US LHC Accelerator Research Program
Task Sheet

Task Name: AC dipole **Date:** May 23, 2006

Responsible Person: Sacha Kopp

Statement of work:
The goal of the project is to arrive at an optimized design for an AC dipole in the LHC, capable of generating driven oscillations of up to 4 sigma amplitude at 7 TeV, and develop techniques for using it to understand the LHC optics. For the hardware, two possible paths are identified:

- a high Q system similar to the one in RHIC, or
- a low Q system similar to the one in the Tevatron.

In the high Q case, frequency tuning range may be an issue, and this could possibly be solved by using a high-power gyrator (as proposed by Schmickler) or other techniques which will be investigated. In the low Q case, it may also be possible to use the LHC pinger magnet design in a similar way as in the Tevatron. The achievable field strength and the magnetic field quality need to be investigated, especially for the low Q case. In both cases, the optimal driving frequency and the required tuning range needs to be determined. The two possible design paths will be studies in detail, and relevant tests will be carried out by modifying or upgrading the RHIC and Tevatron systems, respectively. Once an optimal design is agreed upon, the actual devices to be installed in the LHC will be financed by CERN.

The project also includes studies and simulations of techniques using AC dipoles in the LHC for linear and non-linear optics measurements etc, as well as visits to apply those techniques at the LHC once beam is available (perhaps in the context of the LARP beam physics/commissioning effort).

Milestones and deliverables

November 2006	Detailed requirements document ready for inclusion in CERN EDMS
April 2007	Technology choice (high Q vs. low Q)
September 2007	Conceptual design report with system specs. Includes results from theoretical studies and simulations.
FY08	Detailed design

Budget estimate:
For FY07, the requested M&S budget is $40k for domestic travel and hardware tests, and the effort is estimated to 4 FTE months.

The projected budget for FY08 is $40k M&S, and necessary hardware to perform related tests in RHIC and Tevatron. The manpower effort may be up about 1 FTE year, depending on the level of design work required.

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