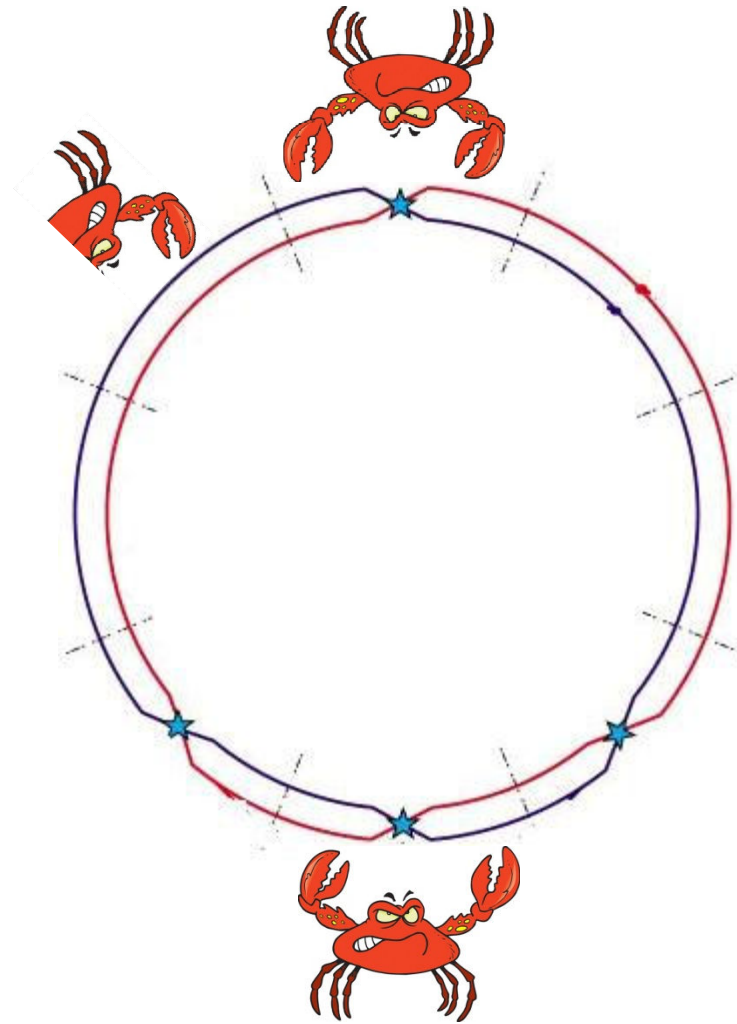


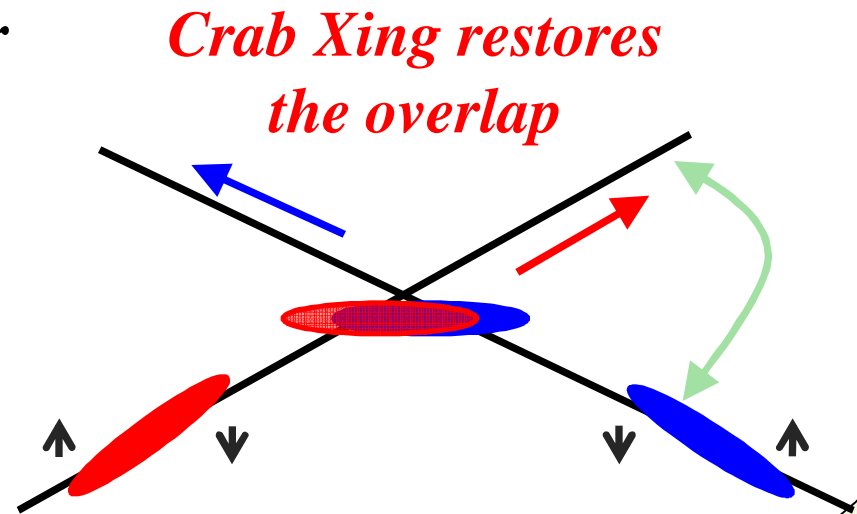
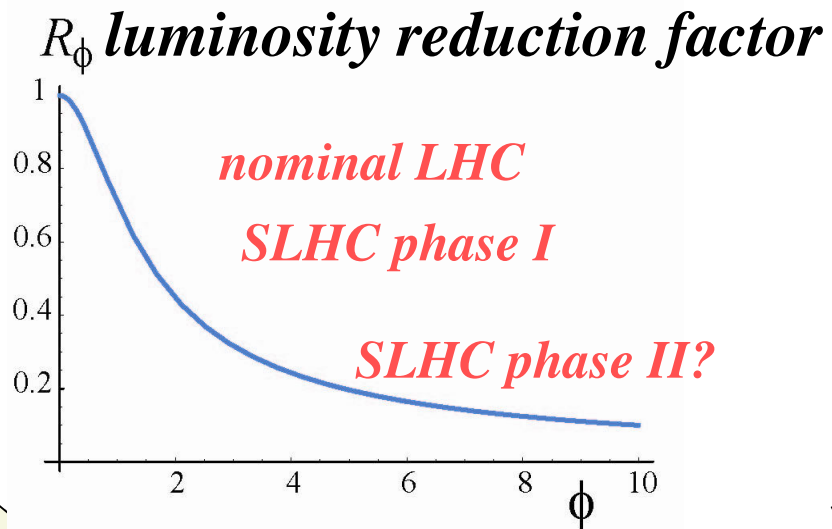
# *Summary of Session I, « Setting the scene »*



# LHC Crab crossing, F. Zimmermann I

## Main points of the talk:

- For the upgrade, **the crossing angle is bound to increase**, whether for increased  $I$ , longer triplet (larger aperture quads) or decreased  $\beta^*$ .
- **Large luminosity loss** due to the resulting imperfect overlap



# LHC Crab crossing, F. Zimmermann II

## Main points of the talk:

- **No beam dynamics show-stopper identified**, but no experimental proof of feasibility at large Piwinski angle.
- Luminosity decay at  $10^{35}$  is **very fast** (2 to 4 hours)
- **Luminosity leveling with the crossing angle** appears operationally simple (local crabbing) and **increases the average luminosity** *if beam current not limited*. Pile-up reduced to more reasonable values (450 to  $\sim\{80\dots150\}$ )
- **Performance estimate :  $4 \cdot 10^{34} \text{ cm}^{-2}\text{s}^{-1}$  flat (or more!)**
- **Phase I recommended:** partial global scheme in SS4 for assessment of feasibility (this would be a 1<sup>st</sup> in p collider)

# LHC Crab crossing, F. Zimmermann

## Discussion:

- The choice of phase I/phase II for the crab crossing is misleading: phase I is a **feasibility test for machine studies only** and these two phases are decoupled from the LHC upgrade phases.
- The other upgrade options **have not been discarded**. Given the challenges, it is likely that they have to be either combined or left open.

# sLHC: view from the experiments, M Nessi I

## Main points of the talk:

- **Major undertaking** requiring 18 months shut-down around 2018,  $\frac{1}{4}$  BCHF/experiment, **must start NOW** to be ready in 2018.
- The timing is such that **all functionalities of the detectors must be preserved** for the upgrade, in spite of larger event number, background (neutrons,...) and doses: very complex.
- Detector **granularity depends on expected pile-up**

## sLHC: view from the experiments, M Nessi II

### Main points of the talk:

- To progress, **assessment of feasibility of sLHC** and chosen scenario(s) (pile-up and radiation environment) needed, *with significant increase in integrated luminosity.*
- **Luminosity leveling very important**
- LOI for Phase II in work and planned for **mid 2010**
- *A full crab cavity solution will be a very elegant solution ... we will support it.*

## sLHC: view from the experiments, M Nessi

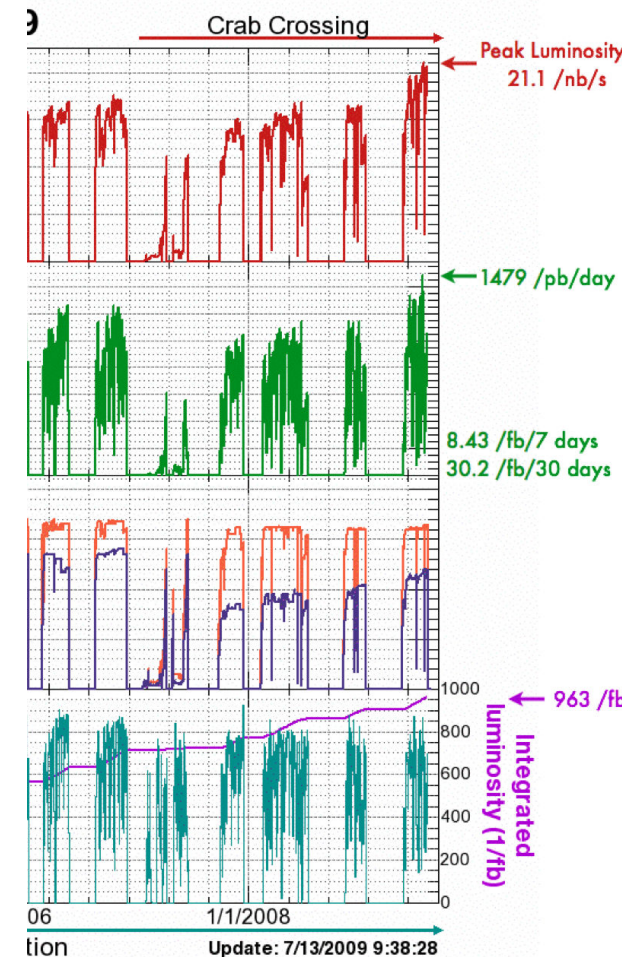
### Discussion:

- sLHC is presented as a block, involving several new machines, with possibilities of slippage in approval, planning and nominal performance. The scheduling and justification of the detector upgrade would benefit from some « **decoupling** ».
- Given the presented complexity and ambition of the detector upgrade, a **forum joining detector and accelerator people** useful.

# KEKB crab operation, Y Funakoshi I

## Main points of the talk:

- 22 mrad Xing angle, **without serious effect on synchro-b resonances**
- **Global CC scheme.**
- **Chromatic coupling**, specific to the CC optics (but not to the cavities) reduced performance until identified and corrected with skew sext.
- $\Delta Q_{bb}=0.056$  (no CC), predicted at .15 with CC, now 0.09 (?)





# KEKB crab operation, Y Funakoshi I

## Main points of the talk:

- **13 years R&D** on CC
- CC's working **much more stably than anticipated**
- Still, an average of **one trip per day for HER but 0 for LER**, (from up to 25).
- **Phase errors much less than required**
- *Puzzling coherent oscillation with bb damped by RF phase shift*
- **Last opportunity for MD's with CC's this autumn.**

# KEKB crab operation, Y Funakoshi I

## Discussion:

- *Brilliant success requiring time.*
- *The much improved trip rate of HER would still be problematic for sLHC*

# LHC-CC validity requirements & tests, O. Bruening I

## Main points of the talk:

- **Crab Xing interesting for sLHC Phase 1 and 2.**
- **compatible with ultimate beam parameters**
- **Planning issue:** proof of feasibility needed for 2010 (!) or 2014 (shutdown planning), *but late*.
- MD time in LHC will be under heavy pressure: whatever can be done elsewhere should be done and the **experimental program defined very well** in all its dimensions.
- No risk can be taken with the LHC physics program: **transparent CC scheme when not used.**

# LHC-CC validity requirements & tests, O. Bruening II

## Main points of the talk:

- **CC's must be compatible with MP and collimation when used.**
- **CC's must not limit other upgrade options (200 MHz capture cavities or dampers)**
- Test program **must be able to provide clear conclusions** on feasibility, benefits and absence of adverse effects for LOCAL final system.

# LHC-CC validity requirements & tests, O. Bruening

## Discussion/comments:

- a small anticipated increase of the luminosity by the global test scheme may not be a show stopper: the bb TF is indeed much more sensitive than L counters.

## *Conclusions of session I*

- The crab cavity option has a high potential in terms of performance and L levelling.
- KEKB implementation demonstrates the feasibility and success for  $e^-$  machines. It points out as well to subtleties requiring time to be sorted out with so far lower performance than simulated.
- ...but all other upgrade options are faced to such challenges.
- The CC study is supported by the experimenters...

## *Conclusions of session I*

- ...who need as well a forum to discuss/decide on sLHC feasibility and options.
- The planning for a feasibility test appears extremely tight in the present sLHC planning.
- Whatever can be done not using LHC should be done but the assessment of feasibility requires the LHC.