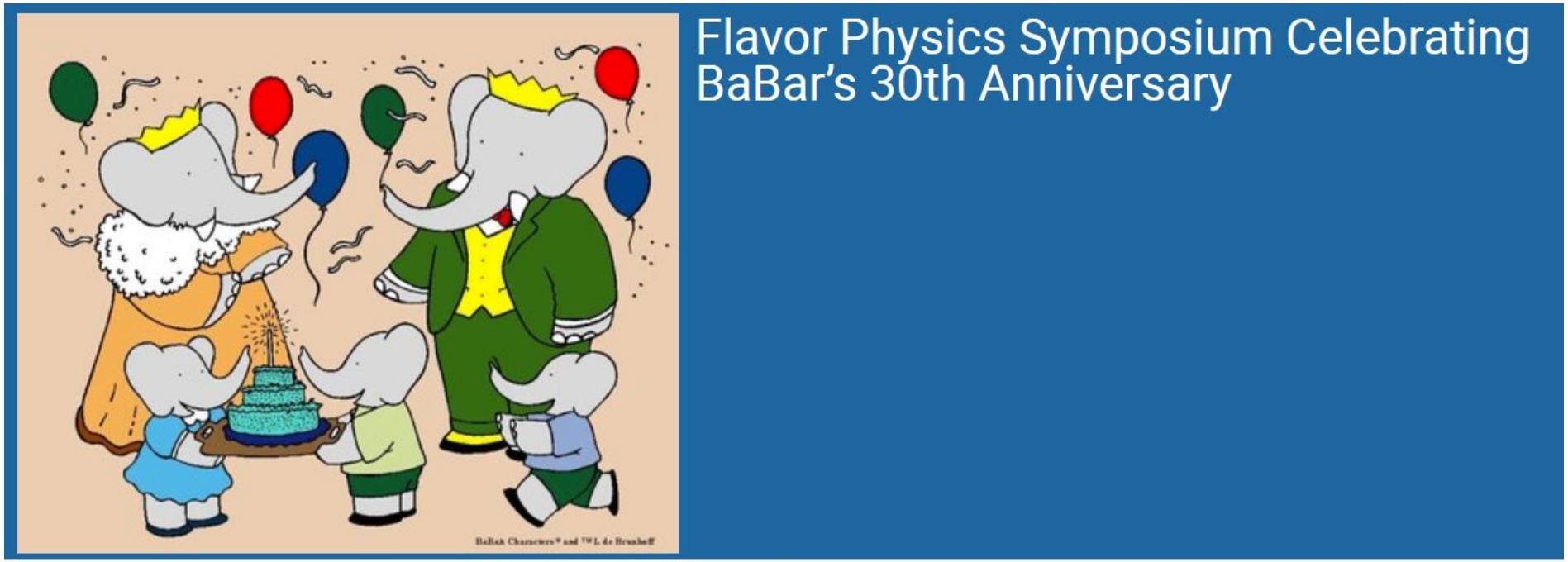


Going from Approval to 1st Physics in 6 years

Jonathan Dorfan

So How In Fact Did We Achieve "Going from Approval to 1st Physics in 6 years"?

- **In case you wish to skip this talk, here is the short answer**

DAMB, WE WERE GOOD……

Or here is Dave Hitlins's take…..

- I think we all realize how remarkable the PEP-II and *BABAR* experience has been
  - We've produced important science that will have a lasting impact
  - We became, in short order, a focused international team that designed and built an innovative experiment (and a high luminosity asymmetric collider) in a remarkably short time

Or Stew Smith ‘s take…..

- Looking back, it’s hard to realize how complex and challenging BaBar was, and yet how quickly it advanced:
  - Just over 5 years from the formal beginning of the collaboration in December 1993 to logging first events in May 1999.
  - Perhaps even more amazing, BaBar was taking data < 5 years from the LOI, and only 4 years from approval of the TDR (> 600 pages).

Panofsky Prize Symposium for Jon and Dave SLAC January 13, 2016

Or HEPAP’s take….

The Path to Global Discovery:
U.S. Leadership and Partnership in Particle Physics

A report from the HEPAP International Benchmarking Subpanel

3.4.1.2 The BABAR experiment Finding: BABAR was a highly successful U.S.-hosted international partnership. The BABAR experiment, which operated at SLAC’s PEP-II B-factory until 2008, was initially host-led. However, it had a high degree of integration of its major international partners (Canada, France, Germany, Italy, and the U.K.).

So How In Fact Did We Achieve "Going from Approval to 1st Physics in 6 years"?

- I believe there were the 4 key success drivers:

1. Preparation/design choices for both the accelerator and the detector were well advanced when approval to proceed was received (Oct 1993)

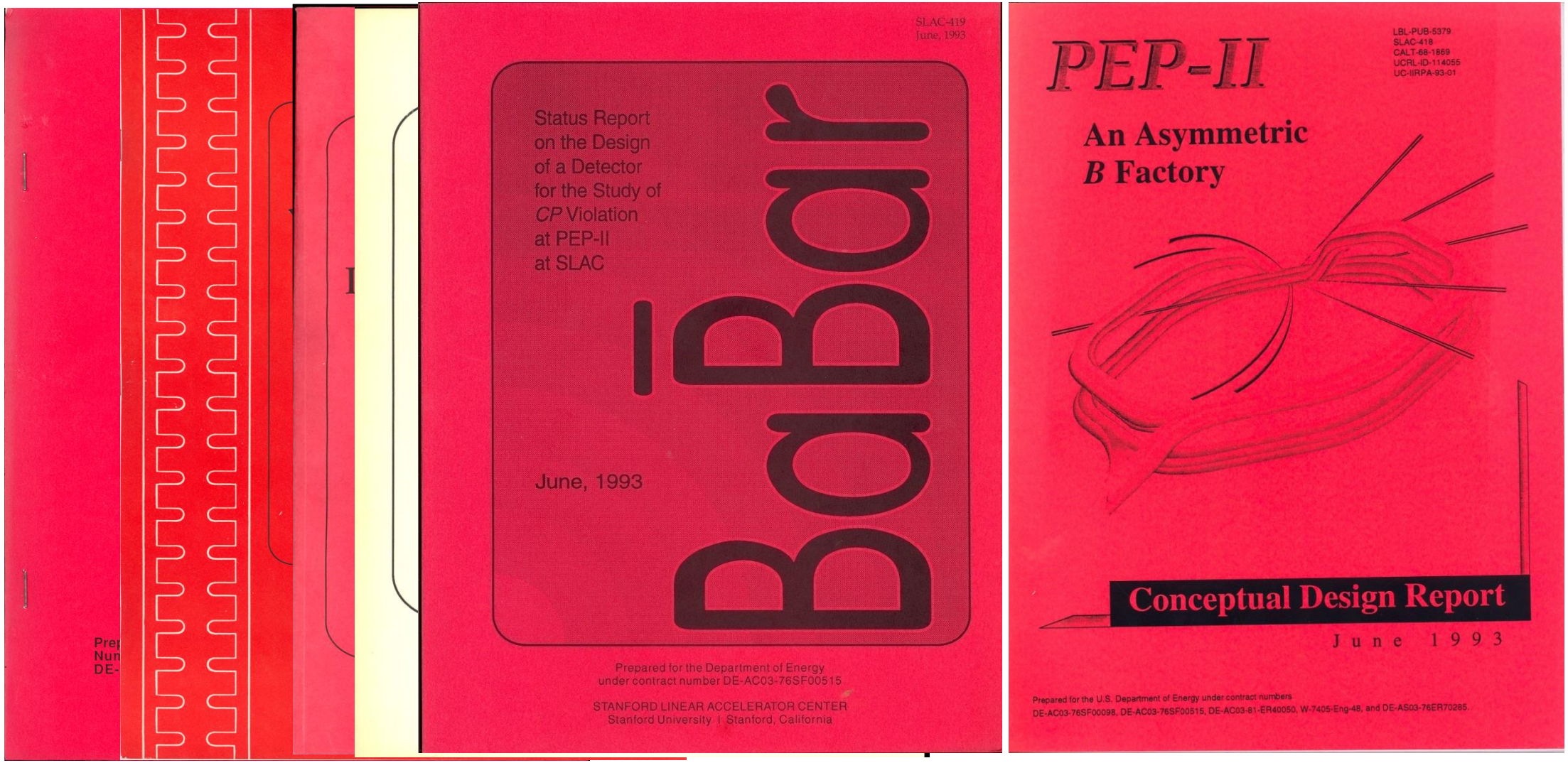
2. The management, organizational and review structures <u>at all levels</u> – US Federal, SLAC, BABAR national agencies, LBNL & LLNL, Babar and PEP-II – were well conceived, pro-active and extremely effective

3. The level and rate of funding adequate to build the accelerator and the detector in a timely way were established quickly and were provided as scheduled

4. Project-threatening national, institutional and/or personal "affronts" were trumped by the passion and commitment to the science

Bottom line – its about the <u>people</u>, and we were rich in both technical and management-savvy overseers and collaborators

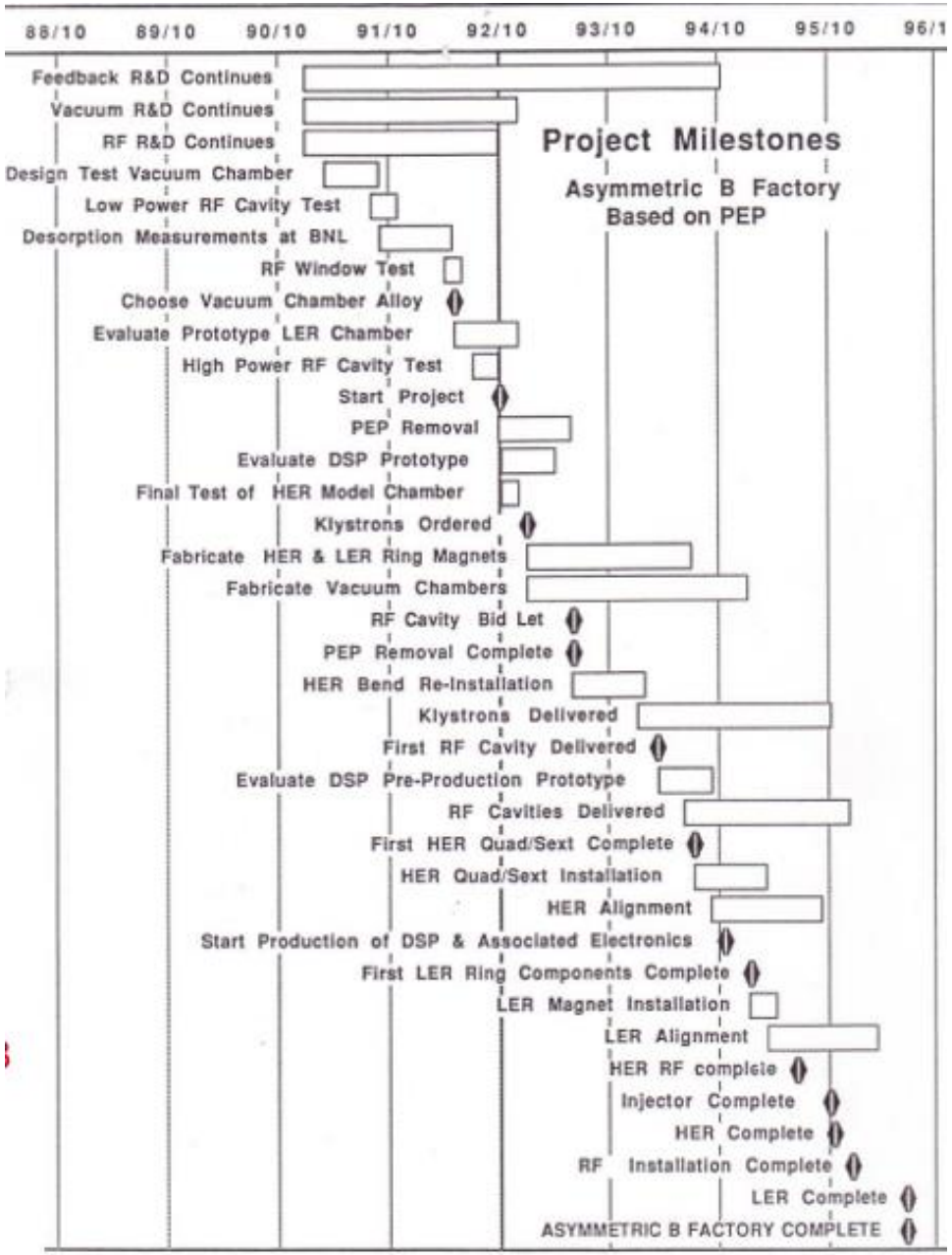
1. **The requirements for construction of both the accelerator and detector were well advanced when approval to proceed was received (Oct 1993)**



June 1993 Companion Construction Blueprints

WE WERE MORE THAN READY TO BEGIN THE TWO PROJECTS

PEP-II Already Had a Mature, Detailed and Reviewed Cost and Schedule in 1991



This schedule: 4 years (1992-1996)
Actual schedule: 4 years (1994-1998)

THE PROJECT COST ESTIMATE RECEIVED A THOROUGH TWO-WEEK GRILLING (REVIEW) AT THE DIRECTOR'S DEMAND. THIS ALSO HELPED TO IMPROVE THE LEVEL OF CONFIDENCE IN THE ESTIMATE.

THE WORKING ESTIMATE IS:

133.8	M$	FOR CONSTRUCTION
33.5	M$	CONTINGENCY(25%)
4.1	M$	INDIRECTS
171.4	**M$**	

THIS IS A 3% INCREASE SINCE THE CDR ESTIMATE. THE ARE THREE CONTRIBUTIONS TO THIS: 1) OMMISIONS (ABOUT A THIRD) 2) "DEEPER" WBS AND 3) MORE UNIFORM APPLICATION OF STANDARD LABOR RATES.

1991 Cost Estimate
Cost at Completion was $177M

License to Unleash the Dogs……

SLAC MEMO

October 4, 1993

To : All Hands

From : Burton Richter

Subject : *B-FACTORY ANNOUNCEMENT*

President Clinton announced this afternoon his recommendation that the proposed *B*-Factory be built at SLAC. This is a dramatic conclusion to our long wait, and I am very happy to share this news with you.

We are hopeful that the process will now continue smoothly, but there are more steps to go. The House has already included funding in its bill. The Senate version just passed does not, but we are optimistic that the joint House-Senate conference committee will restore the funds so the project can start in a few months.

I'm sure all of you have many questions about this good news and how it will affect us. More details are included in my formal press statement, printed on the back. As soon as this Congressional process is complete, I will schedule an All Hands Talk to discuss the *B*-Factory and the rest of the SLAC budget outlook with you.

PEP-II Was Able to Establish Project Mode Quickly

- PEP-II R&D – from 1989 until 1993 - was done as a collaboration of SLAC, LBNL and LLNL. Consequently
  - Transition to an integrated project management team was quick and relatively straight-forward
  - Partitioning of the subsystem tasks followed from the R&D foci
- Jonathan had a lot of freedom and support to recruit the personnel that he wanted (by example, Seeman and Klaisner) and given control over lab. structures (by example co-opting the whole SLAC RF group) to avoid the trap of matrix management constructs
- The Machine-detector Interface group was established well before commencement of the project. Was an invaluable construct

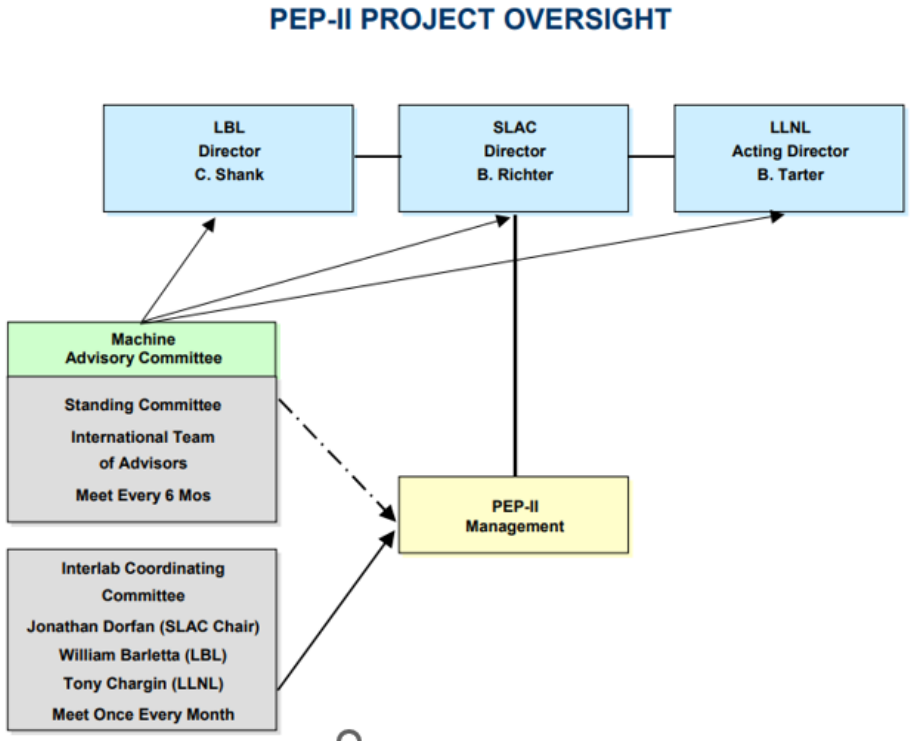
2. The management, organizational and review structures at all levels – US Federal, SLAC, BABAR national agencies, LBNL & LLNL, BABAR and PEP-II – were well conceived, pro-active and extremely effective

SLAC – Burt and David L – advantaged both PEP-II and especially BABAR by establishing entirely new structures. *This really was a sea-change for SLAC .*

a) Burton ensured the success of the SLAC/LBNL/LLNL partnership

Burton Richter's Charge
to the
PEP II Machine Advisory Committee

1) Review the progress of the R&D program and comment on areas where further R&D might be needed.
2) Review the technical design choices.
3) Review and monitor the engineering and construction program for the technical systems and major components.
4) Review the plans and goals for the commissioning of the project.
5) The committee is expected to meet twice a year at SLAC.



2. The management, organizational and review structures at all levels – US Federal, SLAC, BABAR national agencies, LBNL & LLNL, BABAR and PEP-II – were well conceived, pro-active and extremely effective

SLAC – Burt and David L – advantaged both PEP-II and especially BABAR by establishing entirely new structures. *This really was a sea-change for SLAC . They*

b) welcomed and facilitated a large and diverse international team to construct, and operate a complex detector and to generate world-class science

- David L made several crucial moves, borrowing liberally from CERN:
  - Adopted the International Finance Committee (IFC) construct, bringing to the oversight table a senior member from each funding agency. Was an extremely effective group …… came to the rescue many times
  - Created a Common Fund
  - With David H and myself in tow, effectively recruited national partners

David H's summation ……

Embedding PEP-II/*BABAR* at SLAC

- The approach to the new accelerator and detector project within SLAC was, of necessity, different from past practice
  - PEP-II was to be built by a SLAC/LBNL/LLNL collaboration
  - The detector was to follow a "CERN model"
- David Leith laid the groundwork for this new approach to the detector with a number of visits to Europe to study in some detail the CERN model employed for the LEP collaborations, and was able to interest the funding agencies of France, Italy, Germany, the UK and Canada in participating
  - The International Finance Committee managed both the initial investment shares and the ongoing commissioning and operating costs
  - The "Common Fund" was a crucial concept
  - David skillfully managed the IFC meetings:

    A day of meetings with an "exchange of views", followed by a good dinner with adequate liquid refreshment, and a resolution of issues the next day

Common Fund Payments by Country
Spread by US Fiscal Year (K$)

	FY95/ 96	FY97	FY98	FY99	Total Common Fund	Percentage
Canada NSERC		100	100	105	305	2.3%
France CEA	660				660	5.0%
France IN2P3	462		132	66	660	5.0%
Germany BMFT	660			115	775	5.8%
Italy INFN*					1,625	12.2%
UK PPARC		200	390	400	990	7.4%
US DOE	3,578	1,779	2,100	828	8,285	62.3%
Total Common Fund	5,360	2,079	2,722	1,514	13,300	100%

*The effective INFN contribution profile is assumed to follow the profile of the superconducting coil

Summary of BABAR Non-US Finances

(does not include Chinese/Russian in-kind contributions or discounts)

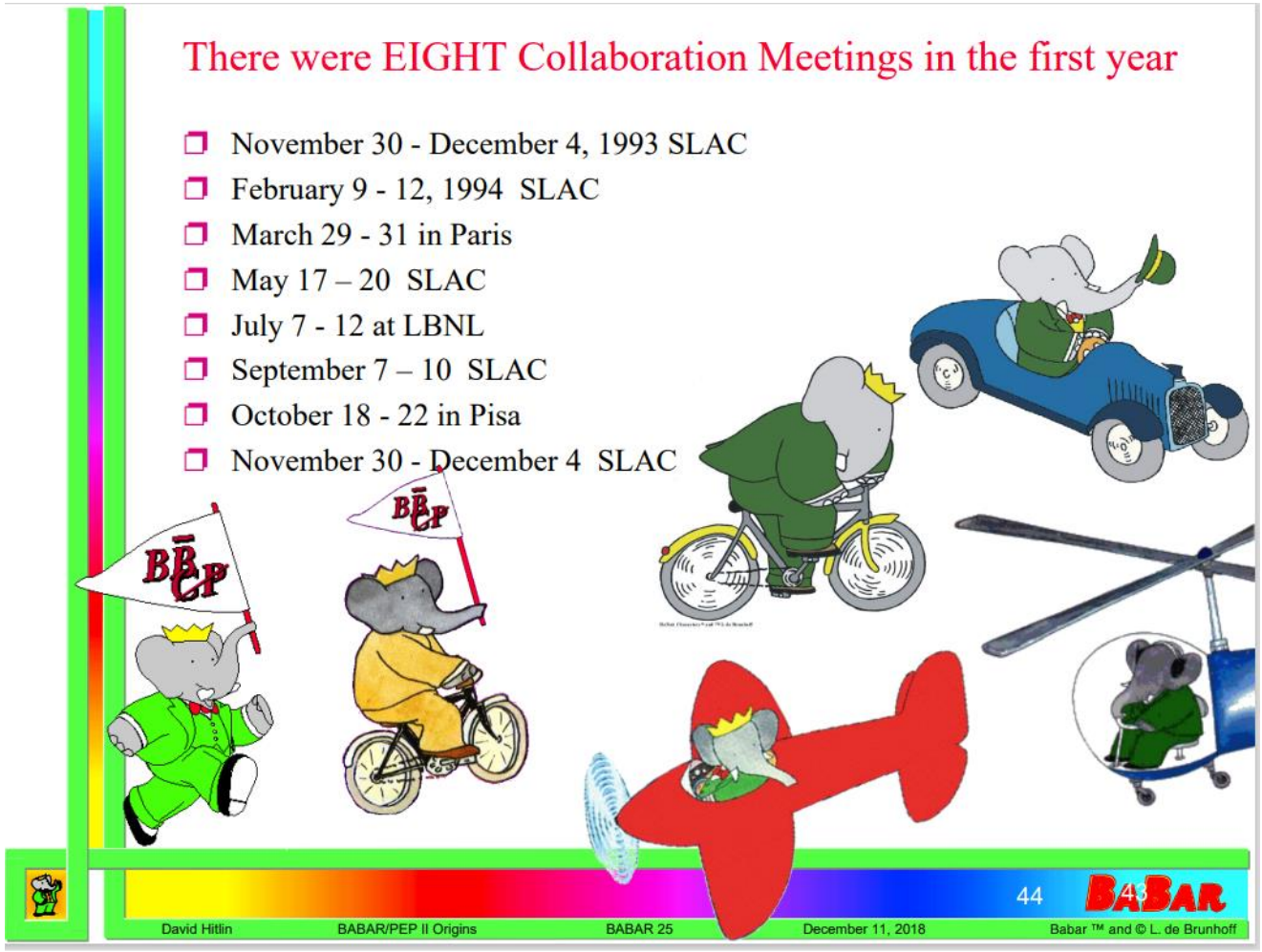
Country	Investment Request	Currency	Investment Request (M$)	Investment Granted (M$)	
Canada*	Total 3.7M	$Canadian	2.76	0	Under discussion
France IN2P3	15M	Franc	2.73	15 M FF	Approved
France CEA	15M	Franc	2.73	15 M FF	Approved
Germany	5M	DM	3.30	2MDM though 97	Good prospects for +3 MDM
Italy	8B	Lire	5.00	8B Lire + SC Coil	Approved
UK	2.475M	£	3.84	2.475 M£	To go to Council
Total M&S in local accounting			**20.35**		
Equivalent total M&S + labor in US acc			**30.53**		

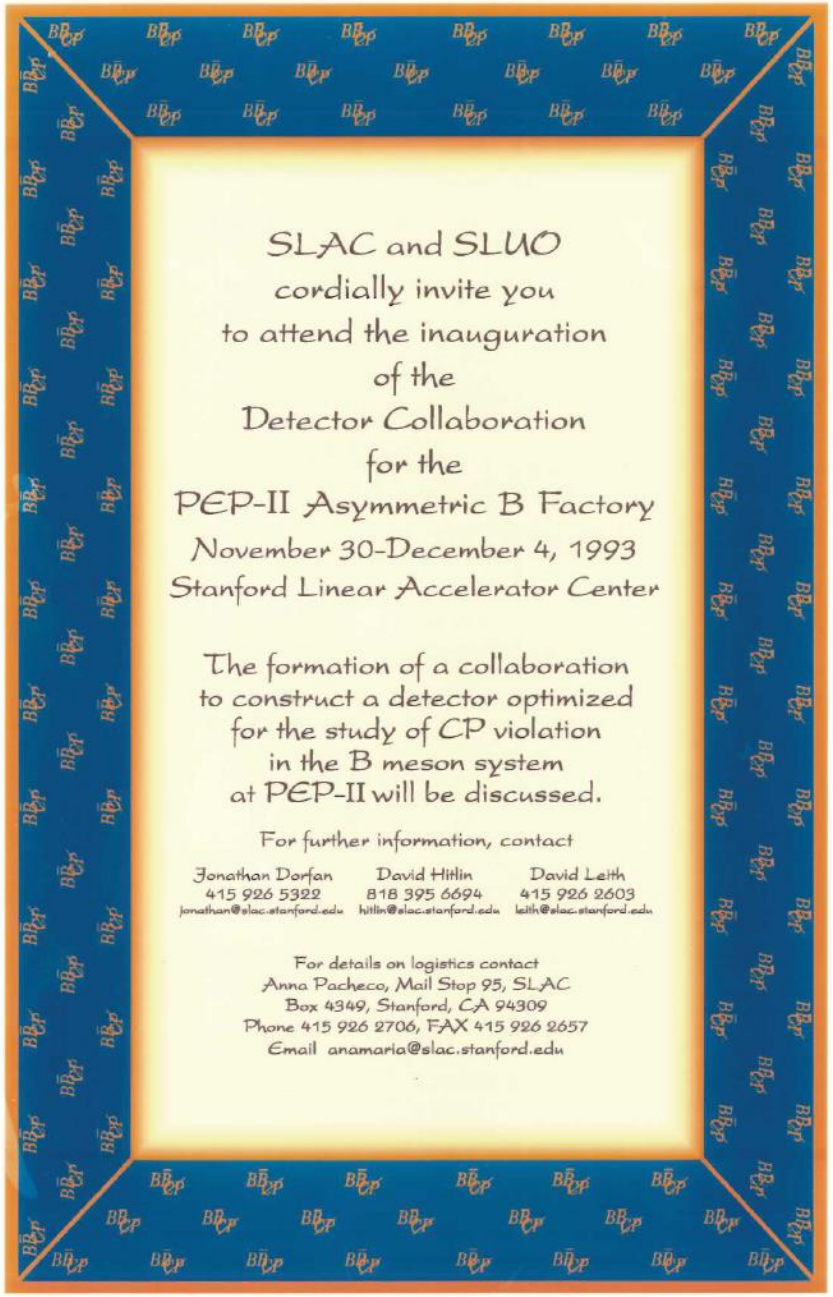
* Canada uses US-style accounting

11/13/95

SLAC Was Ready With a Well Conceived Plan for Forming a Collaboration

- Remarkably, Within 4 months of the Announcement , the BABAR Collaboration Was Formed and Operating





Inauguration of the Detector Collaboration for PEP-II

November 30 - December 4, 1993

Plenary Session/Parallel Session Schedule

Tuesday Nov. 30

8:00 REGISTRATION

9:00 PLENARY

Introduction

15 | Welcome - B. Richter, D. Leith
40 | The PEP-II Collider - J. Dorfan
40 | Physics/Detector Introduction - D. Hitlin

10:30 *Coffee Break*

11:00 PLENARY

Select Subsystem Overviews:

30 | Calorimetry - E. Lorenz
30 | Vertex/Tracking - P. Burchat
30 | Particle ID - R. Aleksan

12:30 *Lunch*

14:00 PLENARY

Collaboration-wide Issues

Collaboration Formation

20 | Introduction - D. Leith
40 | Discussion

15:00 *Coffee Break*

15:30 PARALLEL

Orientation Sessions

	TC1	TC2	OR
15:30 40	*IR*	*Particle ID*	*Trigger-DA*
16:15 40	*Vertex*	*Calorimetry*	*Computing*
17:00 40	*Tracking*	*Magnet-Muon*	*Physics-Simulation*

18:00 MicroWineries - 1

Wine and Cheese Reception

Wednesday Dec. 1

9:00 PARALLEL

Working Groups

TC1 | *Vertex 1*
AUD | *Tracking 1*
OR | *Particle ID 1*
TC2 | *Calorimeter 1*
SCS | *Computing 1*

10:30 *Coffee Break*

11:00 PARALLEL

Working Groups

TC1 | *Joint: IR 1/Vertex 2*
OR | *Particle ID 2*
TC2 | *Calorimeter 2*
AUD | *Tracking 2*
SCS | *Computing 2*

12:30 *Lunch*

14:00 PARALLEL

Working Groups

TC1 | *Joint: Vertex 3/Tracking 3*
TC2 | *Calorimeter 3*
YR | *Magnet-Muon 1*
SCS | *Trigger-DA 1*
OR | *Physics-Simulation 1*

15:30 *Coffee Break*

16:00 PLENARY

Collaboration-wide Issues

Computing

20 | Introduction - F. Porter
40 | Panel Discussion

45 | CP Violation in B Physics - H. Quinn

18:00 MicroWineries - 2

Wine and Cheese Reception

Thursday Dec. 2

9:00 PLENARY

Brief Reports from Working Groups

(10 Minutes/Group)

10:30 *Coffee Break*

11:20 PLENARY

Collaboration-wide Issues

LOI/CDR/Meeting Schedule

20 | Introduction - D. MacFarlane
60 | Panel Discussion

12:30 *Lunch*

14:00 PARALLEL

Working Groups

YR | *IR 2*
TC1 | *Joint: Vertex 4/Trig-DA 2*
OR | *Particle ID 3*
AUD | *Tracking 4*
TC2 | *Calorimeter 4*
SCS | *Joint: Computing 3/Phys-Sim 2*
TC3 | *Magnet-Muon 2*

15:30 *Coffee Break*

16:00 PARALLEL

Working Groups

YR | *IR 3*
TC1 | *Vertex 5*
OR | *Particle ID 4*
AUD | *Joint: Tracking 5/Trig-DA 3*
TC2 | *Calorimeter 5*
SCS | *Computing 4*
TC3 | *Joint: Magnet-Muon 3/Phys-Sim 3*

19:00 *Banquet at Ming's*

Friday Dec. 3

9:00 PARALLEL

Working Groups

YR | *IR 4*
TC1 | *Vertex 6*
AUD | *Tracking 6*
OR | *Particle ID 5*
TC2 | *Joint: Calorimeter 6/Trig-DA 4*
SCS | *Joint: Computing 5/Phys-Sim 4*
TC3 | *Muon-Magnet 4*

10:30 *Coffee Break*

11:00 PARALLEL

Working Groups

YR | *IR 5*
TC1 | *Vertex 7*
OR | *Particle ID 6*
TC2 | *Calorimeter 7*
SCS | *Joint: Trigger-DA 5/Computing 6*

12:30 *Lunch*

14:00 PARALLEL

Working Groups

TC1 | *Joint: Vertex 8/Tracking 7/IR 6*
YR | *Magnet-Muon 5*
TC2 | *Calorimeter 8*
OR | *Trigger/DA 6*
SCS | *Computing 7*

15:30 *Coffee Break*

16:00 PLENARY

Collaboration-wide Issues

Architecture & Integration

20 | The SLD Experience - M. Breidenbach
20 | Electronics Interface and Integration Issues - D. Marlow
50 | Panel Discussion

18:00 MicroWineries - 3

Wine and Cheese Reception

Saturday Dec. 4

9:00 PLENARY

Summaries

15 | IR Summary
15 | Vertex Summary
15 | Tracking Summary
15 | Particle ID Summary
15 | Computing Summary

10:30 *Coffee Break*

11:00 PLENARY

Summaries

15 | Calorimeter Summary
15 | Magnet-Muon Summary
15 | Trigger-DA Summary
15 | Physics-Simulation Summary
15 | Collaboration Issues Summary

12:30 *Adjourn*

14:00 to 18:00

SLUO Annual Meeting

Plenary Sessions are held in the Auditorium

Receptions and Coffee Breaks are held in the Auditorium Breezway

Room Codes

AUD Auditorium
YR Yellow Room (A&E Building)
OR Orange Room (Central Lab)
SCS Rm 369 Computer Center
TCn New Training Center (configurable as n=1-4 rooms)

NN Time allotted for the activity

Status as of 11/29/93

The *BABAR* Collaboration

10 Countries
77 Institutions
485 Collaborators

October 1995

USA [33/244]

California Institute of Technology
UC, Davis
UC, Irvine
UC, Los Angeles
UC, San Diego
UC, Santa Barbara
UC, Santa Cruz
U of Cincinnati
U of Colorado
Colorado State
U of Iowa
Iowa State U
LBNL
LLNL
U of Louisville
U of Maryland
U of Massachusetts, Amherst
MIT
U of Mississippi
Mount Holyoke College
Northern Kentucky U
U of Notre Dame
ORNL/Y-12
U of Pennsylvania
Prairie View A&M
Princeton
Rutgers
SLAC
U of South Carolina
Stanford U
U of Texas at Dallas
Vanderbilt
U of Wisconsin

Canada [7/25]

U of British Columbia
Carleton U and CRPP
McGill U
U de Montréal
TRIUMF
U of Victoria
York U

China [4/19]

Beijing Glass Research Inst.
Inst. of High Energy Physics, Beijing
Shanghai Inst. of Ceramics (SICCAS)
Tsinghua U, Beijing

France [5/44]

LAPP, Annecy
LAL Orsay
LPNHE des Universités Paris 6/7
Ecole Polytechnique
CEA, DAPNIA, CE-Saclay

Germany [1/7]

Technische U Dresden

Italy [13/72]

INFN, Bari and U di Bari
INFN, Ferrara
Lab. Nazionali di Frascati dell' INFN
INFN, Genova and U di Genova
INFN, Milano and U di Milano
INFN, Napoli and U di Napoli
INFN, Padova
U di Pavia
INFN, Pisa, U di Pisa & Scuola Normale
INFN, Roma and U "La Sapienza"
INFN, Superiore di Sanita', Roma
INFN, Torino and U di Torino
INFN, Trieste and U di Trieste

Norway [1/1]

U of Bergen

Russia [2/28]

Budker Institute, Novosibirsk
JINR, Dubna

United Kingdom [10/42]

U of Bristol
Brunel University
U of Edinburgh
U of Lancaster
U of Liverpool
Imperial College
Queen Mary & Westfield College
Royal Holloway & Bedford New College
U of Manchester
Rutherford Appleton Laboratory

Taiwan [1/3]

Academia Sinica

Wise Leadership Rapidly Established an Effective Management Construct

Project Management

Spokesman - D. Hitlin
Deputy Spokesman - R. Aleksan
Technical Coordinator - V. Lüth
Project Engineer - R. Bell

Collaboration Council

Chairman - L. Piemontese
Vice-Chairman - R. Wilson

Institution Representatives

Technical Board

Technical Coordinator (Chairman) - V. Lüth
Project Engineer - R. Bell
Chief Electronics Engineer - G. Haller
Chief Software Engineer - D. Quarrie
Integration Physicist - H. Lynch
PEP-II Representative - J. Dorfan
Safety Officer - F. O'Neill
Spokesman - *D. Hitlin*
Deputy Spokesman - *R. Aleksan*
System Managers:
PEP-II/BABAR Interface - H. DeStaebler
Vertex Detector - F. Forti/N. Roe
Drift Chamber - D. MacFarlane
DIRC PID - G. London/B. Ratcliff
Aerogel PID - Y. Karyotakis
CsI Calorimeter - R. Schindler
IFR - C. Sciacca
Magnet - R. Bell
Electronics - A. Lankford
Computing - N. Geddes/F. Porter

Executive Board

Canada - P. Taras
France - G. Wormser
Germany - K. Schubert
Italy - M. Giorgi
UK - J. Fry
US - K. McDonald
US - A. Seiden
US - M. Witherell
SLAC/US - W. Innis
LBL/US - M. Pripstein
Spokesman - *D. Hitlin*
Deputy Spokesman - *R. Aleksan*
Technical Coordinator - *V. Lüth*
PEP-II - *J. Dorfan*

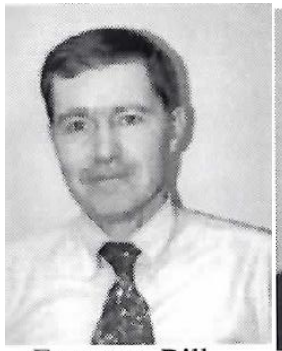
The Sponsor : DOE: They Performed Exceptionally Well

John O'Fallen: The believer

Danny Lehman: Uber "Auditor"

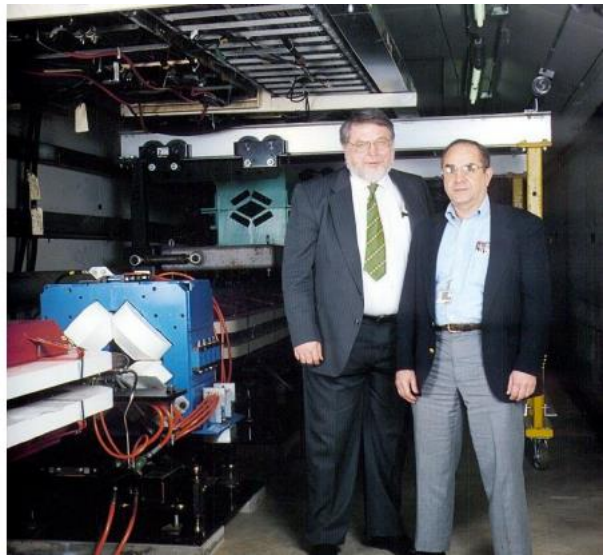
PEP-II On-Site Oversight Office

Reilly, Kevin



Franzwa, Bill

Treacy, David



Dave Sutter with John

3. The level and rate of funding adequate to build the accelerator and the detector in a timely way were established quickly and were provided as scheduled

Annex IV

Figure II-7.3
Revised April 1994

Department of Energy
1996 FIELD BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
High Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars)

1.	**Title and Location of Project:**	PEP-II B Factory Joint Project of SLAC, LBL, and LLNL Stanford Linear Accelerator Center Menlo Park, California	2a. 2b.	**Project No:** 94-G-304 Construction Funded
3a.	**Date A-E Initiated:** 1st Qtr. FY1994		5.	**Previous Cost Estimate:** TEC $177,000 TPC $293,200
3b.	**A-E Work Duration:** 30 Months			**Date of Estimate:** June 1993
4a.	**Date Physical Construction Starts:** 1st Qtr. FY1994		6.	**Current Cost Estimate:** TEC: $ 177,000 TPC: $ 293,200
4b.	**Date Construction Ends:** 4th Qtr. FY1998			**Date of Estimate:** April 1994

7. **Financial Schedule:**

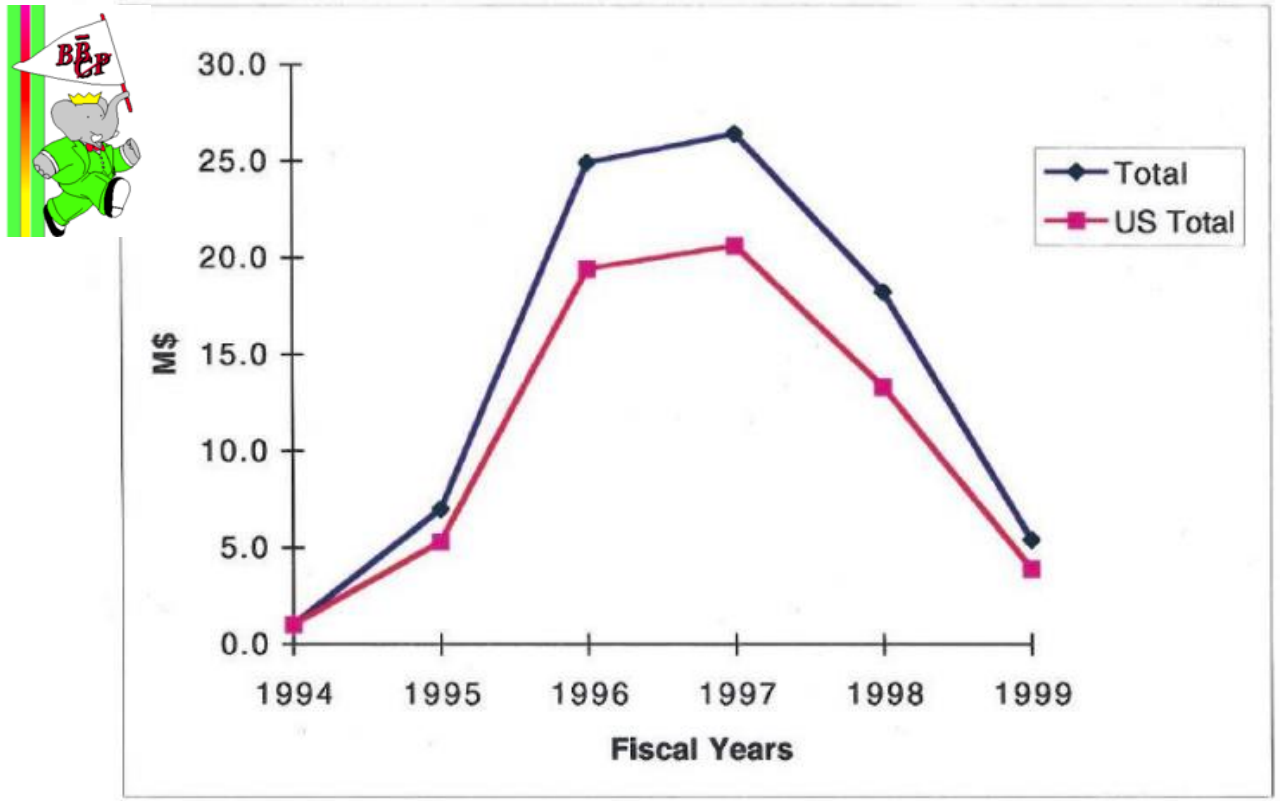
Fiscal Year	Appropriations	Obligations	Costs
1994	$ 36,000	$ 36,000	$ 27,000
1995	44,000	44,000	42,000
1996	52,000	52,000	50,000
1997	45,000	45,000	47,000
1998	0	0	11,000
Total:	$ 177,000	$ 177,000	$ 177,000

PEP-II: April 1994
Field Project Request was already complete

Funding profile as requested: received exactly as planned. A gift for a project

3. The level and rate of funding adequate to build the accelerator and the detector in a timely way were established quickly and were provided pretty much as scheduled

The funding profile allowed us to have a "technically limited" schedule



	1994	1995	1996	1997	1998	1999	Sum
Total	1.0	7	24.9	26.4	18.2	5.4	82.9
US Total	1.0	5.3	19.4	20.6	13.3	3.9	63.5

2. The management, organizational and review structures at all levels – US Federal, SLAC, Babar national agencies, LBNL & LLNL, BABAR and PEP-II – were well conceived, pro-active and extremely effective

DOE dragged us "kicking and screaming" into using a sophisticated Project Management Control System (PMCS) and associated tools. The engineers at all institutions railed against the notion (and considerable work) of pre-programming their design and construction schedule and associated costs.

The system we adopted, and in particular the "sane" manner by which we used it, was one of the key reasons we finished PEP-II and BABAR on time and on budget

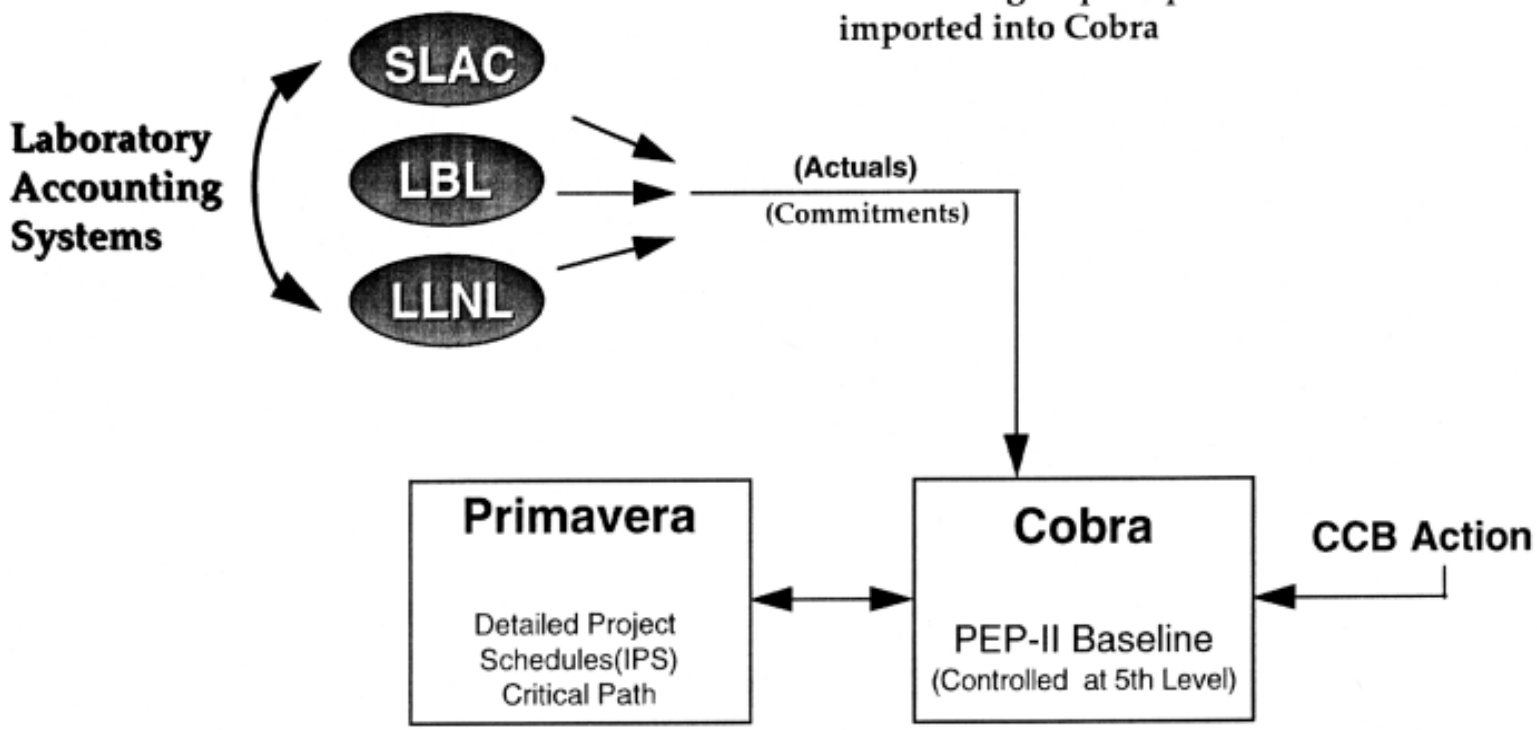
- The ability for the system to quantify lack of progress and to pinpoint the problem area(s) allowed for proactive remediation
- The Change Control process provided an even-handed, well justified application of contingency funds

Project Management Control System

Transfer of Accounting Costs to the PMCS System

Actual cost and commitments are collected by the three labs at the 5th level of the PEP-II WBS

Accounting files are transferred electronically to the PMCS group in specific ASCII format and imported into Cobra



Example of How the PMCS Indicated Trouble – Yet Was Also the Tool To Get Back on Track

BABAR All subsystems as of the end of April 1996

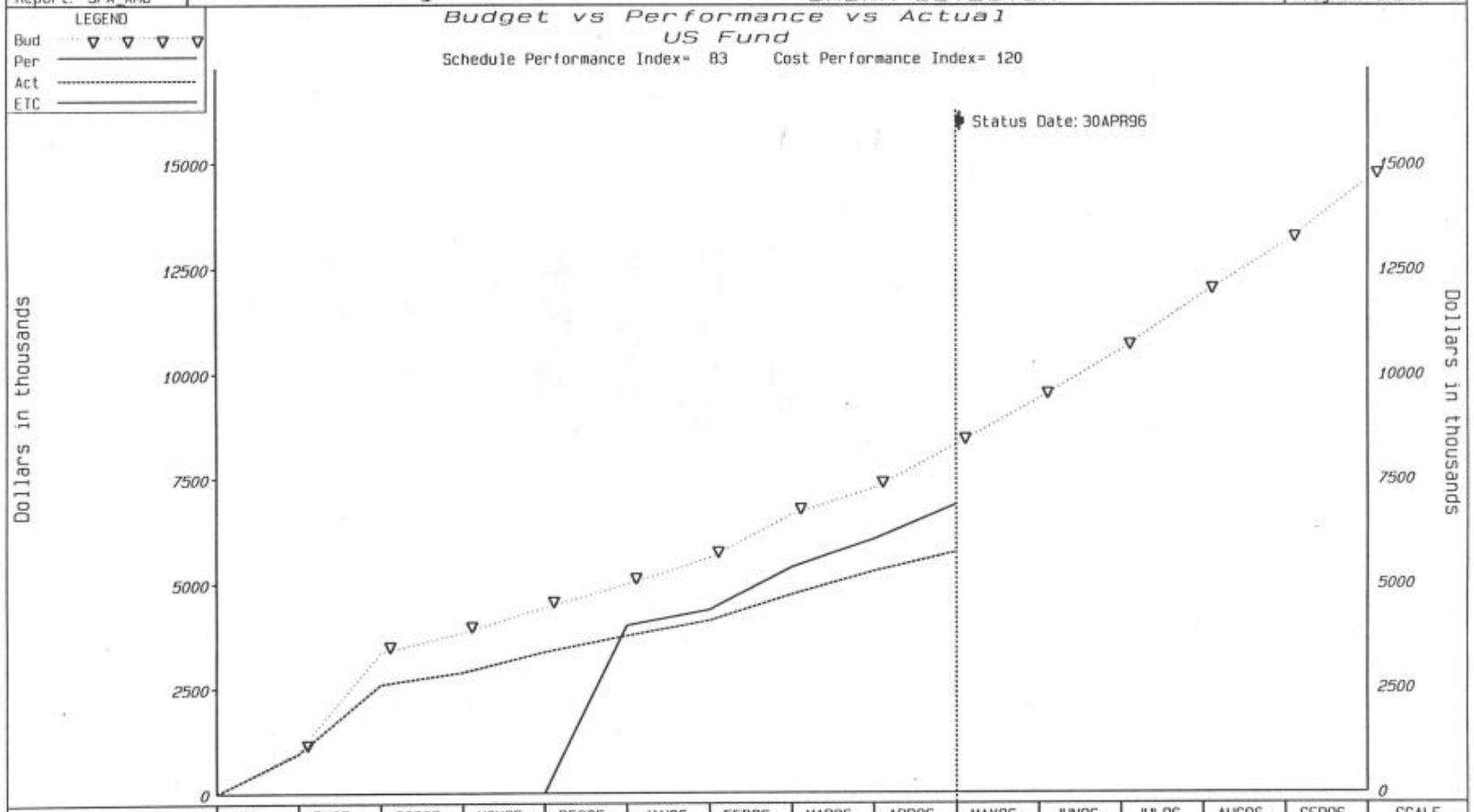
COBRA (R)
Report: SPA_XMB

BABAR PROJECT
1 BABAR DETECTOR

Date: 23MAY96
Program: BABAR

Budget vs Performance vs Actual
US Fund

Schedule Performance Index= 83 Cost Performance Index= 120



	TDR	FY95	OCT95	NOV95	DEC95	JAN96	FEB96	MAR96	APR96	MAY96	JUN96	JUL96	AUG96	SEP96	SCALE
Budget	1,000	3,348	3,827	4,418	4,973	5,593	6,627	7,255	8,302	9,384	10,557	11,889	13,104	14,623	K$
Performance	0	0	0	0	3,999	4,367	5,380	6,044	6,873						K$
Actual/Forecast	940	2,591	2,879	3,363	3,751	4,109	4,728	5,283	5,737						K$
Schedule Variance	-1,000	-3,348	-3,827	-4,418	-974	-1,226	-1,247	-1,211	-1,429						K$
Cost Variance	-940	-2,591	-2,879	-3,363	248	258	652	761	1,136						K$

Schedule Variance = Perf-Budg Cost Variance = Perf-Actual Schedule Performance Index= Perf/Budg Cost Performance Index= Perf/Actual

*** Prepared by BaBar Cost & Schedule Group ***

Schedule variance was $1.4M
Cost variance was $1.1M

BABAR Common Funds as of the end of April 1996

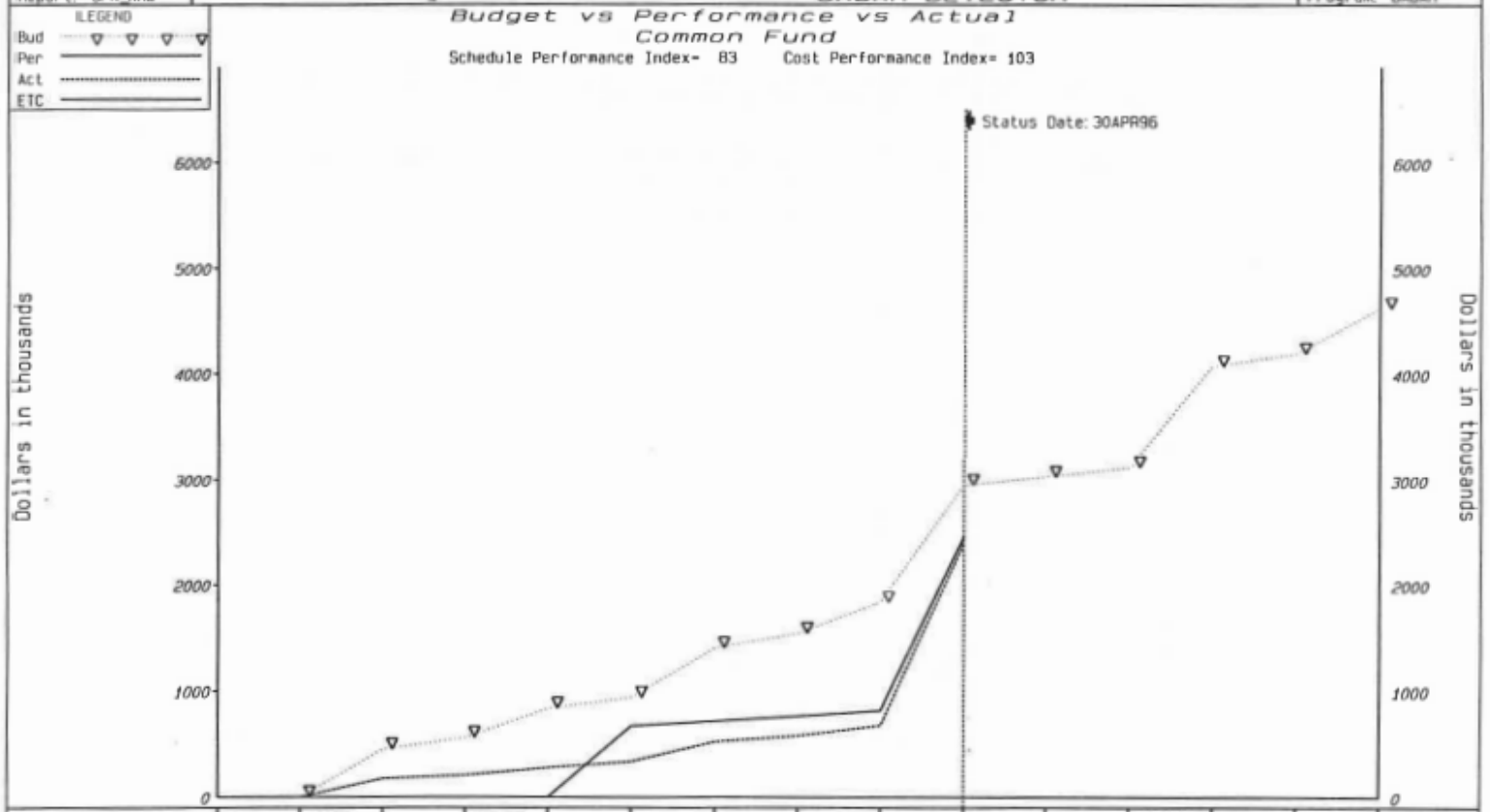
COBRA (R)
Report: SPA_XMB

BABAR PROJECT
1 BABAR DETECTOR

Date: 23MAY96
Program: BABAR

Budget vs Performance vs Actual
Common Fund

Schedule Performance Index= 83 Cost Performance Index= 103



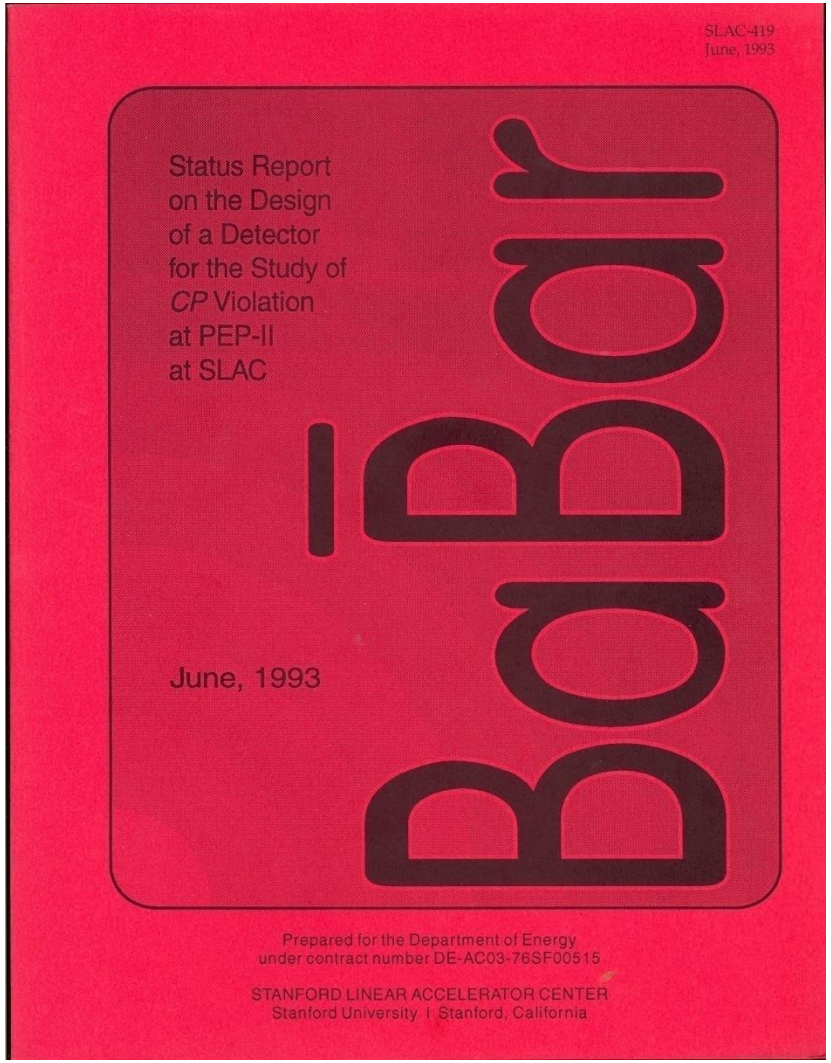
	TOA	FY95	OCT95	NOV95	DEC95	JAN96	FEB96	MAR96	APR96	MAY96	JUN96	JUL96	AUG96	SEP96	SCALE
Budget	0	447	556	833	938	1,404	1,542	1,840	2,948	3,029	3,121	4,076	4,199	4,630	K$
Performance	0	0	0	0	668	713	764	814	2,456						K$
Actual/Forecast	0	173	207	276	335	520	578	671	2,392						K$
Schedule Variance	0	- 447	- 556	- 833	- 270	- 691	- 778	-1,026	- 492						K$
Cost Variance	0	- 173	- 207	- 276	333	193	186	143	64						K$

Schedule Variance = Perf-Budg Cost Variance = Perf-Actual Schedule Performance Index= Perf/Budg Cost Performance Index= Perf/Actual

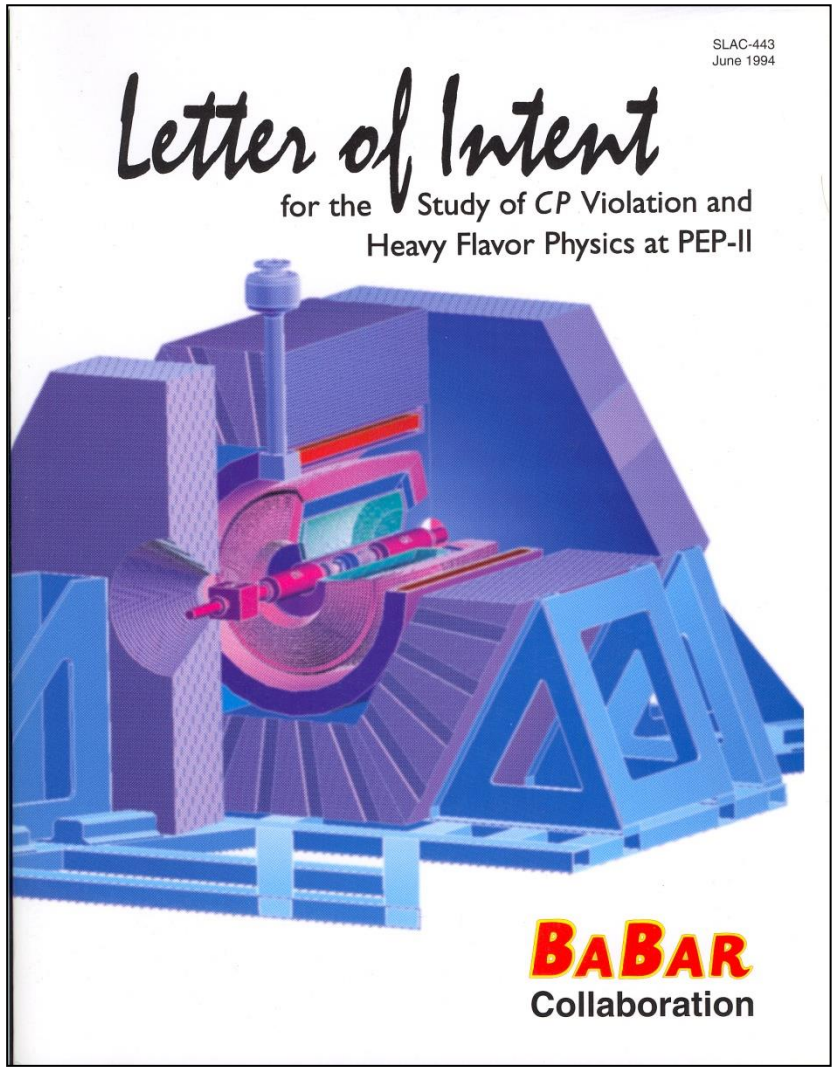
*** Prepared by BaBar Cost & Schedule Group ***

Schedule variance was $492K
Cost variance was $64K

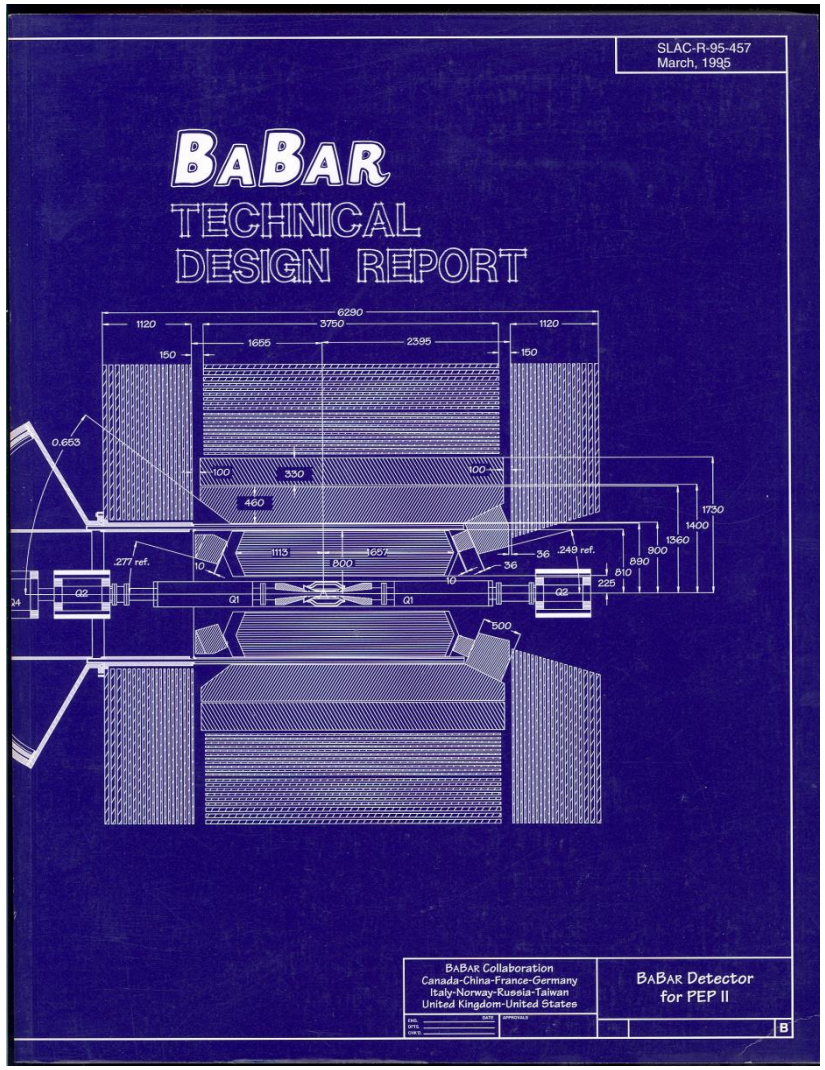
From Formation of the Collaboration to TDR in 15 Months



June 1993
Pre-dates the Collab.



June 1994



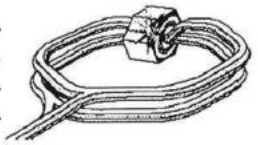
March 1995

Both PEP-II and BABAR benefitted from Tough-minded, but Helpful Oversight

Danny Lehman: Bi-annual reviews

Gil Gilchriese: Chair SLAC Committee

PEP-II *B*-Factory



Machine Advisory Committee Membership

Chairman:	
Ferdi Willeke	(DESY)
Committee Members:	
Daniel Boussard	(CERN)
Joe Bisognano	(CEBAF)
Nicolai Dikansky	(BINP)
John Galayda	(ANL)
Oswald Grobner	(CERN)
Don Hartill	(Cornell)
Albert Hofmann	(CERN)
Shin-Ichi Kurokawa	(KEK)
Katsunobu Oide	(KEK)
Dave Rice	(Cornell)
Ralph Eichler	(ETH/PSI)

Both projects absorbed the critical input proactively – hence the benefit

4. Project-threatening national, institutional and/or personal "affronts" were trumped by the passion and commitment to the science

- Inevitably, there were very challenging decisions, choices between competing options, recovery from unanticipated events, personnel assignment changes, …
- Remediation often meant national, institutional (Lab.) and/or personal anguish, disappointment that at times threatened collaborative stability
- Both BABAR and PEP-II had to deal with such challenges. It was to the credit of the senior managers in both projects that in most cases, supportive and project-strengthening solutions were found

4. Project-threatening national, institutional and/or personal "affronts" were trumped by the passion and commitment to the science

Examples (by no means exhaustive) of some such events for BABAR

- Computing:
  - To use Object Oriented or not
  - The Objectivity dilemma
- Particle ID:
  - fast RICH or DIRC (1994 Pisa meeting)
  - Forward Aerogel
  - Staged bar installation
- Tracking:
  - Small radius TPC
  - Loss of Canadian funding
  - Curved or flat endplates

4. Project-threatening national, institutional and/or personal "affronts" were trumped by the passion and commitment to the science

Examples (by no means exhaustive) of some such events for BABAR

- DAQ
  - Who was responsible for the front end electronics: the Electronics System or the detector subsystems
  - Loss of the ROM (common to all subsystems) engineer
- Magnet, installation
  - Metallic slivers – BR insisted we design a warm
  - Ansaldo ran late – Sid Drell and US Air Force sa
- SVT
  - Honeywell ATOM chip oscillation

Solenoid loading at the Genova airport

4. Project-threatening national, institutional and/or personal "affronts" were trumped by the passion and commitment to the science

Examples (by no means exhaustive) of some such events for PEP-II

- RF
  - Matrix to SLAC RF group or co-opt the group into PEP-I
  - Missed Level 2 Milestone (Klystrons were late)
  - Build back-up Klystrons or not

- Vacuum
  - Continuous fabrication issues at all three labs
  - Outsource e-beam welding or not

- Low Energy Ring
  - 1997 – schedule buster. Changed out system manager and moved majority of chamber fabrication to SLAC

2. The management ……were well conceived, pro-active and extremely effective

- Pro-active schedule management was a key:
  - The best way to control cost is to stay on schedule. This often meant added expenditures in the short term – use the Change Control process to apply contingency wisely
  - The excuse that the PMCS data was wrong was unacceptable
  - No “odd man out scheduling”. Did not allow sub-systems to slip their schedule because another system had slipped
  - If there was a schedule slip, required the system manager to provide a rework that regained the lost time

2. The management ……were well conceived, pro-active and extremely effective

- Aggressive, bold, pro-active response to problems was also key:

  - Don't procrastinate on hard decisions:
    - Move key areas of work/fabrication from Lab./collaborator/nation to another if necessary
      - Many examples for BABAR
      - Likewise for PEP-II. Two of many exmaples….
        - 1997 – schedule buster. Changed out LER system manager and moved majority of chamber fabrication to SLAC
        - Late recognition that the LER had locations where the aperture was too restrictive. Use active beam control or redesign and rebuild the components?
        - Beijing factory failed with LER magnets. Had to move the entire production to Shanghai

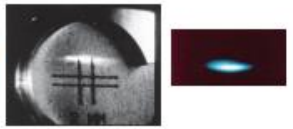
2. The management ……were well conceived, pro-active and extremely effective

- Aggressive, bold, pro-active response to problems was also key:
  - Intercede actively/cooperatively with struggling vendors
    - Almost every BABAR subsystem had a person actively attached to the vendor location
      - Magnet, vertex, Calorimeter, DIRC
  - DIRC was the most extreme case of endless and “heavy” vendor support, even to the extent that we redesigned and helped run the bar production line

The “end game” was Outstandingly Managed

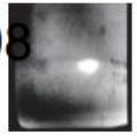
- Staged commissioning of PEP-II meant that we got out ahead of technical and operational issues.,

Strategy of *Staged Completion and testing* of the major subcomponents with real beam

e^- (e^+) at end of New Injection Lines: Oct ’95 (97) 

e- beam through 1/3 of HER : May ‘97 

Stored e- beam in High Energy Ring: June ‘97 

e+ beam to Low Energy Ring Arc 7 Temp. Dump: Jan 98 

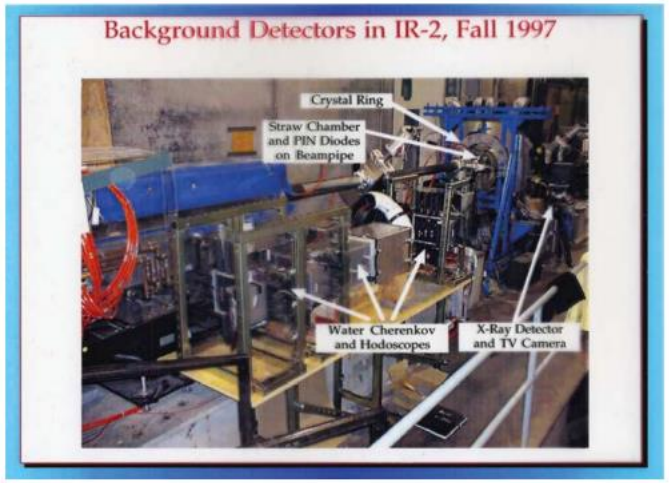
The “end game” was Outstandingly Managed

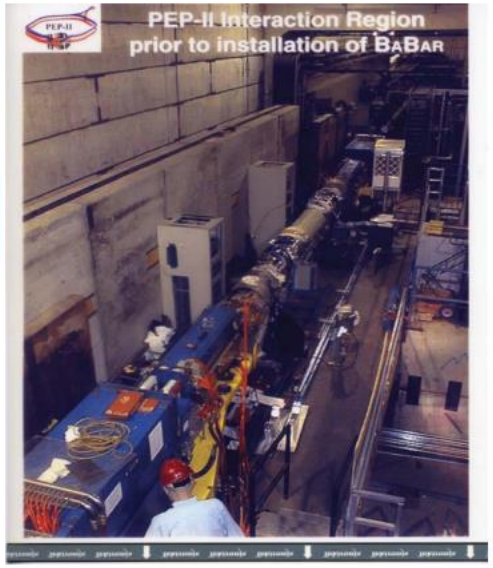
- BABAR: Constant rework of the installation scheduling of the subsystems and their sub-components
  - Best example is the staging of the DIRC bars

- Despite the heroic Monte Carlo simulation of machine related backgrounds, a major effort was mounted to build active devices to measure backgrounds.

- This effort accelerated the first data timeline considerably

Measure/Characterize the backgrounds before Babar moved on line





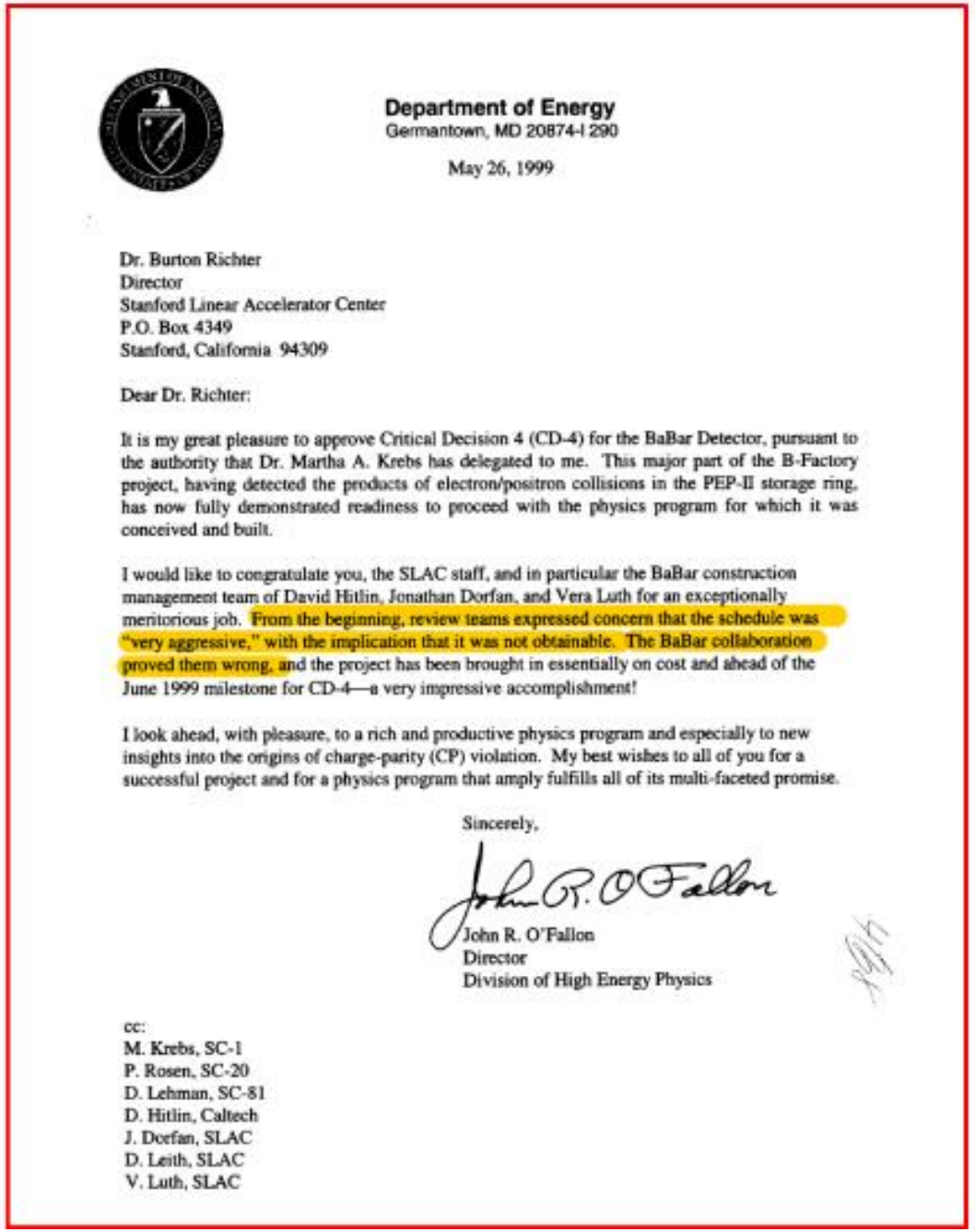
Background Detectors and Groups

Detector	Purpose	Groups
Solid State X-Ray Spectrometer	Synchrotron radiation spectrum	Colorado State U. + LBL
Silicon Diode Stacks	SR, lost-particle rate near beam pipe	Stanford U.
Straw Chamber (from Crystal Ball)	Lost-particles in tracking chamber	SLAC, Tennesee, Ecole Polytechnique
Scanning Crystal Ring	MeV photons from lost-particle showers	LAPP (Annecy) + Saclay (France)
Water Cherenkov + Scintillator Hodoscope	BaBar DIRC backgrounds	U. Cincinnati + LBL
Mini Time Projection Chamber	High-granularity tracking chamber near beam pipe	Orsay (France) +LBL + U. Cincinnati
Silicon Strip Detector (BaBar prototype)	SR, lost particles next to beam pipe	UCSD+UCSC+UCSB + LBL + INFN + ...
Calorimeter Module (BaBar prototype)	Energetic photons, tracks (>100 MeV)	SLAC

The Talent Pool – at all levels – Was Central
Likewise the “esprit de corps”

- We benefitted form a plethora of technical and management talent, who while dedicated to excellence, were also practical minded

- Strong-minded individuals – absolutely. But passion to build the best machine and to do ground-breaking physics trumped all



Department of Energy
Germantown, MD 20874-1290

May 26, 1999

Dr. Burton Richter
Director
Stanford Linear Accelerator Center
P.O. Box 4349
Stanford, California 94309

Dear Dr. Richter:

It is my great pleasure to approve Critical Decision 4 (CD-4) for the BaBar Detector, pursuant to the authority that Dr. Martha A. Krebs has delegated to me. This major part of the B-Factory project, having detected the products of electron/positron collisions in the PEP-II storage ring, has now fully demonstrated readiness to proceed with the physics program for which it was conceived and built.

I would like to congratulate you, the SLAC staff, and in particular the BaBar construction management team of David Hitlin, Jonathan Dorfan, and Vera Luth for an exceptionally meritorious job. From the beginning, review teams expressed concern that the schedule was "very aggressive," with the implication that it was not obtainable. The BaBar collaboration proved them wrong, and the project has been brought in essentially on cost and ahead of the June 1999 milestone for CD-4—a very impressive accomplishment!

I look ahead, with pleasure, to a rich and productive physics program and especially to new insights into the origins of charge-parity (CP) violation. My best wishes to all of you for a successful project and for a physics program that amply fulfills all of its multi-faceted promise.

Sincerely,

John R. O'Fallon
Director
Division of High Energy Physics

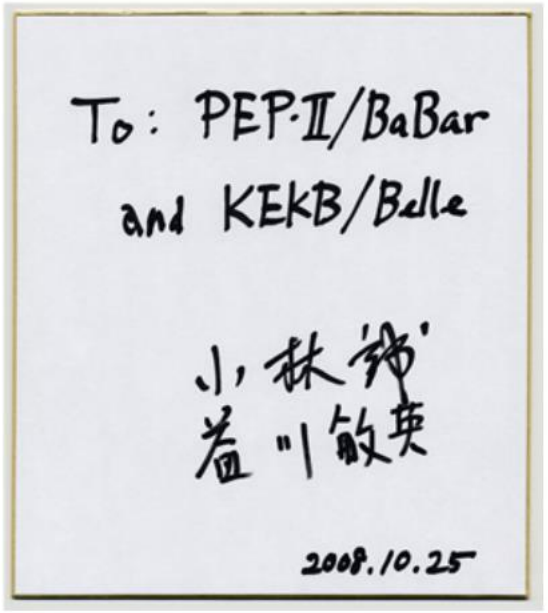
cc:
M. Krebs, SC-1
P. Rosen, SC-20
D. Lehman, SC-81
D. Hitlin, Caltech
J. Dorfan, SLAC
D. Leith, SLAC
V. Luth, SLAC

May 26 1999 letter of commendation from John O'Fallon for the "exceptionally meritorious job. From the beginning,review teams expressed concern that the schedule was "very aggressive" with the implication that it was not obtainable.]The Babar collaboration proved them wrong,…."

So How In Fact Did We Achieve "Going from Approval to 1st Physics in 6 years"?

I Said: "I believe there were the 4 key success drivers:

Well of course, there was an additional, critical driver



Kobayashi and Maskawa wrote: *"Please accept our deepest respect for the B-factory achievements. In particular, the high-precision measurement of CP violation and the determination of the mixing parameters are great accomplishments, without which we would not have been able to earn the Prize."* Japanese translated: first line (three characters) reads "Ko Bayashi Makoto". The second line (four characters) reads "Masu Kawa Toshi Hide".

COMPETITION

This presentation is dedicated to the memory of colleagues whose contributions to the SLAC B Factory were invaluable


Burt Richter

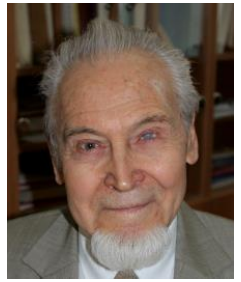

Bob Bell


Bill Davies White


Mike Zisman


Hobey DeStaebler

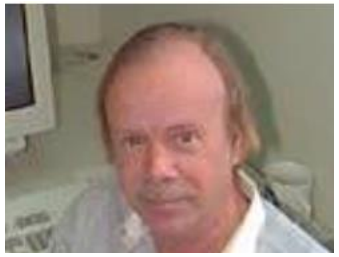

John Rees


Alexei Onuchin


Popat Patel


Roy Schwitters


Maurizio Lo Vetere


Paul Kunz


Uriel Nauenberg


Roy Kerth


Cesare Voci


Bernhard Spaan

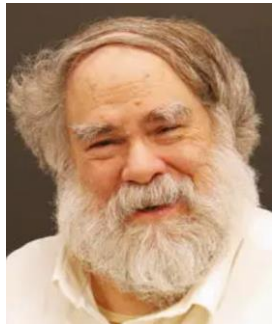

Olga Igonkina


Erwin Gabathuler


David Leith

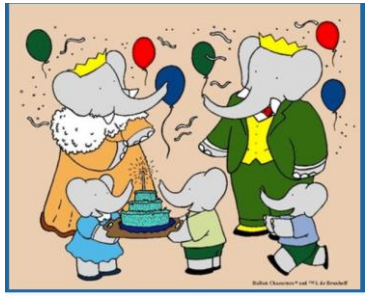

Ewan Paterson


Bill Dunwoodie


Donald Summers


Till Karbach

Livio Piemontese
Alessandra Mazzone
Giancarlo Piredda
Walt Innes
Maurice Benayoun
Torsten Schroeder



Extra Material

The Path to Global Discovery: U.S. Leadership and Partnership in Particle Physics

A report from the HEPAP International Benchmarking Subpanel

3.4.1.2 The BABAR experiment Finding: BABAR was a highly successful U.S.-hosted international partnership. The BABAR experiment, which operated at SLAC's PEP-II B-factory until 2008, was initially host-led. However, it had a high degree of integration of its major international partners (Canada, France, Germany, Italy, and the U.K.). BABAR's founders sought to establish an international collaboration according to the CERN model. They sought and embraced international collaborators and their funding agencies very early in BABAR's inception. The full international collaboration was involved from the beginning in developing the conceptual design of the experiment and in establishing its governance structure. The governance structure of BABAR reflected its strong international partnership. The collaboration had a governance structure in which all partners were equal and collaboration leadership that was elected by the collaboration members. BABAR Project Management consisted of the Spokesperson, Deputy Spokesperson, Technical Coordinator, and Project Engineer. The Spokesperson, Deputy Spokesperson, and Technical Coordinator were elected by the Collaboration Council, consisting of representatives of collaborating institutions, and the Project Engineer was appointed. BABAR's governance structure incorporated an IFC (International Finance Committee) composed of partner funding agencies which provided not only project oversight but also served as a forum for finding shared solutions to challenges arising during experiment construction, operations, and upgrades. BABAR's IFC functioned similarly to the RRBs of the LHC experiments at CERN. The BABAR IFC was notable for its degree of engagement. The partners in BABAR also established and contributed to a common funds which paid for some infrastructure-like items. All partners found BABAR's shared governance and shared responsibility to be very successful, and the scientific success of BABAR is widely recognized.

PEP-II Organization