

ICE SECTION

Elias Métral

- Could mean **In Case of Emergency...**
- ... **Stands for Impedance and Collective Effects**

- ◆ **The ICE section has 1 year! => Started on July 1st, 2010**
- ◆ **Mandate**
- ◆ **Objectives for 2011**
- ◆ **Organization**
- ◆ **1 LD and 1 IC in 2010**

ICE SECTION: the coolest place to be...



MANDATE

- **The ICE section carries out theoretical, simulation and experimental research in the dynamics of high-intensity and/or high-brightness particle beams**
- **It analyses the collective effects limiting the performance of the PSB, PS, SPS and LHC accelerators, including beam coupling impedance, space charge, beam-beam and electron cloud**
- **The team coordinates the machine studies of the PS and SPS complex, and it also contributes to the study effort for the upgrade of the LHC injectors and to R&D activities for CLIC, Neutrino factory and Beta Beams**

OBJECTIVES FOR 2011 (1/3)

See ICE meeting
held on 16/02/11

- ◆ **LHC support for beam-beam, ecloud and impedance:**
 - **Global goal = $1 \text{ fb}^{-1} + 10^{33} \text{ Hz/cm}^2$**
 - **Identify the beam-beam limit(s) => Very important for the LHC performance + Vital ingredient for the LHC upgrade studies**
 - **Push the LHC performance with the 75 ns and/or 50 ns beams (may be also 25 ns), understanding the different limits set by beam-beam, impedance and ecloud**
- ◆ **ZBASE => Continue to populate the database for PSB-PS-SPS-LHC**
- ◆ **Beta-beams => Continue the foreseen studies within the EUROnu Project, EC FP7, 2008-2012**

OBJECTIVES FOR 2011 (2/3)

- ◆ **Contribute to the 2 new projects: LIU and HL-LHC**
 - **LIU:**
 - Identify the space charge limits in the different machines (PSB, PS and SPS)
 - Determine the smallest transverse emittances which can be achieved with the 75 ns, 50 ns (and 25 ns) beams with nominal and ultimate intensities
 - Determine the highest intensity which can be achieved with the 75 ns, 50 ns (and 25 ns) beams with nominal transverse emittances

OBJECTIVES FOR 2011 (3/3)

■ HL-LHC:

- Definition of the work packages for the section => For the HL Design Study within the FP7 framework (4-year programme) with external partners
- Follow-up of the proposal for Long-Range wire compensation, to be ready to install something in the LHC during the long shutdown

ORGANIZATION (1/11)

=> 6 small working groups (long-term follow-up of activities)

HEADTAIL development

Giovanni Rumolo

IMPEDANCE

Benoit Salvant

BEAM-BEAM

Werner Herr

E-CLOUD

Frank Zimmermann (LCU)

SPACE CHARGE

(interaction with resonances
+ compensation)

Frank Schmidt

BETA-BEAMS

Elena Wildner

ORGANIZATION (2/11)

=> 6 small working groups (long-term follow-up of activities)

CERN > Beams Department > Accelerators and Beam Physics Group > ICE (Impedance and Collective Effects) section

BE Beams Department ICE (Impedance and Collective Effects) section

Home Beam-Beam Beta Beams Electron Cloud HEADTAIL development Impedance Space Charge

View All Site Content

Mandate

Old ICE WEB Pages

Cern Home

Old ICE web pages

BE-ABP Group

Recycle Bin

Content Editor Web Part

MANDATE

Minutes of ICE meetings etc.

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ORGANIZATION (3/11)

=> 6 small working groups (long-term follow-up of activities)

◆ Few remarks:

- **The idea is NOT TO PUT BOUNDARIES around activities but to FOLLOW these long-term activities**
- All the working groups should be opened **to everybody** with a web site and regular minutes
- Meetings organized when needed
- **Space charge => Collaborations in particular with GSI (Giuliano Franchetti), KEK (Etienne Forest and Alexander Molodzhentsev) and LBNL (Ji Qiang)**

◆ ICE meetings => Every Wednesday in 6/2-004:

- Closed (to ICE members) from 08:40 to 09:00
- Open (to the world) from 09:00 till 11:00 (max.)

ORGANIZATION (4/11)

HEADTAIL development

E-CLOUD



We have to discuss the next agendas as there are some overlaps... Kevin could present his nice results in both...



ORGANIZATION (5/11)

IMPEDANCE



The LHC transverse coupled-bunch instability seems to be in good agreement with Nicolas' predictions. We have now to plan all the remaining impedance simulations in particular for heating issues... Carlo and Hugo, can you follow the kickers?



We made recently some impedance measurements together on the PS wire scanner...

ORGANIZATION (6/11)

BEAM-BEAM

- ◆ **Preparing the 2nd MD. The 1st one revealed no Head-On beam-beam limit yet (with a beam-beam tune shift much bigger than the one used in the LHC Design Report and with the transverse damper OFF)**
- ◆ **What about the Long-Range which was foreseen to be the main issue?...**

=> Small transverse emittances preferred...

ORGANIZATION (7/11)

SPACE CHARGE



Dear Alexey, do you use the PTCORBIT code for your space charge simulations at Fermilab?

ORGANIZATION (8/11)

BETA-BEAMS

All this is very interesting for the beta-beams...

OK, I will apply that to the beta-beams...



ORGANIZATION (9/11)



I agree...

Excellent idea!

OK Hannes, I have to go home now with Alexis but let's meet in the CCC at ~ 03:00 to perform some further checks...

As I told you, Q26 is not that bad but Q20 is really much better!



ORGANIZATION (10/11)



ORGANIZATION (11/11)

OTHER POSSIBLE WORKING GROUPS...



1 LD and 1 IC in 2010 (and hopefully more in the future...)



Let's drink some champagne for the LD2IC (13/12/2010)!

And also for the LD of Tatiana (01/10/2010)