

# Kick-Off Meeting for LHC Upgrade Studies - General Perspective

Massimo Giovannozzi,  
Frank Zimmermann

# LHC upgrade studies

## optics for new IR

NbTi, Nb<sub>3</sub>Sn, ranking, heat, survival, tracking, ...

## beam-beam effects

parasitic collisions, large Piwinski angle, tracking

## wire, crab, e-lenses

simulations, specifications, experiments

## energy deposition

for different IR solutions, TAS design, absorbers,...

## beam parameter upgrade

50-ns long intense bunches, 25-ns with low  $\beta^*$

## injector upgrade

PS2 optics, performance with PS2, SPS enhancements, e-cloud, impedance

# team in LCU

Oliver Bruning

Riccardo De Maria

Ulrich Dorda

Stephane Fartoukh

Massimo Giovannozzi

Werner Herr

Malika Meddahi

Rogelio Tomas

Frank Zimmermann

+ members from Gianluigi's section

# IR optics

“compact low-gradient” NbTi,  $\beta^*=25$  cm (RDM, OB)

<75 T/m, each magnet optimized

“modular low gradient” NbTi,  $\beta^*=25$  cm (RDM, OB)

<90 T/m, all magnets the same

“low  $\beta_{\max}$  low-gradient” NbTi,  $\beta^*=25$  cm (RDM, OB)

<125 T/m, all magnets same gradient, except Q1

standard Nb<sub>3</sub>Sn upgrade,  $\beta^*=25$  cm (T. Sen, EL)

2 versions with identical layout

early separation with  $\beta^*=8$  cm Nb<sub>3</sub>Sn (JPK)

optimized optics, new types of magnets? (SF)

I\*, beam screens, etc.

1<sup>st</sup> 4(5) optics solutions exist!

NbTi optics important for Phase 1!

# phase 1

initiative by Lyn

report on phase-1 NbTi upgrade by  
summer'07

factor 4 higher luminosity than nominal LHC

how to optimize? which criterion for ranking?

near-term goal:

provide input for Lyn's decision

dynamic aperture

beam-beam performance

heat deposition & radiation issues

# US-LARP

- heat deposition studies and design optimization (shields, absorbers, new TAS) *coordinated by Riccardo in contact wit N. Mokhov*
- other possible input will be discussed by Oliver at April US-LARP meeting