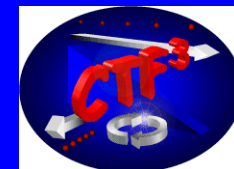


CLIC Test Facility - CTF3

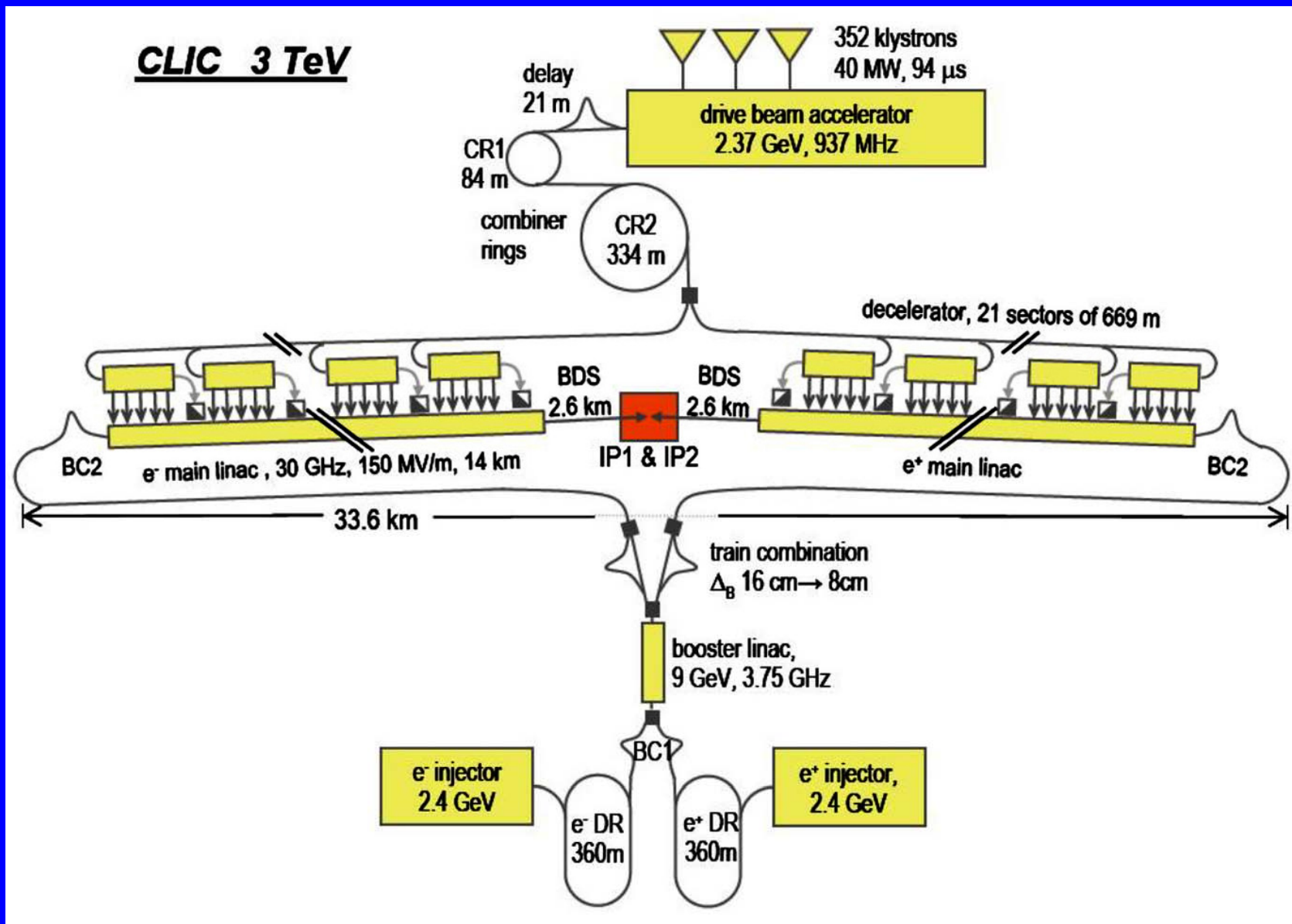
Andrea Ghigo for the CLIC Collaboration



NTA Meeting Roma 22 Marzo 2011

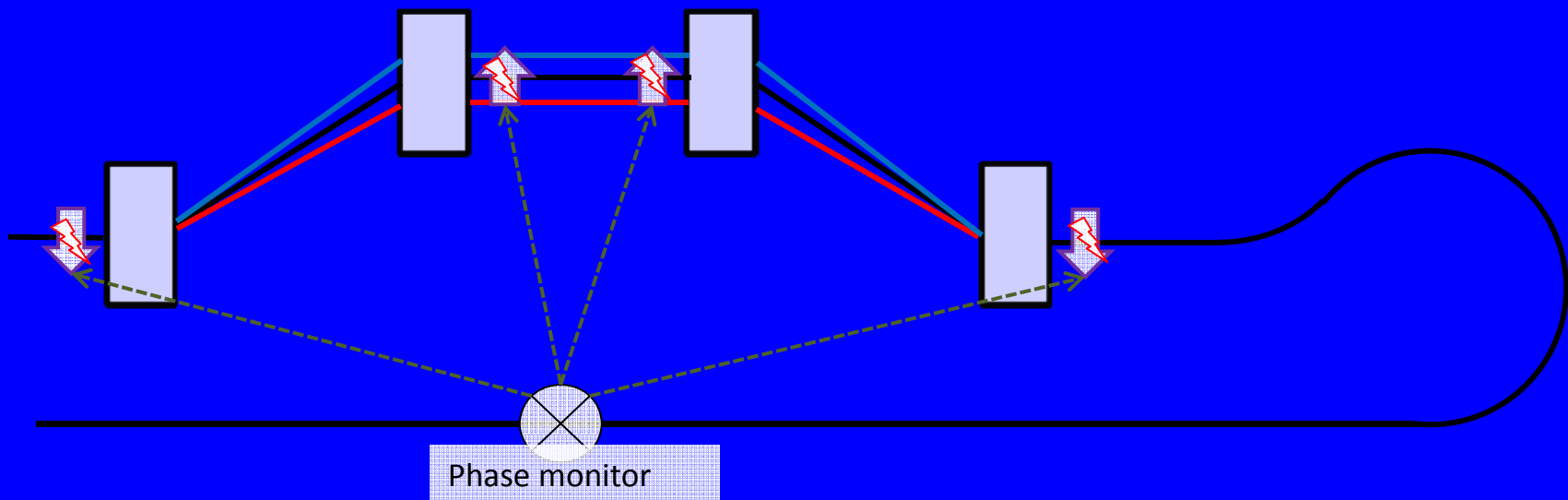


CLIC scheme

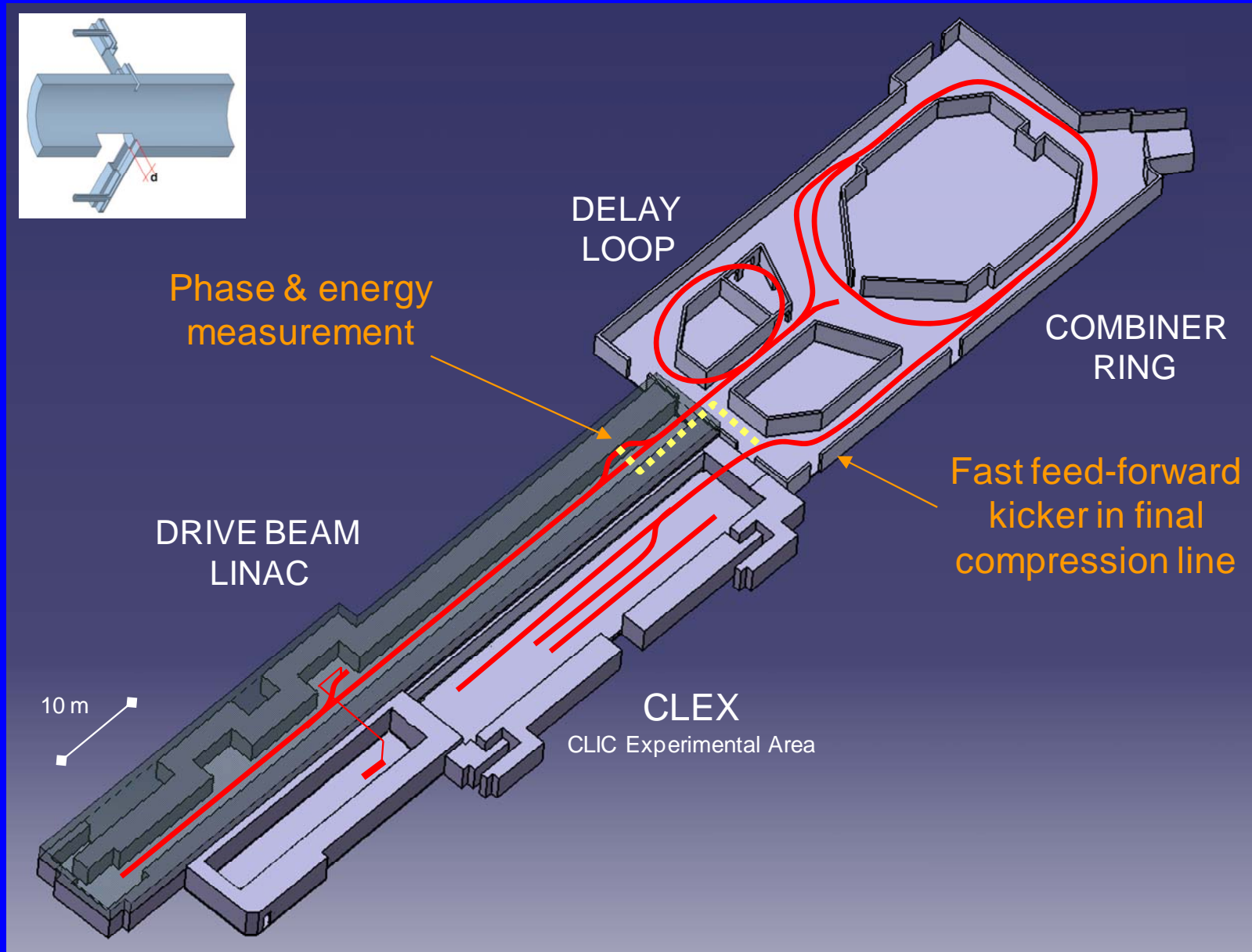


CLIC Phase Feed-Forward System

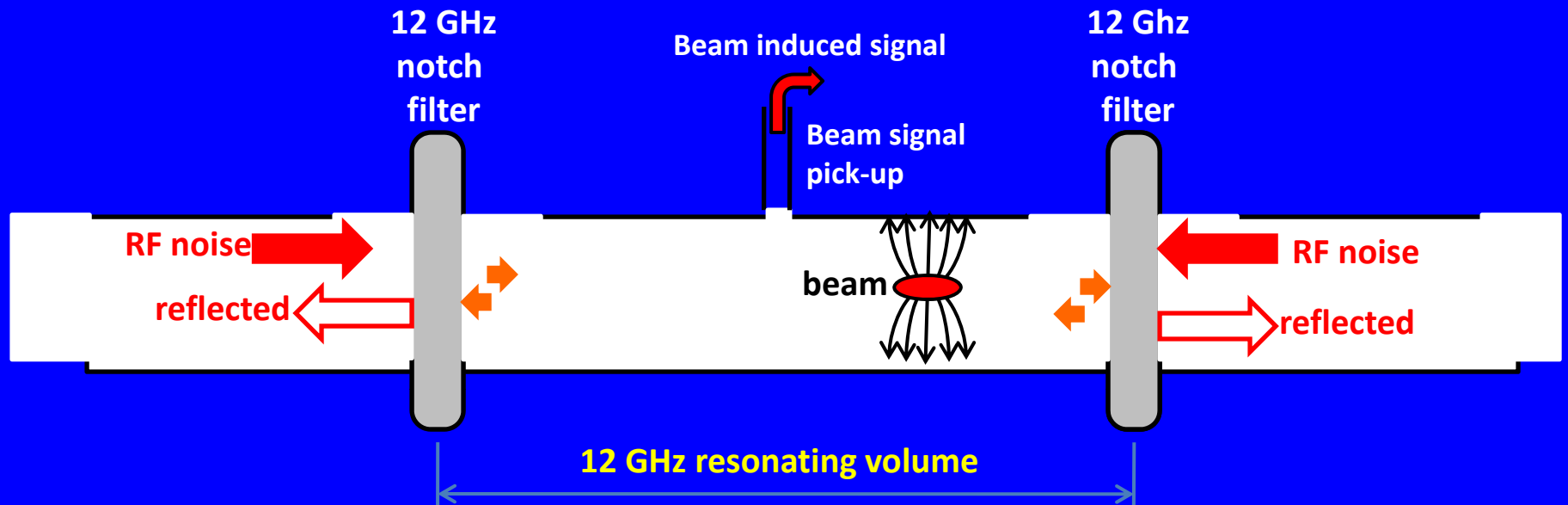
- Phase Feed-Forward system will increase the drive beam stability and correct phase variation along pulse to the required 0.1° at 12GHz
 - Measure phase offset before turn around
 - Correct it after turn around
- The CLIC design based on a 4-bend chicane, each bend equipped with a fast kicker



CTF3 - Phase feed-forward



CTF3 Phase Monitor

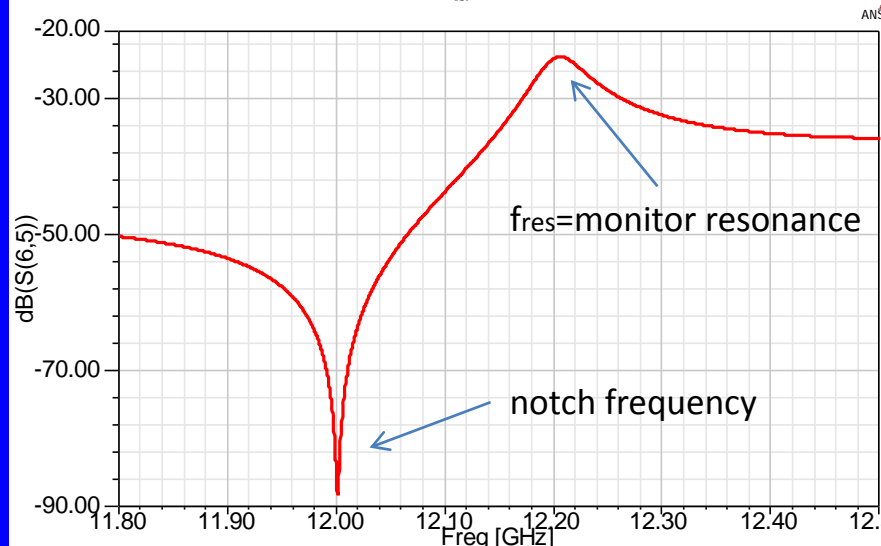


RF noise has to be filtered at both the pick-up sides.

Beam induced field in the volume between the notch filters.

12 GHz component of beam generated field after the first filter could be reflected back by the second filter and detected again.

Unless the distance between the filters is chosen to define a volume resonating at 12 GHz. The pick-up is positioned in correspondence of zero crossing standing wave field.

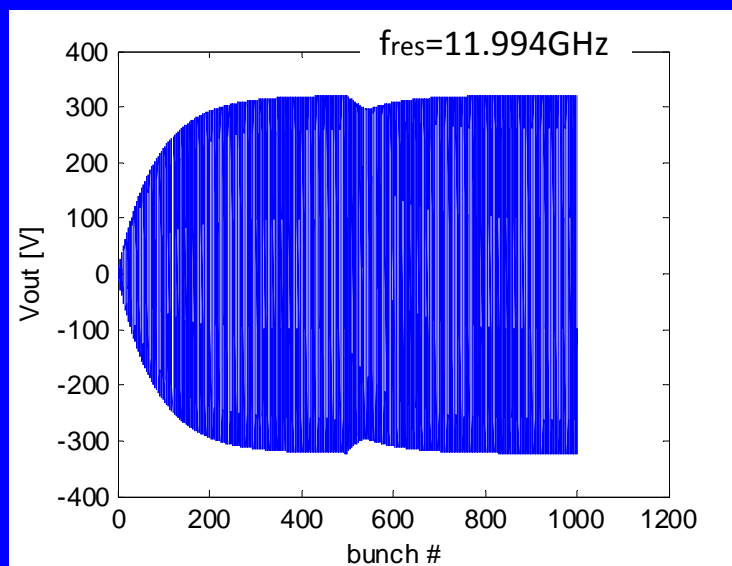


$Q_b = 2.33 \times 10^{-9}$ [C] (bunch charge)

$f_{RF} = 2.99855 \times 4$ [GHz]

Bunch separation: $1/f_{RF}$

$I = 28$ [A]

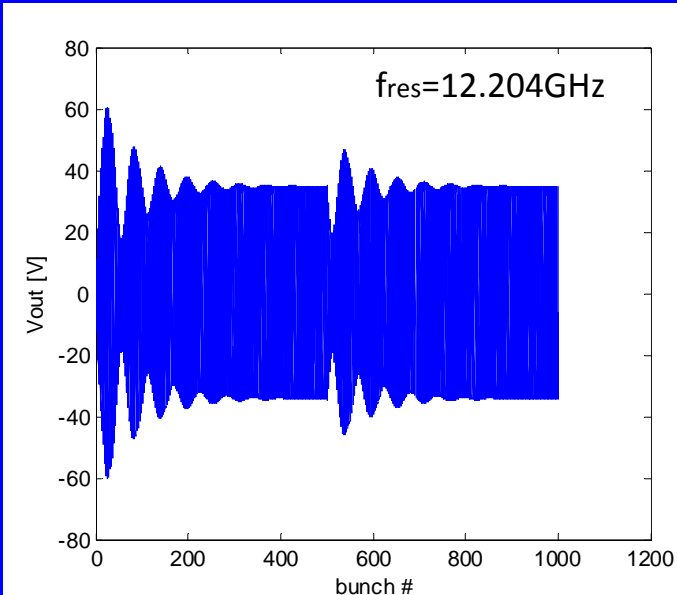
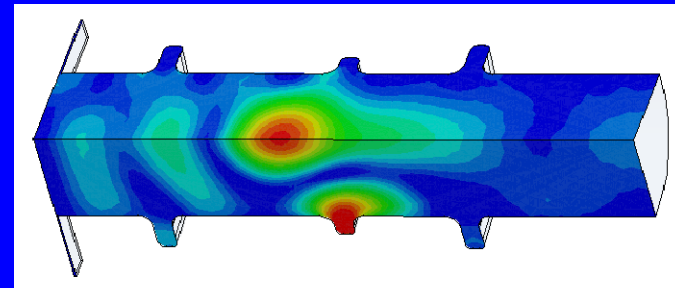


CTF3 Phase Monitor

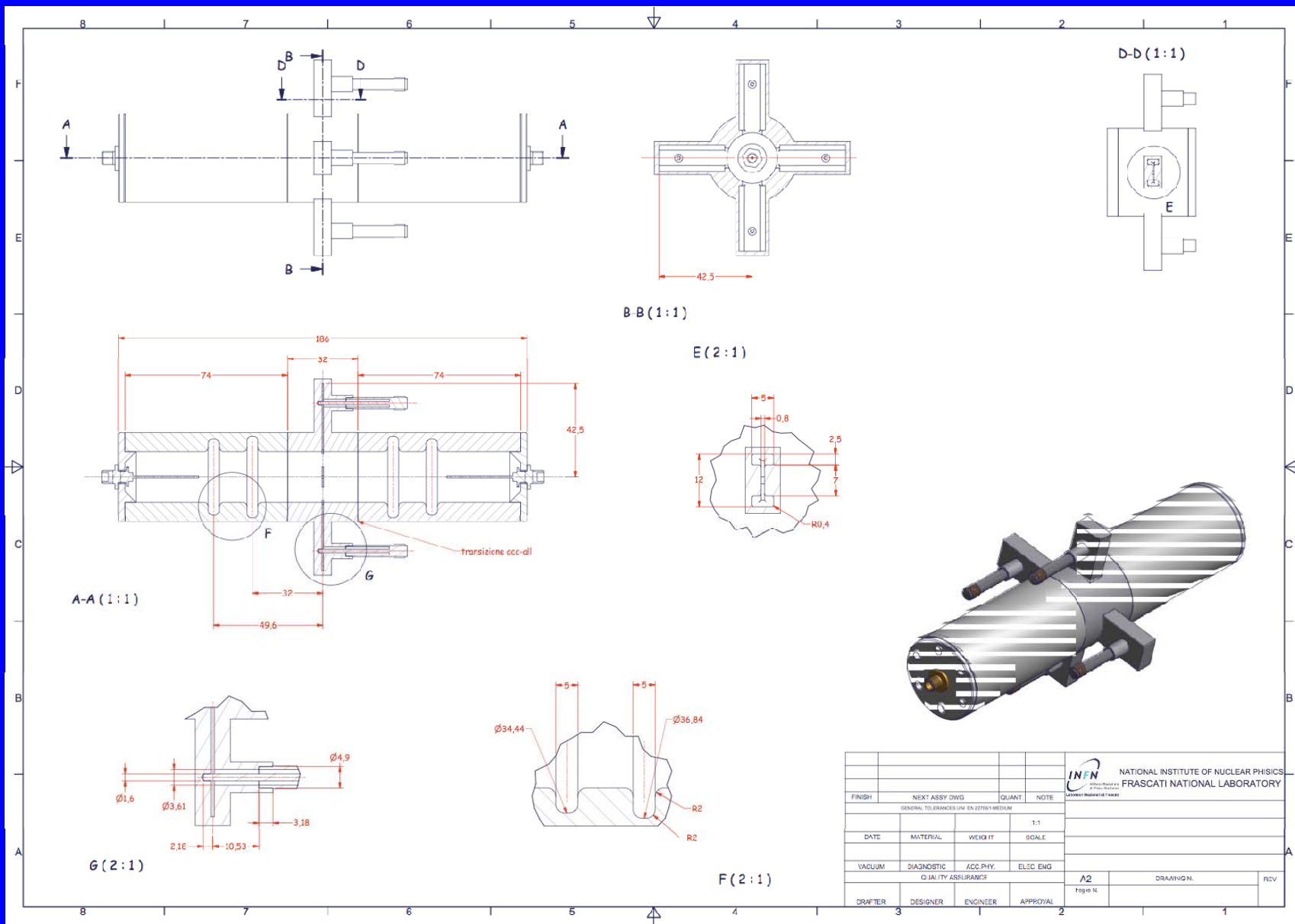
Train length: 1000 bunches.

Oscillation duration (about 300 bunches) depends on the Q of the monitor.

Phase jump ($\pi/6$) occurs after half train length.



12 GHz Phase Monitor



EU funded phase monitor

| Beneficiary short name (all costs in €) | Person-Months | Personnel direct costs | Personnel indirect costs | Sub-contracting cost | Consumable and prototype direct costs | Travel direct costs | Material and travel indirect costs | Total direct costs | Total indirect costs | Total costs (direct + indirect) | EC requested funding ¹ |
|--|---------------|------------------------|--------------------------|----------------------|---------------------------------------|---------------------|------------------------------------|--------------------|----------------------|---------------------------------|-----------------------------------|
| CNRS | 35 | 182.000 | 109.200 | 0 | 66.400 | 10.000 | 45.840 | 258.400 | 155.040 | 413.440 | 124.032 |
| INFN | 28 | 145.600 | 87.360 | 0 | 32.000 | 2.000 | 20.400 | 179.600 | 107.760 | 287.360 | 86.208 |
| Totals: | 63 | 327.600 | 196.560 | 0 | 98.400 | 12.000 | 66.240 | 438.000 | 262.800 | 700.800 | 210.240 |
| FIXED TARGETS | | | | | | | | | | 800.000 | 210.500 |
| CHECKING THE CONDITION | | | | | | | | | | OK | OK |

¹ In principle 30% of total costs

Material cost = consumable + prototype costs (assuming there are no durable equipment submitted to depreciation)

Personnel costs = person-months * monthly direct salary (inclusive contributions to social and other benefits)

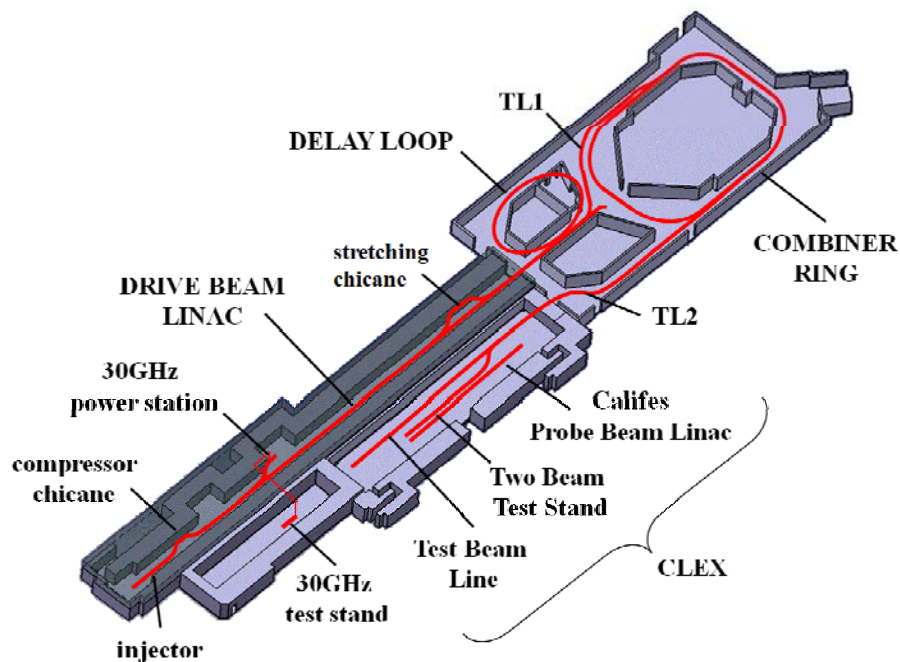
Sub-contracting => note: subcontracted items do not give rise to reimbursement of overheads

Note: for TA and NA full-rate overheads have to be declared according to the 1st table. EC nonetheless re-imburses 7% for these activities.

=> with the EU funding requested in the 2nd Table, it is possible to pay for more person-months than listed

Phase Feed Forward in CTF3

- We want to test the system in CTF3
 - Phase monitor was designed and is being produced in Frascati
 - Frascati will also make the kickers, J.Adams Inst. the pulser
- The most logical place to correct phase is the dog-leg chicane in TL2
 - Phase measurement behind or in the stretching chicane
- Another discussed solution is to correct the phase in Combiner Ring
 - The recombined beam can be stored for few more turns



kicker parameters:

1 mrad maximum kick

Lower would be easier, of course

0.5 m length

Longer would be easier

Of course we need aperture as large possible

At least 4 cm is strongly desirable

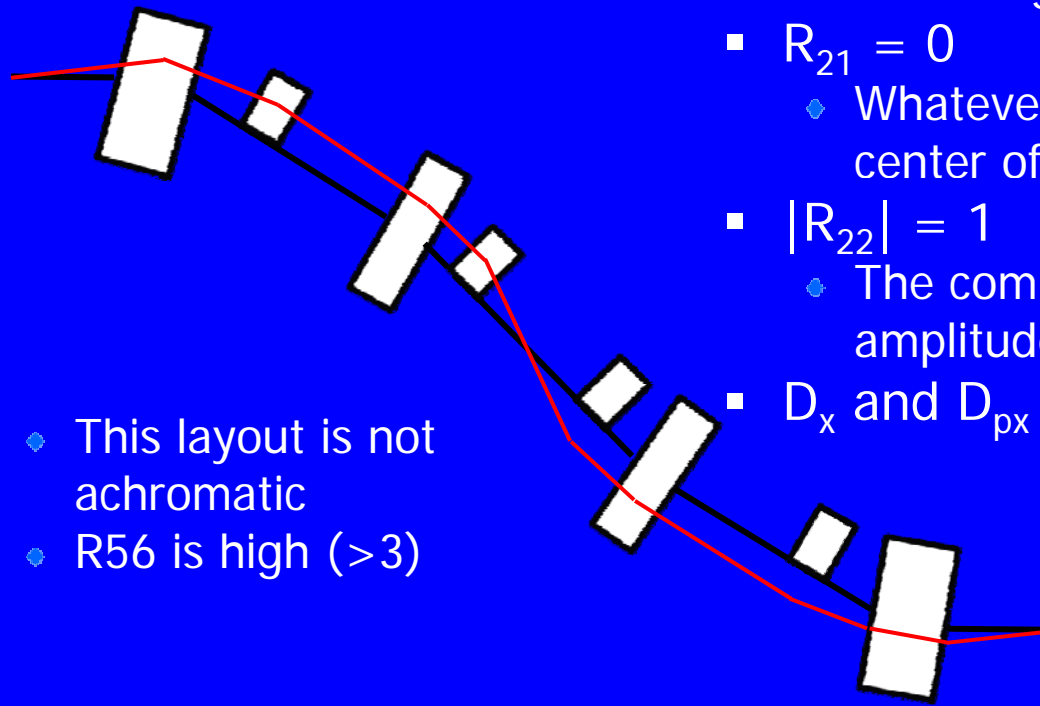
System based on 2 kickers

- investigate possibility of the system based on 2 kickers

Requirements:

- Phase correction range 10deg at 12GHz
- Implies TOF correction range of 0.7ms
- R_{52} of at least 0.7 or bigger (~ 1.0)
 - Assuming kicker with 1 mrad range
- $R_{21} = 0$
 - Whatever the kick, the same position at the center of the 2nd kicker
- $|R_{22}| = 1$
 - The compensating kick of the same amplitude as the first one
- D_x and $D_{px} = 0$

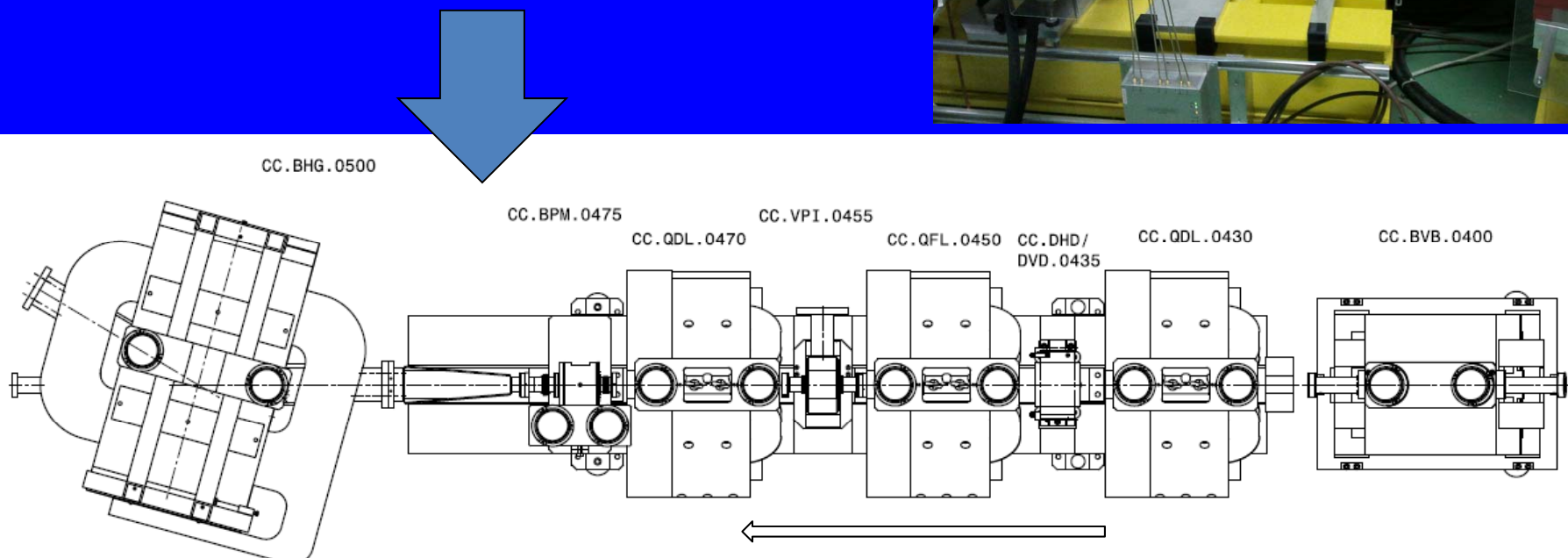
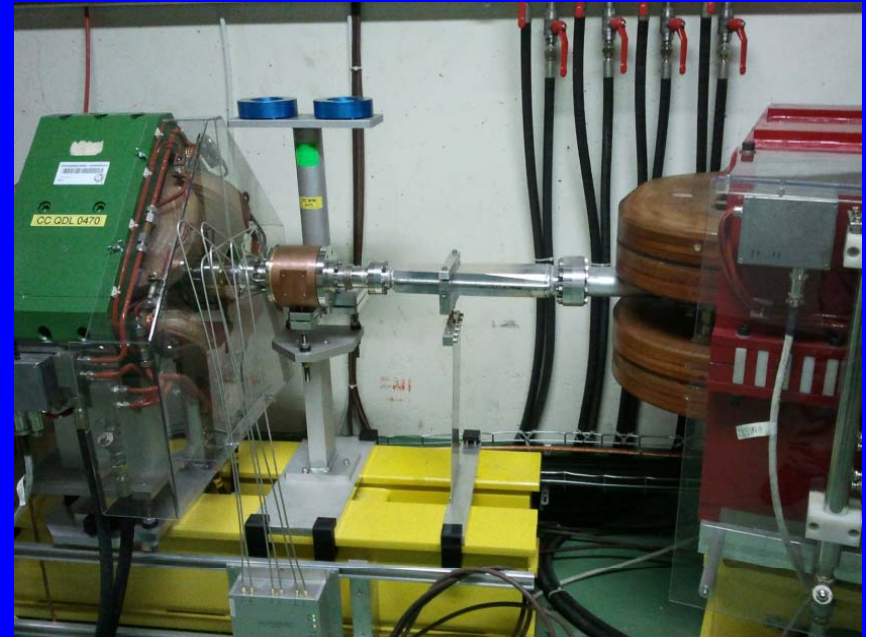
- This layout is not achromatic
- R_{56} is high (>3)



Piotr Skowroński

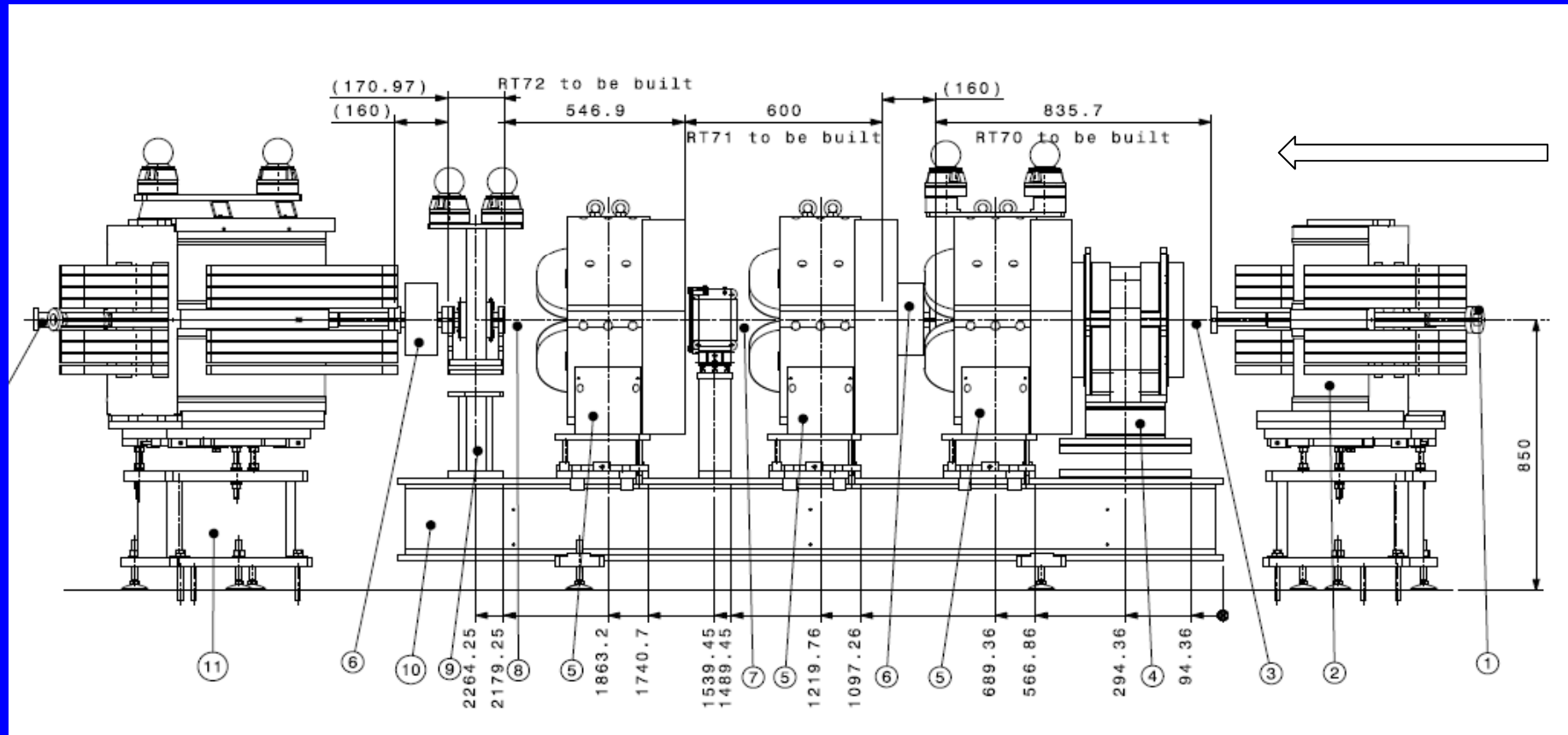
Space for kicker 1

- It is not an issue
 - In the best case only the vacuum chamber inside the bend needs to be reworked
 - Eventually BPM0475 would need to be moved to another location

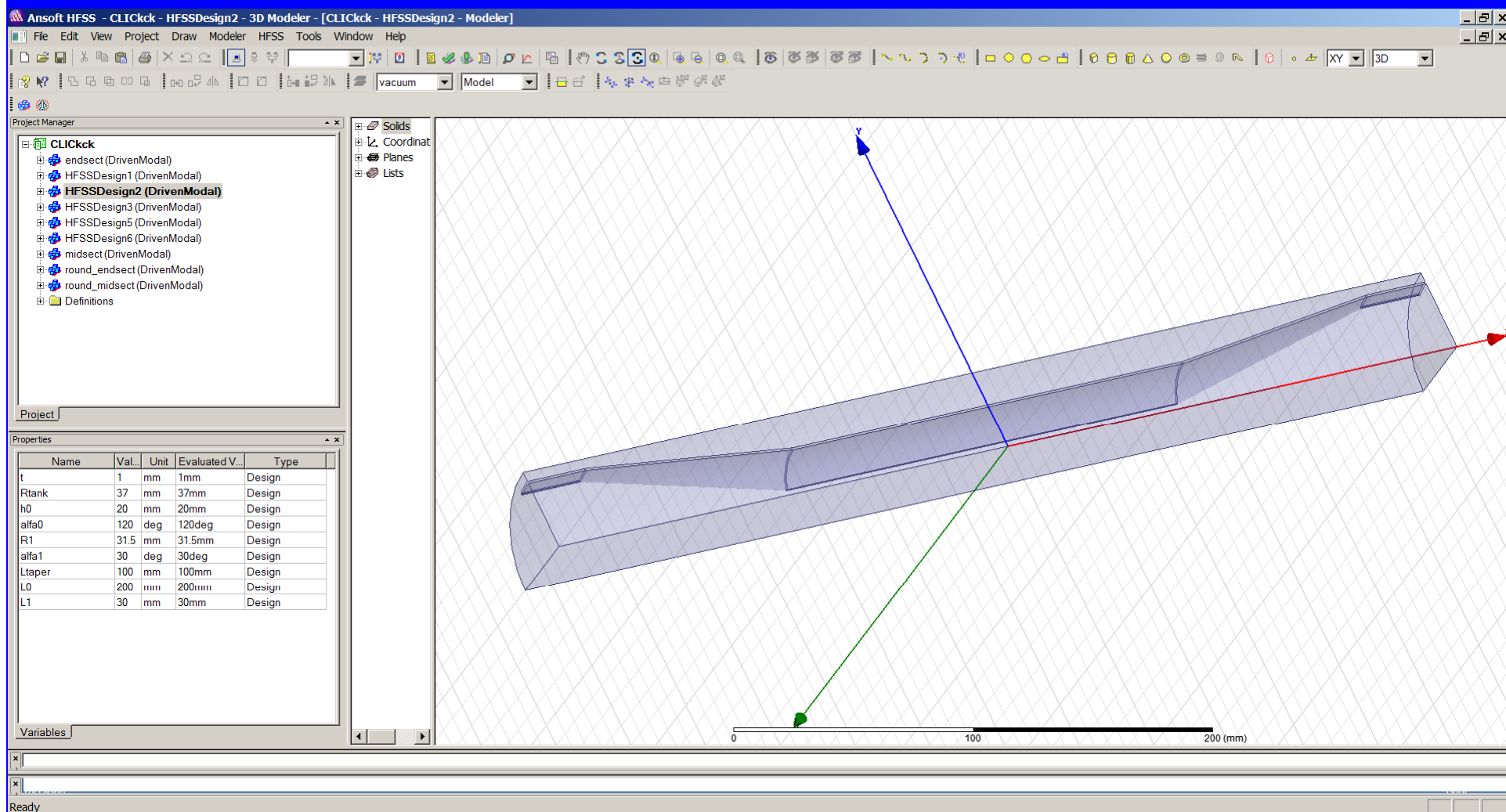


Space for kicker 2

- More detailed study is needed to find 50cm space for the kicker before the last bend
 - Most probably some element reshuffle will be needed
 - Change of quad polarity, or installation of bi-polar power supplies will be needed



HFSS electromagnetic design



F.Marcellini