Review of the Kick Off Meeting for the LCU LHC upgrade studies

Introduction & scope

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Introduction

- Since new group structure, upgrade studies are within the mandate of the LCU section.
- Prior to the MARS exercise, work packages were defined (FZ) and assigned (MG).
- Brief overview of the tasks:

Original tasks

- Oliver/Riccardo: Optics studies, dynamic aperture, energy deposition…
- Ulrich (already defined): Beam-beam studies; wire compensation (simulations and experiments).
- Stephane: Optics computation (high-gradient quadrupoles or multipolar hybrid magnets) and performance assessment (chromatic correction, dynamic aperture, beam-beam).
- Werner: Beam-beam studies for new IR layouts.
- Malika: Optics computation and beam-beam studies.
- Rogelio: Optics computations and dynamic aperture studies. Crab cavity for moderate crossing angle. Responsible for the HHH IR web repository.
- Frank: Overall co-ordination of HHH-APD. Beam-beam studies and wire compensation.

New facts

- Route to IR upgrade changed!
- Staged approach:
  - Phase 1: consolidation of present layout, i.e., it should aim at removing limitations (e.g., collimators impedance) and giving more safety margin in view of achieving nominal luminosity.
    - It should be based on available technology -> NbTi magnets (LHC main dipoles cable)
    - It should be implemented fast -> 2011

      Hence, studies should be highly accelerated!
  - Phase 2: ambitious luminosity upgrade, i.e., factor of 10 increase in luminosity, thus requiring also detectors' upgrade.

Consequences - I

- Paper/seminar with the outcome of studies performed in AT prepared/given (LHC Project Report 1000).
- Paper with the outcome of studies performed by Riccardo and Oliver prepared. Three optics analyzed (see presentation by Riccardo on April 2nd 2007):
  - Optics 1: compact, low-gradient.
  - Optics 2: modular, low-gradient.
  - Optics 3: low-beta, low-gradient.

Consequences - II

- A new strategy was decided to meet the deadlines for Stage 1 upgrade, namely:
  - Focus on the three optics.
  - Finalize them (see presentation by Riccardo on April 2nd 2007).
  - Carry out a complete assessment of their performance (DA and beam-beam).
  - Include performance of collimation (efficiency, protection, impedance).
  - Document the results.

Organization - I

- Additional meetings focused on upgrade studies:
  - Wednesday morning (every other week) starting from May 2nd.
  - All LCU members invited.
  - Minutes available from the LCU web site.
  - Summary reported at the general LCU meeting on Mondays.

Organization - II

Task	Phase 1			Phase 2
	Layout 1	Layout 2	Layout 3	
Optics studies	Malika	Rogelio	Riccardo/Oliver	Stephane
DA (single particle)	US-LARP?	Rogelio	Riccardo	
Beam-beam and crossing scheme	Malika/Werner	Malika/Werner	Malika/Werner	
Energy deposition (collision debris)	US-LARP?/Riccardo (linkman)	US-LARP?/Riccardo (linkman)	US-LARP?/Riccardo (linkman)	
New TAS design	US-LARP?	US-LARP?	US-LARP?	
Cold D1 and D2	US-LARP?	US-LARP?	US-LARP?	
Collimation (efficiency, protection, impedance)	R. Assmann & collimation Team	R. Assmann & collimation Team	R. Assmann & collimation Team	R. Assmann & collimation Team
Wire compensation				Ulrich/Frank
Crab cavity				Rogelio/Frank
Impact of beam-beam effects for LHC upgrade scenarios with long, flat bunches and large Piwinski parameter (50 ns scenario)				Werner/Ulrich/Frank

NB: Layout 3 is the most advanced and it can be used for further studies, such as DA, beam-beam and collimation.