

Status of work at CERN

CERN-KEK committee meeting

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Contents

- Status
 - 1. Position
 - 2. Present main work
 - 3. Living in France
- Plans
 - Work plans during my stay
- Summary

Status (1) Position

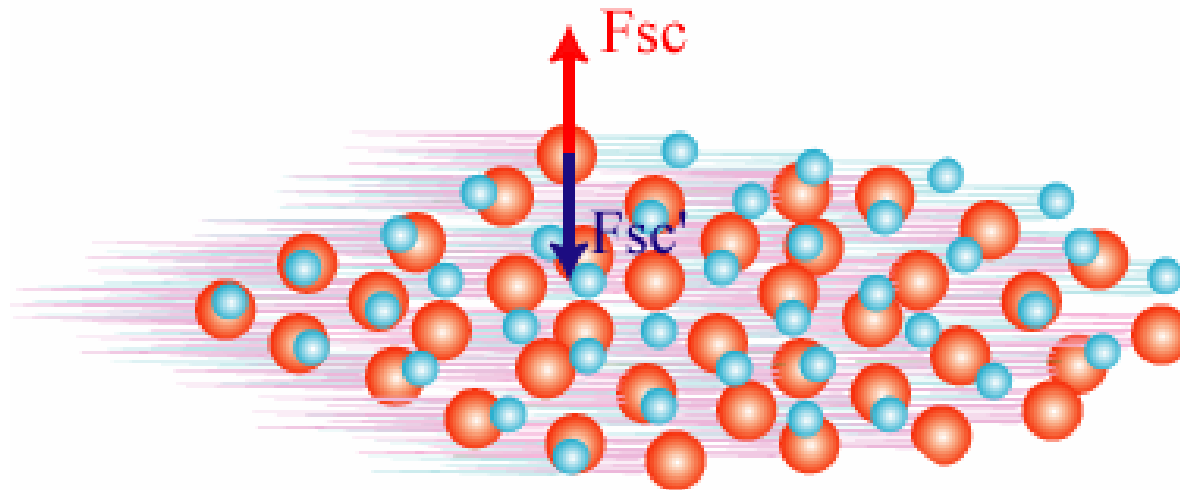
- The 3rd CERN-JAPAN fellow
(the 1st fellow of accelerator researcher)
from October 1st, 2006
- Department/Group:
Accelerators and Beams / Beam Instrumentation
- Supervisor: Dr. Roland Garoby (BI leader)
 - Works for LHC injectors and their upgrade

Status (2) Present main work

- Study of ‘space charge compensation with electron lens’
 - Ref. A.V.Burov et. al., PAC01, P2896 (2001)
 - Private communications in LUMI06(Oct. 2006)
 - Proposed but not realized

Study motivation & basic idea

- Space charge effects are considerable in LHC injectors.
- Space charge force would be compensated by an opposite charged beam, e.g. Proton beam & Electron beam (lens).



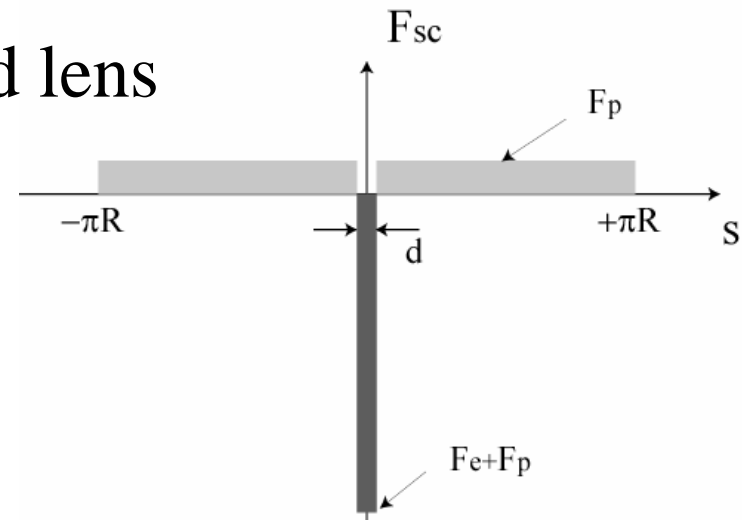
Requirements for lens

- Compensation with localized lens

$$\int_0^{2\pi R} (F_p + F_e) ds = 0$$

$$\rho_e(r) = A\rho_p(r)$$

$$\rightarrow A = \frac{2\pi R}{d} \frac{1 - \beta_p^2}{1 - \beta_e \beta_p}$$



s : independent variable

R : machine radius

A : density ratio

d : lens length

The ratio A and the length d should be realistic.

Lens length for PS2

- Conditions
 - Electron lens (10keV, 2A) $\rightarrow 2.08 \cdot 10^{11}$ e/m
 - Proton peak line density ($B_f=0.33$ assumed)
 - $3.2 \cdot 10^{11}$ p/m ($1.3 \cdot 10^{14}$ p/turn for CNGS)
 - $8.1 \cdot 10^{10}$ p/m ($3.2 \cdot 10^{13}$ p/turn for LHC)

For CNGS

PS2 @3.5GeV

$d/2\pi R \rightarrow \sim 5.8\%$

$d \rightarrow 1200\text{m} \cdot 0.058 = 69\text{m}$

For LHC

PS2 @3.5GeV

$d/2\pi R \rightarrow \sim 1.5\%$

$d \rightarrow 1200\text{m} \cdot 0.015 = 18\text{m}$

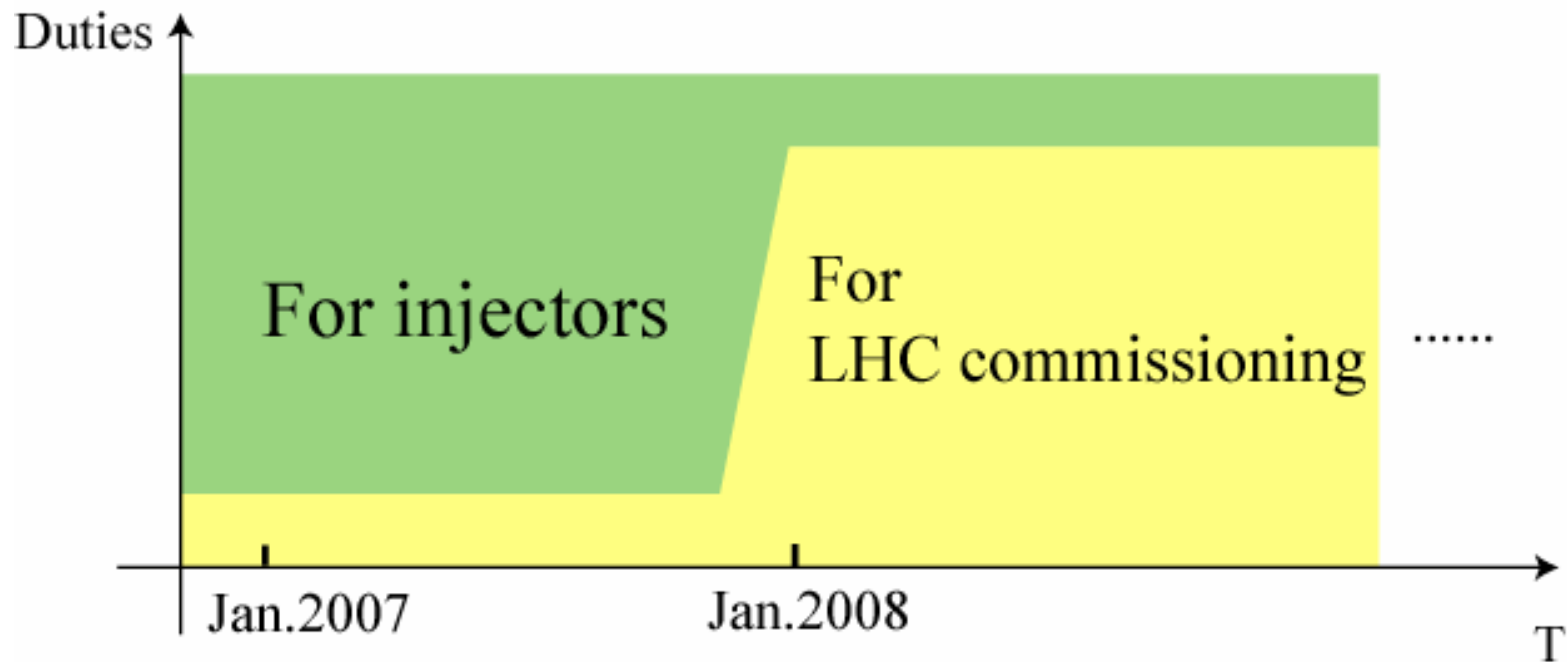
Status (3) Living in France

- Swiss card obtained, French card applied
- Studio apartment in Ferney-Voltaire
- Car for commuting
- Cooking for myself

I have been ready to work.

Work plans

- Not only works for LHC injectors but also works for LHC commissioning



Work for LHC commissioning

- Study of LHC optics correction
 - With Dr. F.Zimmermann (AB/ABP),
Dr. R.Tomas Garcia (AB/ABP)
 - Measure optics and correct them as close to the design values as possible
 - Practical and important to achieve the Luminosity goal

Summary

- Status
 - Attached AB/BI
 - Present main work:
 - study of space charge compensation
 - Life is OK
- Plans
 - Works for LHC injectors and works for LHC commissioning