DAQ $ 200k** **Operating Cap $ 500k**	**VTX endcp $2000k** **TPC $2500k** **Operating Cap $ 500k**
Non-DOE funded Equipment		**VTX barrel RIKEN**	**VTX barrel RIKEN** **Muon Trig Det NSF**	**VTX barrel RIKEN** **Muon Trig Det NSF**	**Muon Trig Det NSF**	
Data Produced		**540 TB raw data**	**1200 TB raw data**	**1600 TB raw data**	**1600 TB raw data**	**1600 TB raw data**

Notes:

9. Enter the "as run" data from FY03. This gives us a base point for extrapolating various budget scenarios (e.g. constant effort)
10. **For each run mode enter primary physics goals, required data sample (beam, energy, integrated luminosity), and number of cryo weeks (using C-A guidance for collider projections)**
11. **Ops cost = manpower and consumables supported by the RHIC operations budget to run the machine, detectors and RCF. The sum of Ops cost + R&D funding + Cap equip funding should equal the total RHIC budget under KB0202011 (Accelerator Operations) and KB0202012 (Experiment Support) and KB0201021 (Exp. Equipment for RHIC Research [ex-AEE])**

DRAFT PHENIX 5-year planning template

PHENIX 37 Week Scenario

Fiscal Year	2003[1]	2004	2005	2006	2007	2008
Run Plan[2] **Run Mode 1** **Run Mode 2** **(37 weeks)**	d+Au 200 GeV 16 weeks, 2.7 nb-1 p+p 200 GeV 10 weeks, 0.35 pb-1, 27%	Au+Au 200 GeV 5+19 weeks, 205 ub-1 p+p 200 GeV 5+5 weeks, 0.5 pb-1, 40%	Si+Si 200 GeV 5+14 weeks, 4.7 nb-1 p+p 200 GeV 5+10 weeks, 3.8 pb-1 50%	Au+Au 62.4 GeV 5+19 weeks, 45 ub-1 p+p 500 GeV 5+5 weeks, 2.1 pb-1 50%	p+p 200 GeV 5+19 weeks, 76 ub-1 60% p+p 62.4 GeV 5+5 weeks, 2.7 pb-1 60%	Au+Au 200 GeV 5+29 weeks, 1500 ub-1
Ops cost[3] **Base cost** **Incr. Cost/week running** **Incr. Cost/week Breakdown**	**$6.0M** **$24k/wk**	**$6.3M** **$27k/wk =** $14k media $11k gas $ 2k Visitor Incr.e	**$6.6M** **$42k/wk =** $31k media $11k gas $ 2k Visitor Incr.e	**$6.8M** **$42k/wk =** $31k media $11k gas $ 2k Visitor Incr.e	**$7.1M** **$42k/wk =** $31k media $11k gas $ 2k Visitor Incr.e	**$7.4M** **$42k/wk =** $31k media $11k gas $ 2k Visitor Incr.e
R&D Plan **R&D Projects** **Annual funding required[3]**	**VTX brl/endcp $85k** **HBD $50k** **TPC $45k** **DAQ $40k**	**VTX brl/endcp $400k** **HBD $250k** **TPC $300k** **DAQ $200k**	**VTX endcp $450k** **TPC $300k** **DAQ $200k**	**VTX endcp $300k** **TPC $300k**		
Capital Equipment **Capital projects/upgrades** **Annual funding required[3]**	**Operating Cap $500k**	**Operating Cap $500k**	**VTX brl $2000k** **HBD $ 750k** **DAQ $ 100k** **Operating Cap $500k**	**VTX brl $2000k** **HBD $ 750k** **DAQ $ 200k** **Operating Cap $500k**	**VTX brl/endcp $2000k** **TPC $2000k** **DAQ $ 200k** **Operating Cap $ 500k**	**VTX endcp $2000k** **TPC $2500k** **Operating Cap $ 500k**
Non-DOE funded Equipment		**VTX barrel RIKEN**	**VTX barrel RIKEN** **Muon Trig Det NSF**	**VTX barrel RIKEN** **Muon Trig Det NSF**	**Muon Trig Det NSF**	
Data Produced		**920 TB raw data**	**2000 TB raw data**	**2000 TB raw data**	**2000 TB raw data**	**2400 TB raw data**

Notes:

1. Enter the "as run" data from FY03. This gives us a base point for extrapolating various budget scenarios (e.g. constant effort)
2. **For each run mode enter primary physics goals, required data sample (beam, energy, integrated luminosity), and number of cryo weeks (using C-A guidance for collider projections)**
3. **Ops cost = manpower and consumables supported by the RHIC operations budget to run the machine, detectors and RCF. The sum of Ops cost + R&D funding + Cap equip funding should equal the total RHIC budget under KB0202011 (Accelerator Operations) and KB0202012 (Experiment Support) and KB0201021 (Exp. Equipment for RHIC Research [ex-AEE])**

RHIC 5-year planning template

STAR: Constant Effort

Fiscal Year	2003[1]	2004	2005	2006	2007	2008
Run Plan[2]						
Run Mode 1	d + Au 38.2M	AuAu 5+14	Au or Fe 5+9	d + Au 5+9	AuAu 5+5	AuAu 5+10
Run Mode 2	5+11 weeks ; pp 10 weeks :	pp 5	pp 5+5	pp 5+5	pp 5+9	pp 5+5
.	T 0.39 pb^{-1} L 0.37 pb^{-1}					
Ops cost[3]	5.9M	6.4M	6.7M	7.0M	7.3M	7.6M
Base cost	(30 TB/wk)**Tapes					
Incr. Cost/week running	= $30k/wk gas & gen supp.= $8k/wk	40k/wk	41k/wk	43k/wk	45k/wk	47k/wk
R&D Plan		GEM (200k)	GEM (340k),	GEM (345k),	GEM (300k)	
R&D Projects	TOF (100k) DAQ (20k)	TOF (140k), DAQ (350k), MVTX (350k),	TOF (140k), DAQ (750k), MVTX (350k),	DAQ (670k), MVTX (260k)		
Annual funding required[3]	120k	FEE (100k) 1.14M	FEE (145k) 1.73M	1.28M	0.3M	
Capital Equipment					Gen Cap 250	GenCap 250
Capital projects/upgrades	RCF (120k), TOF(60k), EEMC (60k), FPD	EEMC(240k) BEMC(100k) SSD (100k)	(FHCAL, FTU, RP) 450k TOF $2M	(FHCAL,RP) 450k MVTX $1M	MVTX, $2M DAQ $2.5M	MVTX $1M DAQ $2.5M
Annual funding required[3]	(250k) BEMC (3.0M) EEMC (1.5M)***	TOF (140k) BEMC (2.3M) EEMC (0.4M)		TOF $2.5M FTU* $1.5M	FEE $1.5M FTU* $2.5M	FEE $1.0M Begin TPC construction

Notes:

12. **In the above, the start for the construction of a new TPC has been noted for FY2008, but no budget number has been included since the required profile is unknown at this time. A rough indictor of the potential scope is the cost of the present STAR TPC which was of order $10-12M FY96 dollars over 3-4 years.**

13. *****The only non-DOE major construction item at present is the endcap electromagnetic calorimeter (NSF, IUCF, Indiana University, other) which completes in FY04. Of order $0.4M in non-DOE funds will be spent in FY04.**

14. **Experience during the shutdown periods in the out years is expected to be more or less similar to present experience and is projected to require a similar level of effort by C-AD and STAR technicians. Upgrades will be implemented during nominal shutdown periods between runs. Some systems, (e.g., TOF, DAQ, MVTX, FTU) will require use of C-AD trades in the out years for electrical work, survey, etc..**

15. **** The cost of tapes/week assumes 15TB/week of raw data, 15TB/week of processed results; cost assumes $1k/TB.**

16. **In STAR's view, for the foreseeable future, the spin program will be in a development mode, "learning its way" as the new hardware and infrastructure are implemented and commissioned. This requires modest periods of spin running each year, probably at least through Run VI. If progress is slower than anticipated, this approach may need to be extended for another year before production running would be truly efficient. STAR does not believe a long period with no spin running (e.g., skipping a year) followed by an extended run would be successful and feels this is not a good strategy until the spin capability is fully developed and stable, at which point long production runs make sense.**

6 ***Funding for the construction cost of the Forward Tracker Upgrade (FTU) may come from MIT as the result of a request they make to medium energy DOE; it is possible this funding may not go through BNL.**

7 **Jerome Lauret has been in contact with Bruce Gibbard about the STAR data load. This will be refined.**

8 **The double entries in 2004 for EEMC and BEMC break out the construction budget, and the projected cost to operations capital for these systems for spares, etc.**

The run goals have not yet been specified in terms of integrated luminosity. That is in progress. The only part of the projected plan which is manifestly outside C-AD guidance are the short AuAu runs (less than 4 weeks) at reduced beam energy (possibly) requested in Run IV and Run V. These violate the 2 week "overhead" indicated as necessary by C-AD. However, in private communication, Thomas Roser has indicated that if it is not necessary to develop luminosity, stable collisions can be established significantly faster than 2 weeks.

RHIC 5-year planning template

PHOBOS Detector info.

Fiscal Year	**2003**[1]	**2004**	**2005**	**2006**	**2007**	**2008**
Run Plan[2] **Run Mode 1** **Weeks: 27 total (37 total)** **Run Mode 2** **.**		AuAu@200 5+10(18) FeFe@200 5+4(6)	pp@200 5+7(12) AuAu@63 5+7(12)	pp@500 8+4 Add. Species Add. Energy	Non-optimum Schedule Overflow?	-------
Ops cost[3] **Base cost (31 week cryo.)** **Incr. Cost/week running** **Avg. Cost/week running**	 $0.86M -- --	 $0.89M $10k $3.0k	 $0.92M $10k $3.1k	 $0.96M $11k $3.2k	 $1.0M? $11k $3.4k	 ???
R&D Plan **R&D Projects** **Annual funding required**[3]	-------	-------	-------	-------	-------	-------
Capital Equipment **Capital projects/upgrades** **Annual funding required**[3]	 $0.225M	 $0.1M (DAQ/Trg)	 $0.1M (DAQ/Trg)	 $0.1M? (DAQ/Trg)	 -------	 -------

Notes:

17. Enter the "as run" data from FY03. This gives us a base point for extrapolating various budget scenarios (e.g. constant effort)
18. **For each run mode enter primary physics goals, required data sample (beam, energy, integrated luminosity), and number of cryo weeks (using C-A guidance for collider projections)**
19. **Ops cost = manpower and consumables supported by the RHIC operations budget to run the machine, detectors and RCF. The sum of Ops cost + R&D funding + Cap equip funding should equal the total RHIC budget under KB0202011 (Accelerator Operations) and KB0202012 (Experiment Support) and KB0201021 (Exp. Equipment for RHIC Research [ex-AEE])**

RCF Cost Estimate (At year $M) for 27 Wk Model - Central Disk

9/16/03

	FY03	FY04	FY05	FY06	FY07	FY08
FTE's	20	22	24	24	24	24
Ops Costs	5.18	5.78	6.45	6.71	6.98	7.26
R&D Costs	0	0	0	0	0	0
Ops Equip	2.00	2.00	4.42	2.40	2.00	2.00

RCF Cost Estimate (At year $M) for 27 Wk Model - Distributed Disk

9/16/03

	FY03	FY04	FY05	FY06	FY07	FY08
FTE's	20	22	24	24	24	24
Ops Costs	5.18	5.78	6.45	6.71	6.98	7.26
R&D Costs	0	0	0	0	0	0
Ops Equip	2.00	2.00	3.40	2.00	2.00	2.00

RCF Cost Estimate (At year $M) for 37 Wk Model - Central Disk

9/16/03

	FY03	FY04	FY05	FY06	FY07	FY08
FTE's	20	22	24	24	24	24
Ops Costs	5.18	5.78	6.45	6.71	6.98	7.26
R&D Costs	0	0	0	0	0	0
Ops Equip	2.00	5.18	6.93	2.00	2.00	2.00

RCF Cost Estimate (At year $M) for 37 Wk Model - Distributed Disk

9/16/03

	FY03	FY04	FY05	FY06	FY07	FY08
FTE's	20	22	24	24	24	24
Ops Costs	5.18	5.78	6.45	6.71	6.98	7.26
R&D Costs	0	0	0	0	0	0
Ops Equip	2.00	3.55	5.26	2.00	2.00	2.00