



# **US LHC Accelerator Research Program**

***bnl - fnal- lbnl - slac***

## Beam Commissioning

E. Harms/FNAL



# Beam Commissioning Outline

- LARP/Beam Commissioning Goals
- Activities and Budget
  - FY2004
  - FY2005
  - FY2006 and beyond
- Summary



# Beam Commissioning Goals

- Full-time U.S presence during LHC commissioning
- Share expertise of commissioning and operating superconducting accelerators
- Commission and train CERN personnel on U.S.-provided instrumentation
- Enhance U.S. accelerator expertise

*Beam commissioning in this context is defined as activities of a more general nature. Electron cloud, collimation, etc. are not included here.*



# Beam Commissioning Goals

Accelerator Systems Milestones

June 14, 2004

	FY04			FY05								FY06														
	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	
Tune Feedback				1				2				3				4										
Luminometer				1		2																				
Abort Gap Monitor/LDM							1																			
Phase I Collimation Studies				1					2			3		4												
Electron Cloud	1				2						3		4			5,6	7									
IR and Beam-Beam			1					2		3					4											
Phase II Collimators	1							2			3					4										
Hardware Commissioning				1	2						3	4														

## Beam Commissioning

- 1) TI-8 tests begin
- 2) Reduced level of activity in FY05
- 3) Define how LARP BC fits into the LHCOP commissioning plan, at Chamomix '05
- 2006) Participate in LHC Injection Test, 2 weeks in 2006 with beam
- 2007) Several long-term postings to CERN for machine commissioning



# Beam Commissioning FY 2004

US LHC Accelerator Research Program  
Task Sheet

**Task Name:** LHC Beam Commissioning

**Date:** 9 Jan 2004

**Responsible Person(s)** (overall lead, lead at other labs): Steve Peggs

**Budget** (specified for each lab):

**Statement of work for current FY** (include description of year's "deliverable" and, if appropriate one or a few intermediate milestones): Work for this year will primarily center on initial discussions with CERN and LARP collaborators on the involvement of US Accelerator Scientists in the beam commissioning of the LHC. The expected outcome of these discussions is

- a determination of specific tasks that can be carried out by the US contingent,
- possibly convening a mini-workshop on the subject, and
- the identification of tasks, candidate visitors and a schedule of their presence for LHC commissioning.

It is hoped that at least one scientist from the US will participate in TI-8 line beam commissioning now scheduled for September 2004.

**Statement of expected follow-on work in subsequent years** (include "ultimate" goal and time scale for this sub-program, as well as plans for specific work and rough budget need for next 2 years): The aim of this effort is to provide a US presence in beam commissioning of the LHC that provides mutual benefit to both LHC operation and to the US effort in accelerator physics. This work will proceed at an increasing level until peaking during LHC commissioning which is expected to begin in 2007.



# Beam Commissioning FY 2004

- Determination of presence for commissioning
  - Chamonix 2004 (Peggs)
  - Follow-on discussions (Harms, Syphers)
  - T18 commissioning this fall (Syphers)
- 0.3 FTE



# Beam Commissioning FY2005

US LHC Accelerator Research Program  
Task Sheet

**Task Name:** Beam Commissioning

**Date:** 4 June 2004

**Responsible Person(s)** (overall lead, lead at other labs): E. Harms, A. Drees, M. Furman

**Budget** (specified for each lab): \$20K

**Statement of work for current FY** (include description of year's "deliverable" and, if appropriate one or a few intermediate milestones):

Work for this year will be two-fold:

- begin a U.S. presence during LHC-related commissioning activities, specifically for TI-8 line commissioning and collimation tests in early FY2005
- continuing discussions with CERN and LARP collaborators on the involvement of U.S. Accelerator Scientists in the beam commissioning of the LHC.

The expected outcome of these discussions is a determination of specific tasks that can be carried out by the US contingent and the identification of tasks, candidate visitors and a schedule of their presence for LHC commissioning. Areas of interest by the U.S. include beam physics, collimation, and electron cloud issues.

FY05 0.1 FTE (FNAL)

**Statement of expected follow-on work in subsequent years** (include "ultimate" goal and time scale for this sub-program, as well as plans for specific work and rough budget need for next 2 years):

The aim of this effort is to provide a US presence in beam commissioning of the LHC that provides mutual benefit to both LHC operation and to the US effort in accelerator physics. This work will proceed at an increasing level until peaking during LHC commissioning which is expected to begin in 2007. During commissioning, the stated goal is to have one U.S. physicist present on every LHC commissioning shift.

FY06 0.3 FTE (FNAL), 0.3 FTE (BNL)



# Beam Commissioning FY2005

- Scaled back activity reflecting beam operation at CERN
- Refine scope of involvement at Chamonix 2005
- 0.1 FTE



# Beam Commissioning FY 2006 and beyond

- Sector Testing
- Injection testing
- Ramp up to full commissioning
- Resources
  - 0.6 FTE in 2006
  - 5-6 FTE in 2007 and beyond



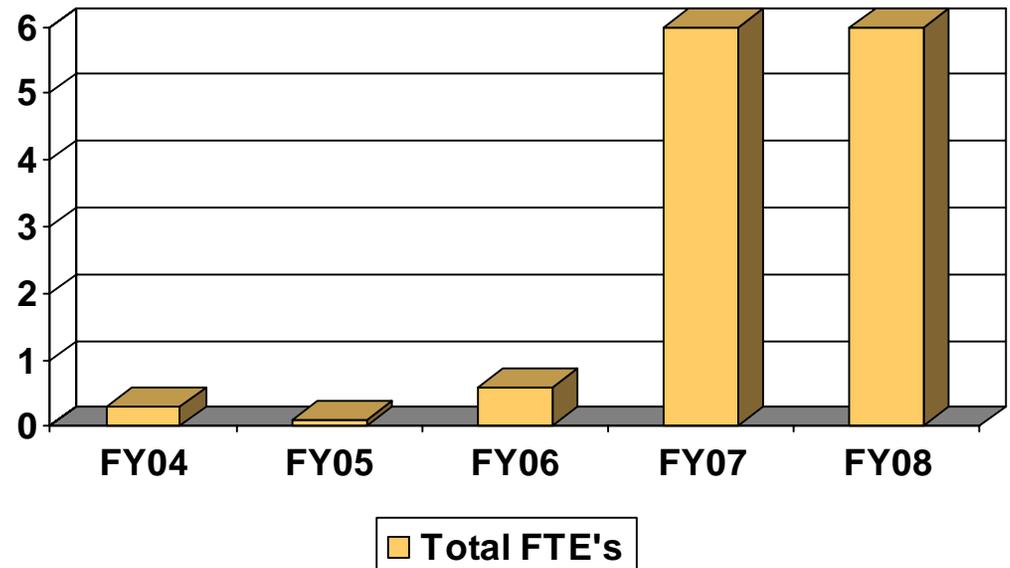
# Beam Commissioning Summary

## Beam Commissioning Budget

Fiscal Year	FY04	FY05	FY06
FNAL	0.2	0.1	0.3
BNL	0.1	0	0.3
LBNL*	0	0	0
<b>Totals</b>	<b>0.3</b>	<b>0.1</b>	<b>0.6</b>

\*LBNL involvement with e- cloud is beyond the scope of beam commissioning

## Projected LARP Participation in Beam Commissioning





# Beam Commissioning Summary

- Currently the LARP involvement is small as the scope of possible activities becomes clearer
  - Discussions in progress
  - Presence for T18 commissioning this fall
  - Chamonix 2005: determination of involvement
- With the CERN accelerator complex off in 2005, very little activity foreseen
- U.S. presence will grow in 2006 and beyond as commissioning draws near and begins
- Actively recruiting interested U.S. scientists must begin shortly