



Date :  
16/06/2017

## MEMORANDUM

To : Lucio Rossi (HL-LHC PL), Paul Collier (BE), Roberto Losito (EN)

From : Rhodri Jones (GL of BE-BI), Francesco Bertinelli (GL of EN-MME), Stefano Redaelli (HL-LHC WP5)

**Subject : Clarification of responsibilities within the hollow e-lens project for HL-LHC**

Cc : *Gianluigi Arduini (BE-ABP), Oliver Bruning (HL-LHC), Diego Perini (EN-MME), Adriana Rossi (BE-BI), Gerard Tranquille (BE-BI)*

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The design of a hollow electron lens (HEL) system for halo cleaning in HL-LHC is being studied.

This study has progressed over the last few years starting from the initial physics concept, and aims to reach the necessary level of detail in order to be assessed for eventual inclusion in the HL-LHC baseline.

This memorandum describes the roles of the Project Leader, Equipment Owner and Senior Design Engineer collaborating in work performed so far and in future development.

**Project Leader (HL-LHC WP5 Leader):** Stefano Redaelli (BE-ABP)

Responsible for the overall coordination of the study as part of the HL-LHC collimation system, and in particular for:

- defining the functional requirements and specifications for the HEL in terms of optics and beam dynamics considerations
- justifying the scientific merit of the HEL within the HL-LHC project
- defining and coordinate the simulation and experimental studies aimed at validating the performance of the system and its compatibility with HL-LHC beam dynamics
- promoting and coordinate collaborations for contributions to the HEL study and possible future fabrication
- managing the overall budget.

**Equipment owner:** Adriana Rossi (BE-BI)

Responsible for the technical design and any future long-term operation of the HEL, and in particular for:

- defining the geometry of the electron gun electrodes and perform simulation of the electron beam transport in collaboration with BINP and FNAL

- measuring the characteristics of the electron gun and instrumentation on a dedicated test-stand
- defining and coordinating the design of the required beam instrumentation
- defining and coordinating the supply of the modulator, power supplies and cabling together with concerned groups
- validating the overall technical design with BE-ABP taking into account the functional requirements and specifications imposed by HL-LHC beam dynamics
- preparing the cost estimate for HEL instrumentation, electronics, control and electrical items
- in case of approval of the project, coordinating and supervising acceptance tests and installation.

**Senior Design Engineer:** Diego Perini (EN-MME)

Responsible for the engineering design, and in particular for:

- developing an optimal, integrated concept design satisfying HEL specifications and requirements of concerned groups, specifically:
  - mechanical design of the electron gun including the cathode material
  - mechanical design of the collector
  - main solenoid magnets, bending magnets, quench protection and cryostats
  - vacuum chamber
  - supports, transport, alignment and survey
  - integration of instrumentation within the HEL
  - integration of the HEL within the HL-LHC tunnel, interfaces with cryogenics and other services
  - impact of materials and fabrication issues on design
- defining and coordinating thermo-mechanical engineering simulations
- defining and coordinating the more advanced, detailed mechanical design as necessary
- following-up the development and fabrication of test electron gun electrodes and test guns
- preparing the cost estimate for HEL materials and mechanical aspects
- in case of approval of the project, coordinating and supervising fabrication drawings and the fabrication of the components and assemblies in contributing institutes, CERN and industry.

Francesco Bertinelli (EN-MME Group Leader)

Rhodri Jones (BE-BI Group Leader)

Stefano Redaelli (HL-LHC WP5 Leader)