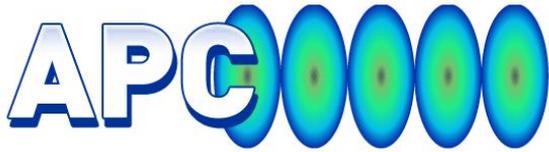


LARP

Tanaji Sen



LARP - Overview

- US LARP: BNL, FNAL, LBL, SLAC collaboration

Goals: 1) Make more LHC luminosity earlier
2) Use, develop & preserve unique US resources & capabilities in accelerator science & technology,

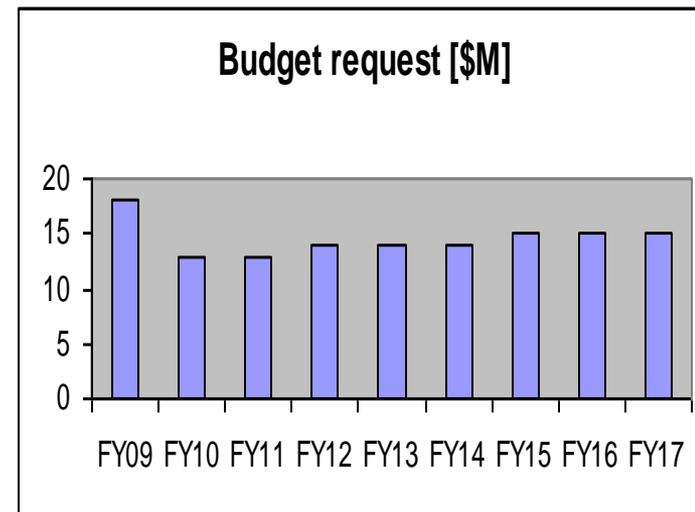
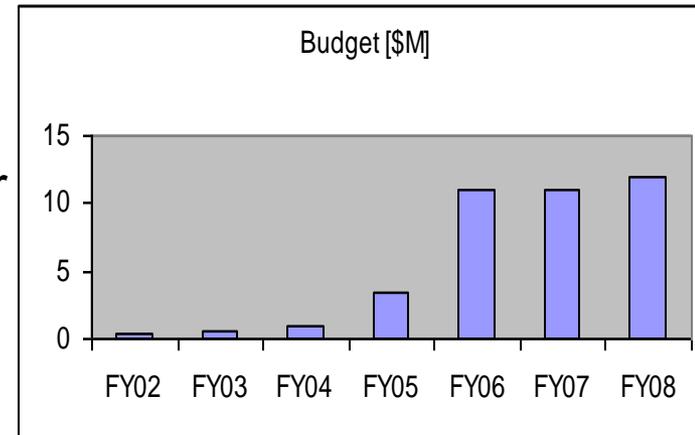
- Accelerator Systems (AD & APC), Magnets (TD)

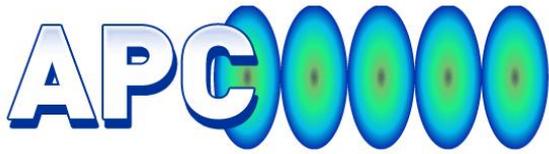
Within APC and AD

- Scientists: 12
- Engineers and designers: 8
- Guest scientists and post-docs: 4
- Graduate student: 1
- Hardware commissioners at CERN: 2

- Related activities funded by FNAL: LAFS, LHC@FNAL

All Labs

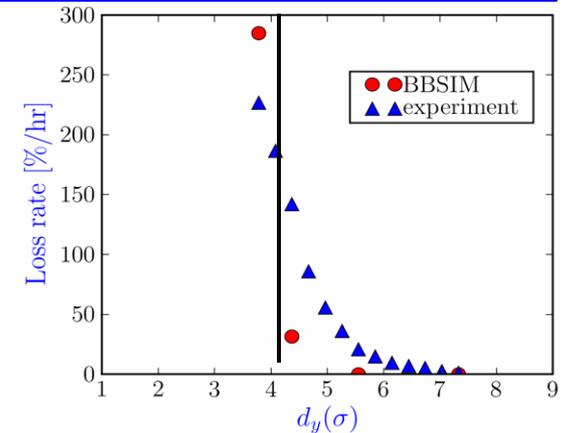




LARP: Accelerator Physics, Instrumentation

Accelerator Physics

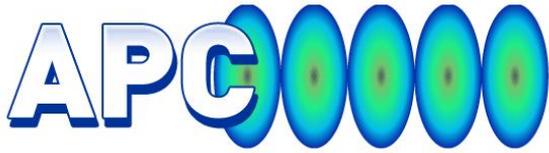
- Beam-beam simulations and wire compensation [T.Sen]
FY08: simulations vs experiments in RHIC, benefits to LHC luminosity. Good agreement with single beam.
- Electron Lens compensation [V.Shiltsev] – new in LARP
FY08: Gaussian e-gun for head-on beam-beam compensation, application to RHIC.
- Crystal Collimation [N.Mokhov] - new
FY08: Install crystal, measure volume reflection and collimation efficiency



Instrumentation

- Schottky Monitor [A. Jansson]
FY08: Deliver controls interface to CERN. Monitors installed in LHC.
- AC Dipole [S. Kopp]
FY08: Linear and nonlinear Tevatron optics measurements. Measured beta* at B0 and D0.
- Chromaticity tracker and feedback [C.Y.Tan]
FY08: Collaborate with SPS & RHIC measurements





LARP: JIRS, Commissioning, LAFS

Joint IR Studies (with TD) - new

- Optics Layouts [J. Johnstone]
FY08: Optics layout with Nb₃Sn magnets in the inner triplet for the Phase I and Phase II upgrades, crab cavity insertion
- Operational Margins [N. Mokhov]
FY08: Energy deposition studies with Nb₃Sn magnets

Beam Commissioning [E. Harms]

FY08: 1 LTV and several instrument commissioners to participate. Dedicated LHC commissioning starts in November 2008 – for now

Hardware Commissioning [M. Lamm]

FY08: Power Supplies & Cryogenic systems.

LAFS [D. McGinnis]

FY08: Software applications for the Wire scanner, Synchrotron Radiation Monitor developed, applications for other instruments proposed

LHC@FNAL [E. Gottschalk]

FY08: Remote participation in SPS chromaticity measurements. Network security fears at CERN: remote commissioning uncertain



LARP: New tasks & LAUC

Future LARP activities at FNAL – to be proposed

- Injector Studies
 - space charge studies for new LHC injectors
- Optical Diffraction Radiation Diagnostics
 - non-invasive technique for beam profile measurements
- Crab cavity beam dynamics
 - impact of crab cavity and beam-beam interactions
- Other ideas welcome!

New Construction project proposed LAUC

- Phase 1 ($\sim 2 \times 10^{34}$ Luminosity)

Collimators, Superconducting Magnets, SPS Electron Cloud Feedback

- Phase 2 (10^{35} luminosity)

Electron lenses, Crab cavities, SPL RF modules

\$M	2010	2011	2012	2013	2014	2015	2016	2017
Phase 1	15	20	10	5				
Phase 2			10	15	20	20	15	10