

phase 1: HHH-2008 discussion, Monday

- optics up to $\beta^*=0.25$ m, feasible without moving Q4, Q5?

review: 120 mm, 120 T/m, 0.25 m,... no solution which matches these conditions exactly; close solution with 126 T/m is unstable; large motion of matching quads gives robust solution; $\beta^*\sim 0.35$ m? **optics needed a.s.a.p.; could also reconsider magnet parameters**

-phase -1 beam-beam tune shift? OK

- schedule ; radiation can affect duration

phase 2:

- feasibility of very low β^* ? **0.15 m with Nb3Sn at 1.9 K** (LARP results) ; lower emittance may help?!
- feasibility of low emittance? e-cloud instability & IBS get worse; injection errors, kicker ripple etc more critical; so far not much better than spec.
- feasibility of large intensity? already $1.7e11$ is hard in SPS ; explore $\sim 2.4e11$ level with linac4? **ultimate is LHC RF limit**

phase 2 continued

- should we assume $\#evts/cross < 200$
what are the costs?; leveling desired
- leveling
demonstration or test in the LHC ; feasibility not excluded ; orbit correction in store works at RHIC and Tevatron ; very natural for crab cavities
- extent of luminous region effect of pile up?
- lifetime of magnets?

energy deposition:

- can we state that this is not an issue, i.e. we can always shield?
- phase 1 OK, phase 2 = 4 x phase 1, but Nb₃Sn has a factor 3 radiation tolerance w.r.t. NbTi, - no issue? critical parameters like gradient, crossing angle etc can affect the loss pattern; not a showstopper; cooling capacity sufficient? incomplete modeling of heat deposited in yoke – missing thermodynamics in FLUKA
- magnet lifetime 500 fb⁻¹ – improved by shielding?

HERA upgrade

- importance of alignment and stability
- HERA experience taken into account for LHC phase 1 and 2?

mostly insufficient preparation and design ; effect of CMS stray field?

integration

- D0 possible in ATLAS
- is 13 m good enough in CMS for D0?
- requirements on the vacuum chamber longitudinal extent +/-50 cm ; separation at injection ; operation with different β^*

Linac4, SPL, PS2, SPS upgrade

- brightness, emittance and intensity?
- dependence on bunch spacing

low periodicity of PS2 optics?!

FAIR

- is aperture of 2-3 σ sufficient?
- can one rely on space charge for beam loading compensation & pre-compression?