

DRAFT

US LHC Accelerator Research Program
FY2005 Task Sheet

M. Furman, LBNL

Task Name: Accelerator Physics / Electron-Cloud Effects

Date: June 29, 2004

Responsible Person(s) Miguel Furman (LBNL)

Budget (specified for each lab): LBNL \$55k
BNL \$55k
Total \$110k

FY05 Milestones

- 1) Jun 04. Participate in SPS EC experiments and studies
- 2) Sep 04. Go/no go agreement (CERN/LARP/RHIC) to install cold EC detector in RHIC
- 3) Apr 05. Report on simulated reproduction of measured spectrum & spatial distribution of SPS ECs
- 4) Jun 05. Report first cut at defining optimal LHC conditioning scenario
- 5) Sep 05. Report on applicability of map simulation technique to LHC
- 6) Oct 05. First beam with cold EC detector in RHIC
- 7) Oct 05. Report on simulated EC at IR4 diagnostic bench

Statement of work for FY2005:

During the current SPS run, which started in May 2004, we intend to give high priority to EC simulations, code comparisons and calibration against experimental results before a long shutdown begins in November 2004. In addition, we intend to better understand the ECE in the cold sections of RHIC.

Electron-cloud effect deliverables for FY05

Install CERN electron detector in a RHIC cold magnet (FY04-05) (U. Iriso, A. Drees)

Measure tune shift along batch at RHIC (FY05) (U. Iriso, A. Drees)

Simulate ECE at RHIC, calibrate code(s), understand cold vs. warm differences in EC density and conditioning. U. Iriso to learn POSINST (FY05) (U. Iriso, M. Furman)

Reproduce, by means of simulations, the measured spectrum and spatial distribution of the EC at SPS. Reproduce SPS strip detector and calorimeter results. Understand POSINST-ECLOUD differences (FY04-05) (M. Furman, M. Pivi)

Devise experiment to be compared against upcoming SPS measurements to constrain SEY model, eg., build-up and decay time of EC. Suggestion: measure various EC signals vs. N, sB, batch gap length, etc. (FY04-05) (M. Furman, U. Iriso, M. Pivi)

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First cut at defining optimal LHC conditioning scenario (FY04-05) (M. Furman, U. Iriso, M. Pivi)

Understand global parameter space (eg., EC density vs. a few beam, vacuum and surface parameters) (FY05+) (M. Furman, U. Iriso, M. Pivi)

Understand physics of BNL map simulation technique (FY05) (U. Iriso, M. Furman)

Simulate EC build-up and decay in quads (to be measured at SPS by CERN personnel, by means of a “sweeping” detector) (FY05+) (M. Furman, M. Pivi)

Simulate and predict EC at diagnostic bench that will be installed in IR4 in the LHC (Jose Miguel Jimenez) (FY06+) (M. Furman, M. Pivi)

Think about microwave transmission measurements of EC density (J. Byrd, M. Furman) (?)

Think about BTF measurements (?)

Measure ion desorption rate and composition by ion bombardment (?)

Re-measure SEY at low energy (<20 eV); attempt to reproduce CERN data obtained by Cimino and Collins. Re-measure photoelectric yield and photon reflectivity for actual sawtooth beam screen samples. Do cold and warm measurements. Repeat, if possible, in the presence of a B-field. Attempt to resolve alleged existing discrepancies. (?)

CERN contacts: F. Zimmermann, J. M. Jiménez, G. Arduini, D. Schulte

Effort:

LARP Electron-Cloud Effects Budget			
Institution	FY05 (FTEs)	FY06 (FTEs)	Personnel
LBNL	0.3	1.2	M. Furman + 1 postdoc
BNL	0.3	1.0	U. Iriso, A. Dress + 1 postdoc (?)