HL-LHC Lattice & Optics

WP-2-2:   Optics & Lattice Layout

BJH

HL-LHC Collaborators: Optics & Lattice Layout List

Riccardo de Maria

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Angeles Faus-Golfe   Valencia

Javier Resta

Andy Wolski Cockcroft Inst.

Rob Appleby

Kai Hock

Maxim Korostelev

Olivier Napoli   CEA

Jacques Payet

Barbara Dalena

Catia Milardi INFN

Lenny Rivkin   ... ?

Vladimir Shiltsev   ... ?

and the complete LCU team ... for giving advice and support !!!

GOAL:

End of Spring: have a first layout for different lattices

to **define input for the magnet R & D** colleagues

End of Summer: Fine Tuning of different Layout Options to get a clear picture of

achievable luminosity
input for the tracking friends
be prepared for iteration with magnet R & D

Main Topics of the Optics & Lattice Club

... this is work in PROGRES

Main Topics of the Optics & Lattice Club

Overview about the planned topics

1.) MAD-x optics calculations to establish the 120mm aperture ATS-optics versions: Barbara Dalena, CEA

2.) Studying the flat beam option of 1.) ... work closely related to W.H. & beam-beam: Catia Milardi, INFN

3.) Optics transition Injection / ATS-Lumi of 1.) : Maxim Korostelev, Cockcroft

4.) Redesign the matching section for optics flexibility: Rob Appleby, Cockcroft
   * Shifting the position of the matching quadrupoles
   * Introducing additional quadrupoles
   * Explore alternative phase advance IP / arc-sextupoles

5.) Optimisation of IR2-4-6-8 for ATS optics squeeze: Anton Bogomyagkov, Novosibirsk / Javier Resta & Angeles Faus-Golfe Uni Valencia

6.) Introducing local sextupoles in the triplet region to improve the chromaticity correction: Jaques Payet & Antoine Chance, CEA

7.) Optics solutions for 140mm compatible gradients: Riccardo CERN

8.) Optics compatibility with IR collimations: the Nb3Sn story: Bernhard CERN

xx.) flat beam optics for Standard LHC: machine studies, Maxim Korostelev, Cockcroft

Optics Versions as References and solid starting point:

ap. [9] [mm]	grad [10] [T/m]	lengths [11] [m]	β^* [cm]	N1 [12] [ppb]	N2 [13] [ppb]	t [14] [h]
150	144(83%Sn)	8.2 , 7.0	13.0	1.99E11	1.21E11	6.06
150	96(83%Ti)	10.8 , 9.0	17.0	2.03E11	1.36E11	5.24
140	150(80%Sn)	8.00, 6.8	15.0	2.01E11	1.29E11	5.64
140	100(80%Ti)	10.5, 8.8	19.0	2.05E11	1.42E11	4.89
120	180(83%Sn)	7.1 , 6.1	18.6	2.05E11	1.42E11	4.96
120	120(83%Ti)	9.3, 7.8	24.0	2.11E11	1.58E11	4.14
85	160(78%Ti)	7.7, 6.6	44.0	2.41E11	2.11E11	2.33
80	257(80%Sn)	4.8, 5.5	39.0	2.33E11	1.99E11	2.65

Collaboration with other Tasks

WP-2-3: Tracking & Magnet Quality Specification
-- direct impact & iteration needed ---

WP-2-5: Beam Beam studies

WP-2-6: General Parameter Optimisation

Outside WP-2:

Magnet R & D: Dipole / Quadrupole Design in
Nb3Sn & Nb Ti

Vacuum Specs
including beam screen & thungsten layers

Machine Detector Interference
Background, Lumi, Beam Pipe Layout etc

Organisation of Meetings & Information Flow

to start with:

       regular meetings at CERN: 2 x per month
       interchanging with the LCU meeting (i.e. Tue Morning, 10:00h)
           → *input please*

       Once per month: organise as *EVO meeting* / Telephone conference
           to include status reports from the collaborators

       Strong Hope: longer visits of external collaborators at CERN to
           discuss and (re-) define the party line (LHeC like ?)

       Summaris the basic information on a WEB site