

# Baseline Layout

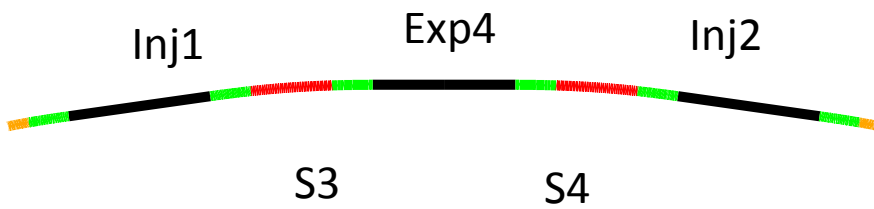
D. Schulte

# The Problem

- Need to define the FCC integration into the Geneva area
- Limitations exist
  - E.g. problems with tunnel under the Jura
  - Connection to the LHC as injector
- Need to provide first layout of the machine now
  - Cannot wait for the lattice design to finish
  - We will iterated later on
- Have to make educated guesses on the layout to decouple the work of the civil engineering and the lattice design

# The Solution

- Michael suggested to explore rings with 3.0, 3.25, 3.5, 3.75 and 4.0 times the LHC circumference
  - Fine
- Define straight lines
  - Four experimental lines
  - Two for injection
  - Two for extraction
  - Two for collimation
  - Everything else (e.g. RF) is integrated in these lines as well
- Define the length of the straight lines
  - 1400m scaling from LHC with  $\sqrt{\text{Energy}}$  for all lines
  - Except for the collimation: 2800m each based on Rogelio's first guess of 3.1km
- Now we can calculate the total length of all arcs
- Need now to define positions of straight lines



## “Round Racetrack” The baseline

Coll1

$$L_{arc} = 0.25 (C - 16.8\text{km} - 4 * L_S - 16 * L_{disp})$$

$$R_{arc} = (C - 16.8\text{km} - 16 * (1 - a) * L_{disp}) / (2\pi)$$

$$L_S = 0.8\text{km}$$

$$R_S = R_{arc}$$

Extr1

$$L_{disp} = 0.4\text{km}$$

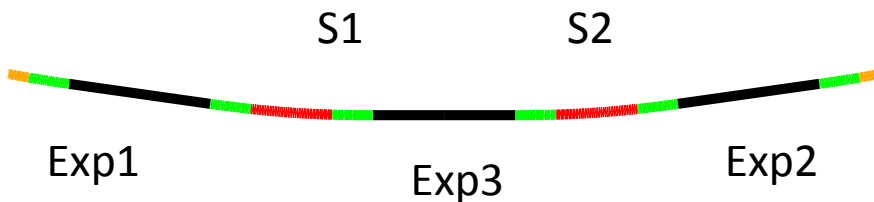
$$R_{disp} = R_{arc} / a$$

$$a = 0.75$$

Coll2

Extr2

Insertion	Length
Exp1	1.4 km
Exp2	1.4 km
Exp3	1.4 km
Exp4	1.4 km
Coll1	2.8 km
Coll2	2.8 km
Inj1	1.4 km
Inj2	1.4 km
Extr1	1.4 km
Extr2	1.4 km



Note:

Dispersion suppressors

Bends between experiments

Spacing between Inj1+2 for LHC



“LHC-type”  
Not the baseline

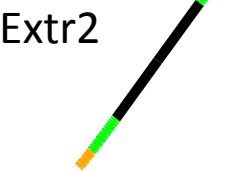
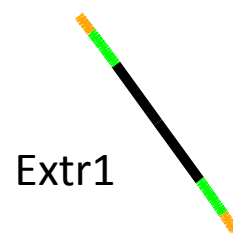
$$L_{\text{arc}} = 0.1 (C - 16.8\text{km} - 4 * L_S - 20 * L_{\text{disp}})$$

$$R_{\text{arc}} = (C - 16.8\text{km} - 20 * (1 - a) * L_{\text{disp}}) / (2\pi)$$

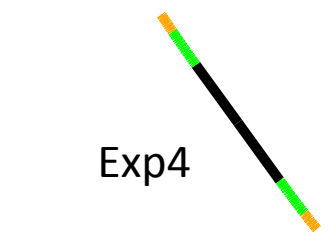
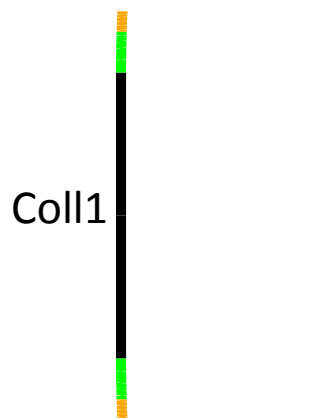
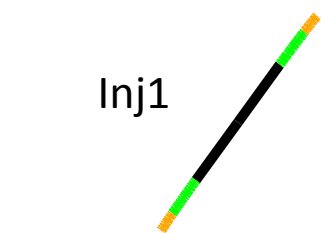
$$L_{\text{disp}} = 0.4\text{km}$$

$$R_{\text{disp}} = R_{\text{arc}} / a$$

$$a = 0.75$$



Insertion	Length
Exp1	1.4 km
Exp2	1.4 km
Exp3	1.4 km
Exp4	1.4 km
Coll1	2.8 km
Coll2	2.8 km
Inj1	1.4 km
Inj2	1.4 km
Extr1	1.4 km
Extr2	1.4 km



# First Discussion Result

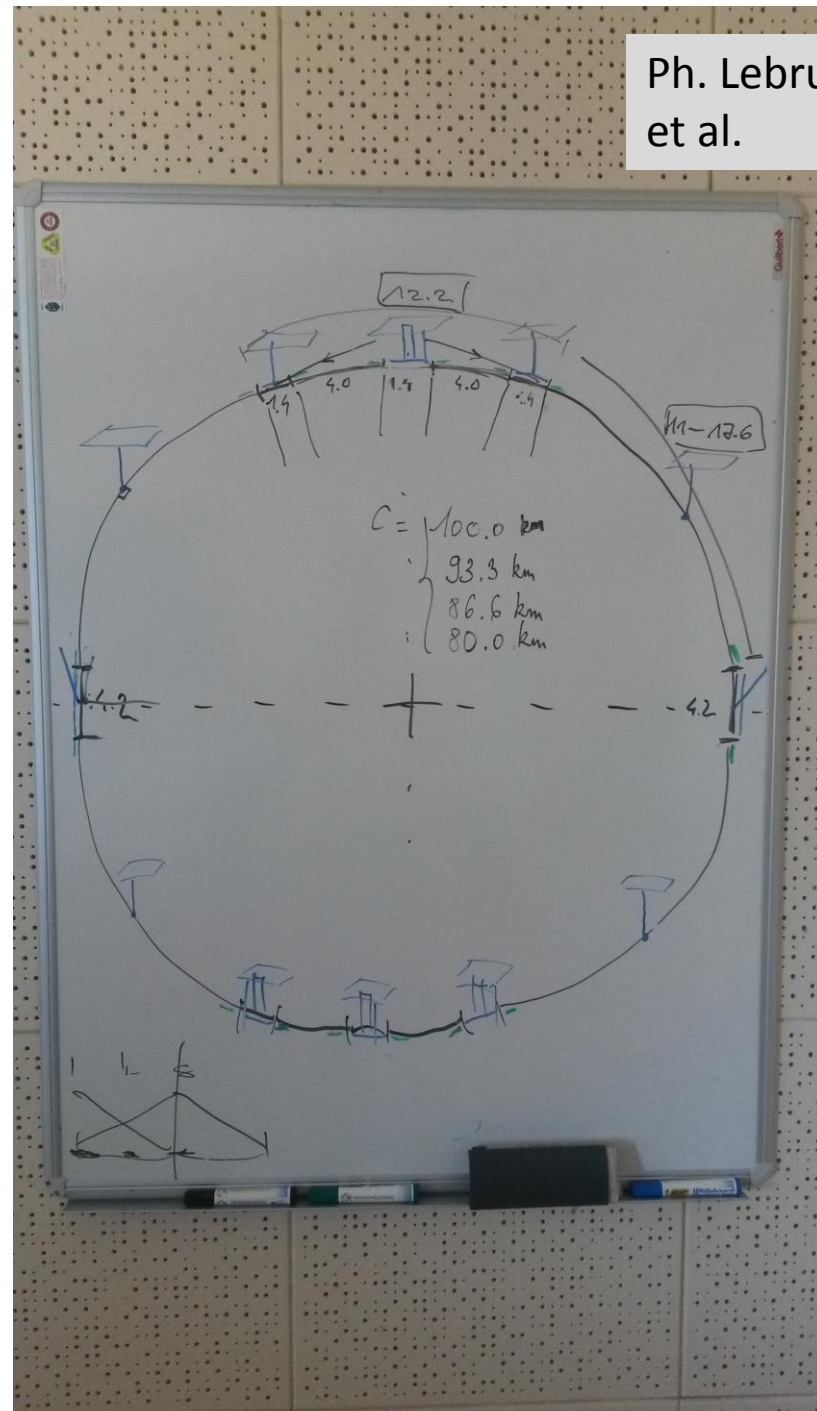
Ph. Lebrun et al.

M. Benedikt, J. Osborn, Ph. Lebrun, J. Wenninger, B. Goddard, D. Schulte

No objection from the FCC-ee design

Can have four RF stations

Injection from LHC might require 10km between the centres of Inj1 and Inj2



# Overall Sketch

Plot by X. Buffat

Straight sections are in red

Dispersion suppressors are in green

Arcs are in black

The short arcs between the experiments are in grey

Shafts are marked with blue lines

C=100km circumference  
example is shown

$$L_{\text{arc}} = 0.25 (C - 16.8\text{km} - 4 * L_S - 16 * L_{\text{disp}})$$

$$R_{\text{arc}} = (C - 16.8\text{km} - 16 * (1-a) * L_{\text{disp}}) / (2\pi)$$

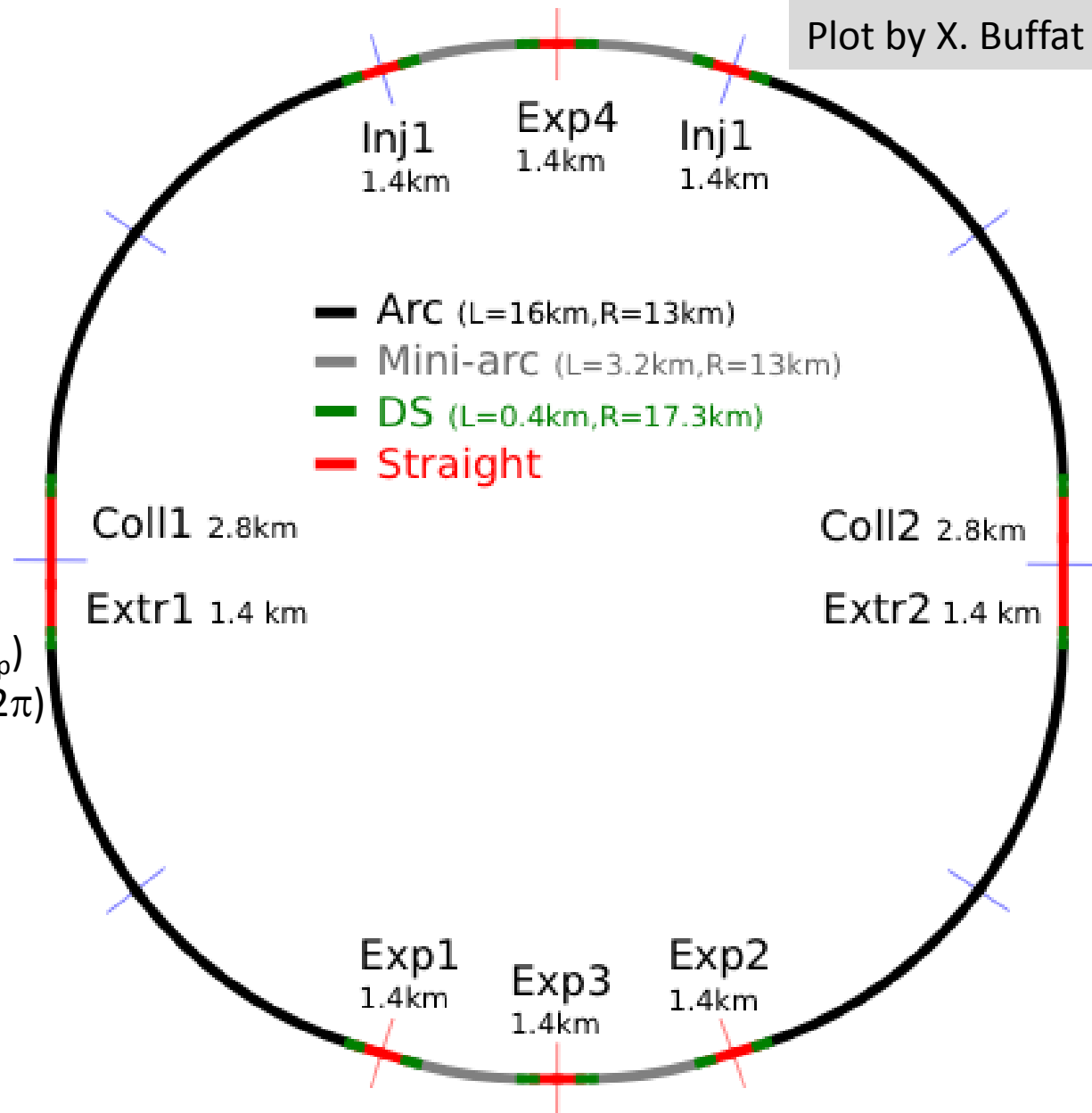
$L_S = 0.8\text{km}$

$R_S = R_{\text{arc}}$

$L_{\text{disp}} = 0.4\text{km}$

$R_{\text{disp}} = R_{\text{arc}} / a$

$a = 0.75$



# Conclusion

- Have a suggestion for the baseline layout
  - Actually with different lengths
- Please confirm that you see no problem with the current proposal
  - We will iterate based on better knowledge in any case